A Phenomenological Approach to User-Centered Design: Conceptualizing the Technology Design Space to Assist Military Veterans with Community Reintegration

Alice Catherine Haskins Lisle

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Joseph L. Gabbard
Russell T. Jones
Nathan K.C. Lau
G. Don Taylor

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ABSTRACT

The current “best practices” of user-centered design (UCD) may not be optimal with respect to eliciting information from representative users from special populations. This research extended elicitation approaches traditional focus on user needs and context to include criteria describing obstacles users encounter. Military veterans were selected for this research effort as representative users for a use case in technology design that addresses the difficulties associated with community reintegration.

This work provides several contributions to the UCD field. First, *different elicitation methods* were compared by the depth and breadth of design space criteria elicited. *Guidelines* were generated for designer use of phenomenology in practice. *Obstacles were added* as an important facet of design, with corresponding *grammar rules* for construction. Finally, an algorithm was applied as a *method for generating personas*.

Additionally, this dissertation contributes to the field of veteran research. Some example contributions include a set of *design space criteria* for designers to consider when designing for veterans, and two *veteran personas* grounded in data procured from the analysis.

This research effort was conducted in three phases: elicitation, first-cycle analysis, and second-cycle analysis. The elicitation process engaged 40 military veterans to complete an interview session and a design session. These sessions explored the lived experience of veterans as they reintegrate into communities, and gathered their ideas for technology to assist with veteran reintegration. The researchers who conducted first-cycle coding focused on categorizing the most important participant statements (meaning units) using a codebook. This analysis resulted in over 3,000 meaning units. Additionally, the meaning unit corpus was subjected to systematic second-cycle analyses, using standardized linguistic structures to generate design space criteria. In total, over 6,000 design space criteria were discovered, and these criteria were synthesized to create personas using a situated data mining (SDM) algorithm. Results suggest that the interview session was crucial to elicit higher quantity and broader coverage of design space criteria. It is recommended that designers conduct and analyze interviews that focus on understanding the lived experience of users (not on their technology ideas) as part of a UCD approach.

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GENERAL AUDIENCE ABSTRACT

User-centered design (UCD) is a design philosophy that emphasizes the needs and other considerations of the end user of a technology when creating that technology. Current UCD practices may not be optimal with respect to obtaining information from representative users from special populations. This research extended elicitation approaches traditional focus on user needs and context to include criteria describing obstacles users encounter. Military veterans were selected for this research effort as representative users for a use case in technology design that addresses the difficulties associated with adjusting to civilian life after service and reintegrating into the civilian community.

This work provides several contributions to the UCD field. First, *different elicitation methods* were compared by the depth and breadth of design space criteria elicited. *Guidelines* were generated for designer use of phenomenology (study of the lived experience of a population with a phenomenon) in practice. *Obstacles were added* as an important facet of design, with corresponding *grammar rules* for construction. Finally, an algorithm was applied as a *method for generating personas*, which are user profiles created to help designers understand their users.

Additionally, this dissertation contributes to the field of veteran research. Some example contributions include a set of *design space criteria* for designers to consider when designing for veterans, and two *veteran personas* grounded in data procured from the analysis.

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Dedicated to Sergeant Major Felix Thomas Jackson

CHAPTER 1. INTRODUCTION

As the nation's veterans are returning home from recent wars in Iraq and Afghanistan, many face great difficulty as they attempt to reintegrate into their communities, employment, school, and families. With the troubling prevalence of disabling conditions such as posttraumatic stress disorder (PTSD) impacting veterans, the medical community, family members, and veterans themselves seek new and innovative personal technology as part of their treatment portfolio. Thus, the focus of this research project is to investigate the lived experiences of veterans as they integrate back into their home communities; examining participatory design approaches to create designs for next generation personal technology to assist them with integration.

In a competition amongst technology designers to be first to market, often the details of a target population's user needs are overlooked. Despite advances made in the user-centered design (UCD) field, bad design habits are still prevalent in practice and industry. Additionally, what many consider to be "best practices" of UCD may not be optimal in eliciting design criteria for special populations such as user needs from representative users. The development of new design methods for special populations is desired in order to tailor technology that has utility, as well as usability. As smart phones are becoming more ubiquitous and widely available, the capability to deliver technology to users, even isolated users, now exists. Thus, designers must seize this opportunity but strive to deliver technology designs that resonate with users.

1.1 Problem Statement

The need to deliver technology that resonates with users is a universal design goal, regardless of user group. However, it was necessary to select a specific special population and user issue as the use case for this research. Military veterans have unique experiences from their time in service that have impacted their lives, and have a noted and well-documented struggle adjusting to civilian life

after service. Well-designed personal technology could possibly assist them with reintegrating into the civilian community, and thus this is a focus of the research.

In addition, methods and tools that designers use to discover, compile, and present the needs of a user (along with other relevant user information) should be assessed and compared. Extant methods used could possibly be improved via the introduction of different approaches to provide new insights about their user groups.

1.1.1 Military Veterans

Almost one million American military veterans have endured multiple deployments, and nearly 50,000 have been physically wounded (Scurfield & Platoni, 2013). Hoge, Auchterlonie & Milliken (2006) estimated that 20% of the military veteran population returning from these conflicts have posttraumatic stress disorder (PTSD). PTSD is an additional barrier to success in transitioning back into civilian society (DiRamio, 2011), and has even been shown to negatively impact educational aptitude (Ellison et al., 2012; Mcgivern, Pellerito, & Mowbray, 2003). However, PTSD is not the only barrier to vets seeking to reintegrate into their communities. Difficulty with community reintegration was found to be an issue amongst all veterans, both with and without PTSD (Sayer et al., 2010).

The military veteran population continues to grow, due to heightened U.S. involvement in foreign conflict since the September 11th World Trade Center attacks, over 15 years ago. Since then, an estimated 2.6 million military personnel have served in the Iraq and Afghanistan wars. Of those, 85% served in direct combat zones (Scurfield & Platoni, 2013). There is a need to discuss community reintegration problems with veterans to ***understand their experiences*** with reintegration, the problems they face, and solutions they propose to mitigate these difficulties.

1.1.2 Participatory Design

Participatory design is a user-centered design method (UCD) that seeks to incorporate ideas from a stakeholder group into the final design of a product. The participatory design literature focuses on methods and techniques, with a variety

of implementation suggestions for user participation in the design process. However, misplaced priorities on generating a design artifact, for example, sometimes leaves designers wondering how exactly the users contributed to the design result (Bratteteig & Wagner, 2016). Some researchers have gone as far to say that participatory design has made cynics of both practitioners and participants, and further requires contributions and ideas from participants in the form of unpaid labor and time (Cooke & Kothari, 2001). How a participatory design project is configured, who is invited to participate, and how participants feel during the session (e.g., if they perceive stress, a power struggle, etc.) all impact the participatory experience and outcomes of the session (Wright & McCarthy, 2015). After participatory design sessions, designers often struggle with ***understanding the user*** and the problem space. Additionally, there is a lack of methods to analyze and represent data that is gathered from participatory design exercises (Pyla, Hartson, & Judge, 2010). Although the particulars of user involvement and participation will undoubtedly vary depending on the research and context involved, further exploration of participatory design in practice is needed, as well as ways to engage the user to better understand the problem space.

1.1.3 Personas

Personas were first introduced as a design tool by Cooper (2004), to illustrate an approach to solving the disconnect between users and the technologies designed for them. A persona is a short representative (archetypal) description of user behavior patterns, displayed as a user profile. Personas are used to humanize the design focus (Martin & Hanington, 2012). Generally, personas are created from information gathered from the real end-users that the personas will emulate, and a single persona could be the culmination of similar or overlapping factors from multiple users. Persona creation should be grounded in the data of the user, not fictitiously created by the designer to impersonate the designer's idea or supposition of users. While there is general acceptance as to what the persona should contain, sometimes personas contain information that is useless for the design task at hand and can be seen as a distraction from the actual user needs (Chapman & Milham, 2006). Another problem that has been identified is the issue

of personas not being believable, likely due to not being based on real user data (Pruitt & Grudin, 2003). Another issue entirely is the implementation of personas is not always understood (Adlin et al., 2006) which brings their utility into question. Moreover, the methodology of creating personas has been called into question, with concern about piece-meal assembly of data points to create the fictitious user (Chapman & Milham, 2006). Thus, the development of persona creation methodologies from real user data grounded in the objective of ***understanding the user's experience*** and their needs and challenges is ideal for the advancement of persona use in practice.

1.2 Conceptual Model to Guide Research Approach

A conceptual model was defined to illustrate the approach used in this research; specifically, to illustrate that the challenges and barriers users experience may be important usability considerations for designers during technology conceptualization. Sometimes, challenges and barriers are salient to the designer, and a motivation for design. These challenges and barriers may be directly addressed by the user requirements. However, some challenges and barriers are not apparent to designers, or may not be addressed by the design for other reasons. These challenges and barriers become absorbed into the context of use.

The current ISO 9241-11 usability standard specifies that usability may be defined in terms of user performance and satisfaction. In addition to the functional specifications (what the user or product should be able to do), there are also non-functional specifications (effectiveness, efficiency, and satisfaction), describing how a user accomplishes tasks, within a specified context of use for the interaction. These aspects define the design scope or design space.

To further illustrate the complexities of the design space, another dimension was conceptualized for this research effort, the *obstacles* that the user population encounter. These are presented in the form of those challenges and barriers previously mentioned. Some of these may be directly addressed by the technology through the needs, but some may not be addressed, and thus are assimilated into

the context of use. See Figure 1 for a comparison between the ISO 9241-11 definition of the design space and the design space definition conceptualized for this research.

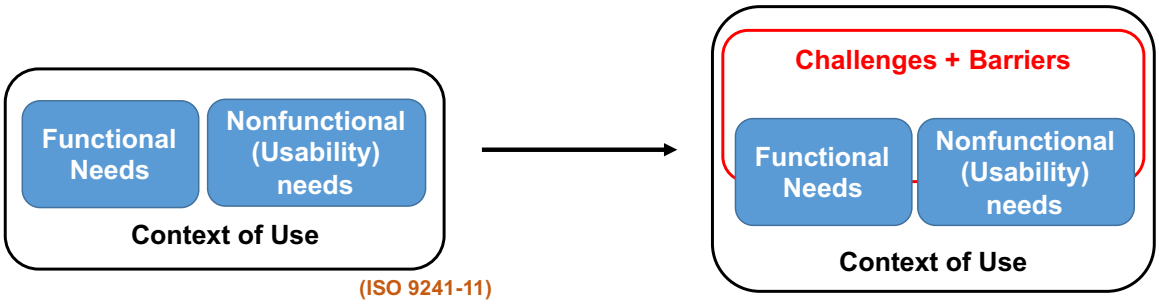

Figure 1. Defining the design space to include challenges and barriers may provide important insights to designers.

It is important for designers to identify and recognize the challenges and barriers that a user population encounter. Failure to do so may lead to false assumptions on the part of the designer, or omission of obstacle consideration altogether. ***Identification of user needs may not necessarily imply that designers understand the challenges and barriers the users face.*** Thus, it is posed that designers gain a better understanding of the design space when they establish a design scope that includes explicit identification of user challenges and barriers. Therefore, for this work, the *design space* is defined as the user needs (functional and nonfunctional needs), user obstacles (challenges and barriers), and context of use considerations. Each specific need, obstacle, or context of use consideration is termed a *design space criterion*.

1.3 Research Objectives

There were four main objectives of this research in an effort to contribute to the user-centered design field, as well as the field of veteran/military research:

(1) using a phenomenological approach, investigate the lived experiences of young military veterans as they reintegrate into civilian society;

(2) scope the design space by assembling design space criteria list via the identification of user needs, user obstacles, and context of use considerations of the young military veteran population;

(3) construct military veteran design personas for designer use, and;

(4) compare phenomenological approaches to traditional participatory design approaches, and provide insights about phenomenological approaches to design.

1.4 Research Questions

Some specific research questions were addressed to achieve the research objectives:

- Research Question 1 (RQ1): What are the experiences of young military veterans with reintegration into civilian society?
- Research Question 2 (RQ2): What are the implications of these lived experiences on the scope of the design space?
- Research Question 3 (RQ3): What is the impact of select elicitation methods on depth and breadth of the design space criteria?

RQ2 and RQ3 contained subsets of questions, outlined below:

- Research Question 2 (RQ2): What are the implications of these lived experiences on the scope of the design space?
    - (RQ2a): What are the **needs** of young military veterans reintegrating into civilian society?
    - (RQ2b): What are the **context considerations** of young military veterans reintegrating into civilian society?
    - (RQ2c): What **barriers** are present and what **challenges** do young military veterans experience with reintegration into civilian society?

    - (RQ2d): What **personas** can be generated from information elicited from the users (military veterans)?
- Research Question 3 (RQ3): What is the impact of select elicitation methods on design?
    - (RQ3a): What is the impact of session **setting** (individual or group) on **phenomenological design**?
    - (RQ3b): Is there a **priming effect** associated with a phenomenological approach to design?
    - (RQ3c): What differences exist between a **traditional** participatory design approach and a **phenomenological** approach to design?

1.5 Research Approach

A mixture of phenomenology and user-centered design methods were employed for this research effort. This research was conducted with one phase of data collection, and two phases of data analysis (first-cycle coding and second-cycle coding). The data collection phase elicited verbal descriptions of lived experiences and novel technology designs in the form of over 80 hours of audio files. The first-cycle coding process was then applied to reduce the data set from the transcripts corpus to a more concise set of identified verbatim excerpts of meaning, termed *meaning units*. The examination of the meaning units assisted with the development of the phenomenological summary, which addressed RQ1. Focus then shifted from phenomenology to user-centered design in order to address RQ2 and RQ3. The meaning units deduced from first-cycle coding efforts were used as the input data set for second-cycle coding efforts. This second cycle of coding examined the elicited experiences through a designer lens. Each meaning unit was examined, and design space criteria were identified using grammar rules and standardized linguistic structures to identify user needs and context of use considerations in the design space (Gausepohl, Beaton, and Winchester, 2011), along with new grammar rules to note obstacles (challenges and barriers) in the design space. An algorithm was used to identify persona

attributes with respect to the design space criteria, and two persona profiles for designer use were created that were rooted in real data from target users. Additionally, different elicitation approaches were compared, with respect to the quantity and breadth of design criteria elicited. Figure 2 presents an overview of the research approach.

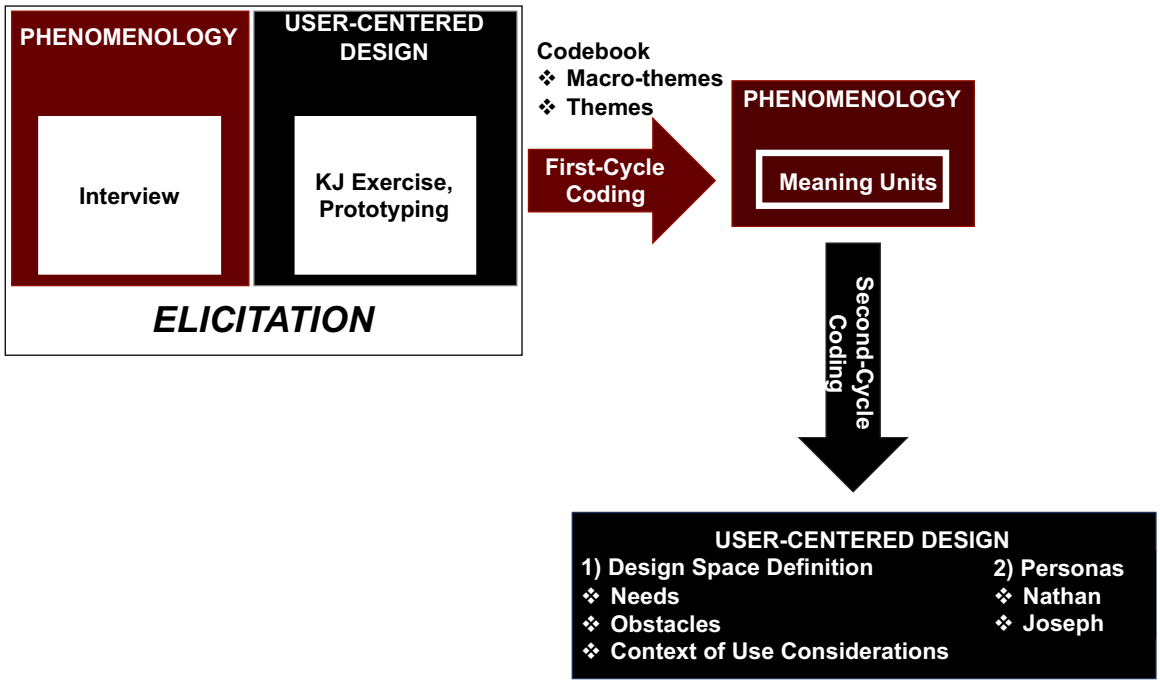

Figure 2. The research approach employs methodologies from phenomenology and user-centered design to enrich understanding of the design space and to foster creation of data-grounded personas.

1.6 Contribution

There are several distinct contributions of this research to the field of user-centered design methods:

(1) comparison of *different elicitation methods* as measured by the depth and breadth of design space criteria elicited;

(2) *guidelines* for designer use of phenomenology;

(3) *addition of obstacles* to the design space, which include both challenges and barriers as important facets of design;

(4) new *grammar rules* for the construction of challenges and barriers to supplement pre-existing grammar rules, and;

(5) application of an algorithm as a *novel method for generating personas* rooted in a quantitative approach that cross-compares participant design space criteria.

Results of this research effort directly contribute to the field of veteran research as well. Specifically, this work provides:

(6) a phenomenological *summary of the lived experiences of veterans* as they reintegrate into the civilian community;
(7) a *codebook* that outlines the major topics veterans experience as they reintegrate;
(8) a set of *design space criteria* outlining the needs, obstacles, and context of use considerations of veterans reintegrating into the civilian community, and;
(9) two *veteran personas* grounded in data procured from the analysis of the elicitation outputs.

1.7 Dissertation Overview

This dissertation document is organized into five chapters. Chapter 2 presents a review of relevant literature to the dissertation topic. Chapter 3 describes the methods used for elicitation, as well as the first-cycle coding process and results that identified, extracted, and categorized the verbatim meaning units from participants. Chapter 3 also provides an examination of the four elicitation treatments and the resulting meaning units quantities from each treatment. Chapter 4 details the process of second-cycle coding, the examination of each meaning unit and the use of grammar rules to identify and structure each design space criterion in the form of a need, obstacle, or context-of use consideration. Chapter 5 provides reflection on the research activities, and the contributions, limitations, and suggestions of topics for future exploratory work are presented.

CHAPTER 2. REVIEW OF LITERATURE

The following literature review will include an overview of user-centered design (UCD) and phenomenology, as well as research relevant to understanding today's veterans. A summary of substantive findings with regards to community integration issues, current psychological treatments, the effects of warzone experiences, veterans' preferences for treatment are presented, as well as a review of existing technological applications to address issues the military veteran population faces.

2.1 User-Centered Design

2.1.1 Background

In the decade or so prior to the development of participatory design, research teams and designers used informed scenarios to communicate ideas, though this did not include participant/user input (Grudin and Pruitt, 2002). The innovations developed over time with regards to participatory design, including user research with focus groups and interviews containing representative users (Grudin and Pruitt, 2002). User-centered design was born from designer application of cognitive science, psychology, and computer science to make information systems more useful and easier to use (Johnson, Johnson, & Zhang, 2005), and in this research, phenomenology is integrated in attempt to enrichen UCD practices.

2.1.2 The 'KJ' Session

Within the broad scope of participatory design, the KJ technique or KJ session is just one approach to elicitation. The KJ session, named for its creator Kawakito Jiro (Ullrich, 2003) is a type of participatory design, in which the knowledge of group participants is considered, and at times, measured as part of the research design.

The basic process for conducting a KJ session, resulting in a KJ diagram or affinity diagram, exists to help the researcher determine "the causal structure of a

problem" (Ulrich, 2003, p. 2), while revealing facts (that are stated by participants) that are essential alone and also as building blocks towards community understanding of a problem (Ulrich, 2003). Many qualitative researchers find that KJ sessions are especially well-suited for multifaceted, non-technical problems [that may] "involve disparate interests and perspectives" (Ulrich, 2003, p.2).

The basic, simplified steps for conducting a KJ session is to formulate an appropriate question, and then pose it to the group. As participants provide answers (often on sticky notes), their facts are arranged into aggregates. In turn, those facts are grouped and arranged into diagrams, with categories evolving. The relationships between the categories is then established through dialogue with participants (Ulrich, 2003), a hallmark feature of participatory design.

2.1.3 Phenomenology: an appropriate tool for UCD

Phenomenology is not a novel term in the UCD field, for example, *phenomenological usage* describes the effect in which users utilize a product in their daily lives over time (Hartson & Pyla, 2012). ***In this research effort, phenomenology is expanded to the elicitation approach by removing technology jargon from interview questions in order to more fully understand the lived experience of the user, before imposing any potentially constraining technology infrastructure on questions presented to users.***

Because the personal knowledge of interview subjects, including veterans, is "both useful and necessary" (Lopez and Willis, 2004, p. 730), phenomenological methods could be utilized often in participatory design to gather experiences and values of the user group. Frauenberger, Good, Keay-Bright (2010) found that "phenomenology plays a critical role in participatory design" (p. 187). Their research shed light on the importance of user-led design. For example, their ECHOES project created a technologically enhanced learning environment for children. They demonstrated how phenomenological thinking led to improved design. Although the study's product was an HCI model, the authors note that the designs were based on ***user experiences with a phenomenon, absent of technology considerations***, and based on values expressed by users. They explain that phenomenological frameworks have "fundamental implications on the

nature of technological artifacts [while] offering insight into the process of design" (Frauenberger, Good, and Keay-Bright, 2010, p. 187).

Employing phenomenological methods within participatory design helps the "mindful interpretation of participants' input" (Frauenberger, Good, and Keay-Bright, 2010, p. 190). The researchers' state that the ECHO ***program was successful due to phenomenological thinking, because this "mindful interpretation" can help reveal design ideas for new technology***. In summary, this type of method "captures the essence" (Frauenberger, Good, and Keay-Bright, 2010, p. 190) of participant lived experience, which led to improved technology design.

2.2 Personas: Employing UCD

Personas are one of many design tools created to aid designers in the development of user-centered products. Personas are "fictitious user representations" (Junior and Filguieras, 2005, p. 277) that are created to represent but also to reveal and express user motivations. User-centered design supports and drives the development of personas while prioritizing and focusing on user requirements over technical requirements (Junior and Filgueiras, 2005). The overall goal in the field of persona development within user-centered design is to simplify communication by combining user needs and designer expertise.

Personas are distinguished from other design methods in that they feature identifiable aspects such as names and faces, as well as additional attributes (Blomquist and Arvola, 2002), yet retain generic features (Junior and Filgueiras, p. 279). Perhaps most importantly, ***the personas' "needs, goals, tasks"*** (Blomquist and Arvola, 2002, p. 197) are presented for designers to consider when creating items that the persona would theoretically use.

2.2.1 Personas development

Cooper, credited as the creator of persona use, utilized personas as a "precise description of a hypothetical user and [his/her] goals" (in Blomquist and Arvola, 2002, p.197). A key feature is the persona is not one type of user, but instead, an "archetype" serving as a "representation of aggregate users"

(Blomquist and Arvola, 2002, p.197). Personas can represent an existing person, if the emphasis remains on the user, not on a task or goal. (Goodwin, 2009).

Essentially, persona attributes are built over time, through aggregated user information. For example, Junior and Filguieras (2005) explain that user information, such as "personal information, technical information, relationship information, and opinion information" (p. 289) are collected by querying participants during the design phase of persona development.

A criticism of persona development that needs to be addressed is that personas are at times, "not based on firsthand customer data" (Murata, qtd. in McGinn and Kotamraju, 2008, p. 1521). There has also been a concern that a significant sample size must be utilized for resulting personas to be reliable. McGinn and Kotamraju (2008) set out to change the order of activities that are normally involved in persona development in order to address sampling size concerns. The researchers ideated a method for persona development that was more data-driven than participant-influenced. Their newer method began with meeting the client team initially in order to gather data before field studies or participant interviews were conducted. After that initial step, a survey was created and sent to the "target market" of product-users. They received 1,300 responses and then performed factor analysis to determine categories of product-users (consumers). Persona frameworks emerged from the factor analysis and limited follow-up interviews were conducted to make adjustments.

Additionally, the Blomquist and Avola (2002) participant-observation research revealed a number of issues they came across while utilizing personas, as well as several methods to compensate for them. Key breakthroughs were the use of "units of thought" (p. 198) which came about after grouping conversations (of designers and users), as well as the development of "needs-goals" matrices (p.198), which addressed the problem of personas merely completing work tasks (as opposed to considering their goals).

Sinha (2003), working in the field of persona development within website architecture, advised that personas must not only reflect the users, but their information needs, and conclude with a consideration for how the user-information

will be utilized. Sinha's contribution to this field is a statistical technique, which he designed to identify "groups of underlying needs" (2003, p. 830). In other words, Sinha envisioned that user information (gleaned from participant observation and interviewing) based on user needs, not mere job tasks, must be the basis for persona development. Sinha's research was not theory, but instead combined the elements of participant design with user-centered research, which could be measured by statistics called Principal Component Analysis (PCA) (Sinha, 2003, p. 831), which aids in "factor loadings" (Sinha, 2003, p. 831), of groups of data.

2.2.2 Personas in practice

Personas have been gaining popularity over the past three decades, and have become an established method within user-centered design to facilitate user inclusion in the design process. In fact, the use of personas is one method employed to "customize, incorporate and share" research about users while designing for users, even when measuring larger data sets (Junior and Filguieras, 2005, p. 281) and solving practical business problems (Adlin et al., 2006, p. 13). The benefits of personas, shown by numerous researchers, are that they allow for a focus to be placed on users and user-contexts; and they allow for building of momentum in large scale user projects during design phases. In addition, personas serve as an influential "medium for communication" (Grudin and Pruitt, 2002, p. 150). Because personas are utilized to "design for the archetype" (Goodwin, 2009, p. 295) they are considered a "communication tool" (Goodwin, 2009, p. 295) between designers, researchers/interviewers and users (of the product).

Researchers such as Reimann credit Norman (2004) with an aspect of personas that needs to be understood, if user-needs are to be truly considered. Reimann (2005) evaluated research and noted that product design, with the implementation of user-design, must include visceral, behavioral, and reflective aspects. For example, visual and sensory information that humans perceive "prior to interaction" (Reimann, 2005, p. 1). Behavioral processes are where humans "manage simple, everyday behaviors", and reflective or reflection, when there is a "conscious consideration…on past experiences" (Reimann, 2005, p. 1) through

memory and not direct experiences. This is relevant to any analysis of user design because this broadens and deepens scope of the expectations placed on persona design.

2.2.3 Case Study: Personas for Smartphone App Design

LeRouge, Ma, Sneha, and Tolle (2013) focused on user-centered design in the consumer health care industry. They stated that consumer healthcare technologies (CHT) are considered "important catalysts for empowering healthcare consumers" (LeRouge, Ma, Sneha, and Tolle, 2013, p. 251) since the latter often want to secure a more integral role in managing their health and associated health information. LeRouge et al. (2013) note that motivation for adopting user-centered design strategies depends on "suitability/relevance, perceived usability and anticipated benefits of new technology" (p. 251).

The team investigated user-centered design (through the development of user profiles and personas) and whether or not the user profiles could positively influence design/development of consumer healthcare technology smartphone apps. Their research did not focus on veterans, but is relevant given the structure and underlying guidance posed by the researchers about user-centered design: ***To design for specific groups, the unique <u>challenges</u> facing group members must be understood by designers.*** In other words, the user's challenges are as relevant to the design considerations as their needs and context, a notion echoed in this research effort.

An issue with traditional technology design methods is "the limitation of user participation" (LeRouge, Ma, Sneha, and Tolle, 2013, p. 253). Often, design decisions are made by information technology professionals and/or design professionals, leaving out the critical input of the users. User-centered design is a more "modern human-computer interaction (HCI) philosophy" (LeRouge, Ma, Sneha, and Tolle, 2013, p. 254), in which the "needs, desires ***and limitations*** of users are inquired an analyzed" (p. 254). The researchers employed qualitative methods including observation, literature review and review of patient files, focus groups with patients, semi-structured interviews with medical providers, and mixed-stakeholder discussion groups. Transcripts of all sessions were analyzed

with open coding, and emergent themes were utilized in the axial coding process to connect sub-themes to each other. The underlying goal of coding was "to understand the user's conceptual model" (LeRouge, Ma, Sneha, and Tolle, 2013, p. 256), and the groupings of distinctly different axial trends became the groundwork for the personas. Reference to archival literature, patient files, and survey responses was made in order to enrich the personas and ground them in real user data.

The utilization of the personas was helpful during the technology design phase, especially during debate about different requirements. Designers and programmers could refer to the persona and truly determine if the posed requirement was needed by the persona when making design decisions.

2.3 Phenomenology

A phenomenological study describes the lived experiences of several individuals who experienced the same phenomenon. Furthermore, it identifies *aspects* of the experience that were shared by the individuals who experienced it (Creswell, 2013). Polkinghorne (1989) explains that phenomenological theories are descriptive, however, they have "a special realm of inquiry: the structures that produce meaning in consciousness" (p. 44). Creswell (2007, p. 78-79) summarizes the defining features of phenomenology, compiled from Moustakas (1994) and van Manen (1990):

- An emphasis on a phenomenon to be explored
- The exploration of this phenomenon with a group of individuals who have all experienced the phenomenon
- A data collection procedure that involves typically interviewing individuals who have experienced the phenomenon.
- Data analysis that can follow systematic procedures that move from the narrow units of analysis and on to broader units (e.g. meaning units) and onto detailed descriptions; what the individuals experienced and how they experienced it.

- Phenomenology study ends with a descriptive passage that discusses the essence of the experience in the form of a summary.

This approach, integrated with UCD methodologies, will be employed in this research effort.

2.3.1 Coding: A Qualitative Data Analysis Tool

In order to reduce participant interview responses to a data set of pertinent information, coding is utilized. Charmaz (2001) explains that coding is not only important for organizational purposes, but is the "pivotal link between collecting data and developing an emergent theory to explain data" (p. 46). Within grounded theory methodology, coding supports the study of human action and processes, and provides tools such as the ability to sort and reconfigure many hundreds of pages of text. In this context, codes are created to understand underlying meanings of the verbal information that has been gathered from users. During coding, data segments are taken apart and then named or categorized. This is followed by making proposals with "an analytic handle to develop abstract ideas for interpreting each segment of data" (Charmaz, 2001, p. 113). This is not a linear step, but through iterative examination of the data, coding allows for high-level conceptualization about the true meaning of the verbal information.

Coding is a widely-used qualitative data analysis tool in phenomenological research. Phenomenological research aims to locate and "see" the meaning in experience "rather than to discover causal connections or patterns of correlation" (Dukes, 1984, p. 197). This type of research can be suitable for relatively small samples, who will "speak for themselves… in their own way and in their own time" (Dukes, 1984, p. 197). Phenomenology methods are known for helping researcher and designers to uncover the "structure of lived experiences" (Dukes, 1984, p. 199), and features somewhat lengthy, open-ended interviews, that are later transcribed before uncovering data-derived patterns (Dukes, 1984).

Dukes' research on both the philosophy and method of phenomenological research was influenced by Polkinghorne (1983, summarized by Dukes, 1984). Polkinghorne explained that phenomenological studies are a two-step process which allows for free description of "essential structures of the phenomena"

(Polkinghorne 1983, qtd. in Dukes, 1984, p. 132). First, it is crucial that the description of the "essential structures" (Dowling, 2007, 132) are achieved. Next, as described by Dukes (1984) the researcher focuses on the actual experience being studied, and "describes how the participant's experience is constructed for intentional analysis" (Polkinghorne 1983, qtd. in Dukes, 1984, p. 133). This method is credited by some researchers as "fortifying contemporary qualitative research" (Dukes, 1984, p. 134), especially in medical and nursing fields (Dowling, 2007), as well as social science research.

2.3.2 Code Development

Phenomenological approaches have become "dominant means in the pursuit of knowledge development" (Dowling, 2007, p. 131). Phenomenological approaches are research methods "employed by qualitative scientists" (Dowling, 2007, p. 131), but are also a philosophy that recently has been proposed to have a "critical role in participatory design" (Frauenberger, Good, Keay-Bright, 2010, p. 187). For example, Dowling's 2007 research on medical and nursing methodology summarized the research methods of at least three psychologists. In these studies, descriptions were divided into units which are then transformed into "meanings that are expressed in psychological and phenomenological concepts" (Dowling, 2007, p. 135). Next, a generalized description of the phenomenological meaning (about the experience) were created (Polkinghorne, 1989, in Dowling, 2007).

Coding may aid in the development of persona development through user-centered design. The legitimacy of personas is sometimes questioned through criticizing the persona characteristics (if they are rooted in real data). This challenge may come from a participant or a client who does not feel the persona represents the group, since personas are supposed to be "behavioral specifications embodying the salient characteristics of a class of stakeholders that a design needs to serve" (Faily and Flechas, 2011, p. 2267).

Recent research has addressed the questions that stakeholders sometimes have after the persona is designed. Through coding, relationships amongst themes and concepts are established as an important part of grounded theory methodology. Faily and Flechas (2011) note that coding transcripts of text, aided

by computerized data analysis tools such as ATLAS software leads to the development of initial and then refined thematic concepts. Because persona development that utilizes coding features "traceable steps back to the empirical data", legitimacy of the findings is supported (Faily and Flechas, 2011, p. 2270).

2.3.3 Thematic Analysis

An understanding of categories within grounded theory methods can be explained by first revisiting the nature of the participant interviews. Polkinghorne (1989) supports participatory design as a form of qualitative research. Because the grounded theory method often features "open-ended and unstructured interviews" (Polkinghorne, 1989, p. 48) that are more similar to conversations than questionnaires, interpersonal dialog often reveals values and views that is "theme-oriented, not person-oriented" (Polkinghorne, 1989, p. 49).

Because the interviews 'contain' the data, once the descriptive units are put into written, form the essential structures of the participants' experiences can be placed into categories (Polkinghorne, 1989).

Categories may also be understood through Polkinghorne's description of a process called synthesis. He explains that: "synthesis involves tying together and integrating the list of transformed meaning units into consistent and systematic general descriptions of the psychological structures of the experience under investigation" (Polkinghorne, 1989, p. 56). By utilizing the psychological structures, categories may be formed that reflect the participants underlying patterns (of meaning or action). Because the transformations and the synthesis can be replicated by other scientists, the study is considered more reliable.

2.4 Military Veterans: a population in crisis

According to the United States Department of Defense (qtd. in Kimbrel, Debeer, Meyer, Silvia, Beckham, Young, Morrissette, 2015) over 2.5 million soldiers have been deployed to Iraq and Afghanistan in the fifteen years since the 2001 terrorist attacks on the United States. They clearly state that a "sizable minority" return with "significant mental health problems" (Kimbrel, et al., 2015, p.

165). The following sections describe patterns of behaviors with regards to American veterans in their adjustment periods after they return home from combat.

Since the end of the Vietnam War era, there has been a growing interest in the impact of combat on veterans as well as their families and communities. The Afghanistan (Operation of Enduring Freedom (OEF)) Conflict and the Iraq War (Operation Iraqi Freedom (OIF)) have provided "a time of painful opportunity" (Sayers, 2011, p. 108) to examine wartime deployment effects. This research notes that many veterans can and do successfully navigate reintegration (Sayers, 2011, p. 108). However, there is of course a timeframe when the "complications of combat" (Sayers, 2011, p. 108) are most acute for veterans.

Kimbrel et al. (2015) evaluated 155 veterans (under the age of 35) through written screening questionnaires. Of this cohort (of 155 veterans from Iraq or Afghanistan wars), at least 75% "screened positively on at least one [psychological] clinical subscale, and one-third screened positive on 5 or more subscales" (p. 1065). Findings from this sample population differed from the "sizeable minority" statement of the DoD, above. While it may be difficult to estimate the exact number of veterans who leave the military with lasting mental disorder issues, there is general agreement that it is but one issue that many veterans face as they attempt to reintegrate.

2.4.1 Reintegration problems in the veteran population

Veterans and their spouses may need specialized treatment, especially if the couple is in the difficult adjustment period after a combat deployment. Sayers (2011) evaluated the serious difficulties these couples face, including "***conflict about reintegration,*** PTSD, Major Depression Disorders, chronic rehabilitation and social challenges" (p. 108). This researcher suggests that enrolling in behavioral couples' therapy, in conjunction with individualized treatment is truly essential. In those treatment modalities, a number family problems can be addressed, such as "financial problems, [gender roles], children's behaviour issues, combat injuries…as well as possible clinical diagnosis: PTSD, major depression; relocation, and career transitions" (Sayers, 2011, p. 108). Sayers' research provided summative data regarding veteran behaviors and

consequences. Understanding the complex readjustment period is essential before designing new interventions for community integration.

Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF) combat veterans in the care of the US Veterans Administration (the VA) were studied to shed light on veteran interests and interventions. The purpose of the study was to "promote readjustment to community life" and "explore associations between probably Post Traumatic Disorder (PTSD) and reintegration problems" (Sayer, Noorbaloochi, Frazier, Carlson, Gravely, and Murdoch, 2010, p. 589).

The research was conducted based on a stratified national sample of Iraq and Afghanistan combat veterans participating in reintegration services at the VA. Of the respondents, at least one-third report serious relationship problems, such as recent divorce, substance abuse (with substantial increase compared to pre-deployment), and/or anger and control problems. ***Nearly all (96%) of the respondents "expressed interest in services that would help with readjusting to civil life"*** (Sayer, Noorbaloochi, Frazier, Carlson, Gravely, and Murdoch, 2010, p. 589).

Notably, this research indicates that the ***veterans' preference for the format of integration services and related supports are through regular mail and by Internet*** (Sayer, Noorbaloochi, Frazier, Carlson, Gravely, and Murdoch, 2010, p. 589). This was written survey which relied on respondents' self-reporting of symptoms, which can be considered as a limitation to the research. In addition, the research was published in 2010.

Additionally, several subpopulations reported some notable information. Individuals with PTSD and probable PTSD reported a higher rate of readjustment difficulties and expressed desire for a wider variety of type or format of interventions. This subgroup is seeking ***"more help, information, and services"*** and they are, in many cases, ***"struggling to readjust"*** (Sayer, Noorbaloochi, Frazier, Carlson, Gravely, and Murdoch, 2010, p. 589). This research points to the ***conclusion that further research is needed to discover "non-traditional modes of service-delivery including the Internet"*** (Sayer, Noorbaloochi, Frazier, Carlson, Gravely, and Murdoch, 2010, p. 589) for reintegration assistance.

An identified area of difficulty during reintegration are the barriers to employment. To contribute new insight into this area of veterans' reintegration, the research team of Lee, VanLouy, Young, Stern (2016) conducted focus groups with post 9/11 veterans with disabilities. The research focused on the families of veterans, veterans, and employers who had suggested an interest in hiring veterans with disabilities. Although the main format for data-gathering was interviewing through meetings of focus groups, the group leaders left time for open discussion. ***Barriers to employment***, as noted by employers in the study, were "a ***critical skills gap***…with regards to Information technology and computer proficiency" (Lee, VanLouy, Young, and Stern, 2016, p. 2), perhaps due in part to rapidly changing technology while veterans were deployed over the last decade. Additional ***barriers to employment are homelessness, lack of affordable housing, and potential issues with financial literacy.*** Those factors may combine with ***injury and disability***, and contribute to a ***"significant loss of identity"*** (Lee, VanLouy, Young, and Stern, 2016, p. 3-4). The increase in ***stigma*** due to mental illness diagnosis can seem insurmountable, resulting in "paralyzing ***fear and extreme uncertainty…about the future***" (Lee, VanLouy, Young, and Stern, 2016, p. 7-8).

Brown (2011) also studied veteran reintegration problems. The researcher's broad summary of reintegration problems includes "interpersonal relationships, education, and employment" (Brown, 2011, p. 2). The study also documents the ***higher probability of veteran incarceration*** due to reintegration problems which may involve ***PTSD, alcohol, drug abuse, and sleep problems,*** which are correlated to multiple combat deployments. The data from this research, based on 162 veterans who responded over a 15-month time period, demonstrated that, not surprisingly, multiple combat deployment coupled with PTSD, and alcohol/drug dependency increased the chances of "veteran criminal justice entanglements" (Brown, 2011, p. 2). When seeking explanations for this data, Brown notes that the general population attributes criminal behavior to what is described as moral or social deficiencies. However, he finds that criminal behavior in veterans is more

likely due to a ***response to threats***, and their training in threat response (Brown, 2011, p. 40).

Brown also provide a sociological lens to these broad problems related to reintegration. The average age of the veterans in this study was 28, and 98% were honorably discharged. Of these, 47% faced unemployment, despite retaining employment steadily before military service (Brown, 2011, p. 15). Forty percent of the study participants met all of most of the criteria for Post-Traumatic Stress Disorder. Brown found that over 62% of the females were diagnosed with PTSD. 38% of the group of females with PTSD "attributed their symptoms to sexual abuse during deployment" (Brown, 2011, p. 26).

2.4.2 Post-traumatic Stress Disorder

Posttraumatic stress disorder (PTSD) was first described by the American Psychiatric Association in their 1980 diagnostic manual, due in part to the high quantity of veterans returning home in the 1970s as the Vietnam War came to a close. PTSD is not a single behavior, but is a disorder that often features a pattern that alternates between "avoidant and intrusive symptomology" (Joseph and Masterson, 1999, p. 437), as the patient tries to resolve the trauma internally.

The American Psychiatric Association provides the standard definition and description of Post Traumatic Disorder. PTSD is the persistent re-experiencing of symptoms, personal avoidance of stimuli related or associated to the trauma. The general response a person with PTSD exhibits after trauma is to demonstrate "persistent symptoms of increased arousal" (Joseph and Masterson, 1999, p. 438). The diagnosis also qualifies that the person must have been exposed to (witnessed, experienced or confronted with "actual death, or serious injury", in which their response involved "fear, helplessness, horror" (American Psychiatric Association, 1994, qtd. in Joseph and Masterson 1999, p. 438).

The DSM-IV was used by the majority publications in this literature review, but has been revised with some changes in the DSM-V. In 2013, PTSD was 'moved' within the DSM-V from the anxiety disorders classifier to the category 'traumatic and stressor-related disorders' (Zoellner, Bedard-Gilligan, Jun, Marks, and Garcia, 2013), although this does not necessarily affect the qualifying events

or symptomology. PTSD is still characterized by "recurrent, intrusive memories" of the "highly distressing traumatic event" (Halligan, Michael, Clark, Ehlers, 2003, p. 419). These are not passive recollections but instead "tend to be vividly sensory…experienced as relatively uncontrollable, and evoke extreme distress" (Halligan, Michael, Clark, Ehlers, 2003, p. 419). The effects of trauma on cognitive processing (through memory assessments) is related to the development of the disorganized memories and PTSD symptoms in veterans. Studies by Rosen et al. (2004) document the prevalence and incidence of PTSD in veterans seeking treatment in VA medical centers through evidence-based practice.

Over the last decade, a substantial increase in the prevalence of behavioral health issues and diagnoses have plagued this country's veterans. As explained by Seal, Bertenthal, Miner, Sen, & Marmar our military are "bringing the war back home" (2007, p. 482) and have an increasing difficulty managing stress, depression, and post-traumatic stress disorder (PTSD).

2.4.2.1 PTSD defined in DSM-V. PTSD is defined by the American Psychological Association's DSM-V, by the following criteria, paraphrased by Dr. Michael Friedman:

> *"Criteria A. The person was exposed to: death, threatened death, actual or threatened serious injury, or actual or threatened sexual violence, through 1. Direct exposure 2. Witnessing, 3. Indirectly, by learning that a close relative or close friend was exposed to trauma 4. Repeated or extreme indirect exposure to aversive details of the event(s), usually as a part of professional duties (e.g., first responders)*
>
> *Criteria B. Intrusion symptoms*
>
> *Criteria C. Persistent avoidance of stimuli associated with the trauma*
>
> *Criteria D. Negative alterations in cognitions and mood that are associated with the traumatic event*
>
> *Criteria E. Alterations in arousal and reactivity that are associated with the traumatic event."*

As military conflicts in Afghanistan and Iraq have developed, PTSD research has become increasingly relevant to veterans and their families, victims of war, the military, and many others in society. The research on this topic is important because of its ability to “improve lives through positive effects on health, relationships, and functioning” (United States Department of Veterans Affairs, 2015, p. 1).

PTSD in combat veterans is “common but notoriously hard to treat” (Dunn et al., 2007, p. 222). Previous research has found some clinical efficacy of the following programs and treatments: public communication campaigns/outreach, Cognitive Behavioral Therapy (CBT), and residential (versus) outpatient placement, creative arts therapies (Ding, 2015, p. 1) and suicide prevention hotlines (Isaac, Katz, & Enns, 2009, p. 260). Multi-family groups, individual veterans in group therapy, and 1:1 therapies have also been compared by researchers such as Sherman, Fischer, Owen, Lu, & Han, (2015, p. 136) and Boston (2015, p. 10). Phoenix (2007) also supports the use of psychoeducational group meetings and psychoeducational literature for people who have experienced acute trauma.

Bagley, Munjas, and Shekeile (2010) conducted a systematic review of suicide prevention programs and treatment options for the nations veterans. In the study, which included 261 reviews after locating 3500 sources nationwide, noted that there must be an “adoption of combined approaches to interventions” (Bagley, Munjas, and Shekeile, 2010, p. 258), and they recommended specific interventions that should include “education and awareness programs, community help, and screenings” (Bagley, Munjas, and Shekeile, 2010, p. 258).

Among this array of treatments, Cognitive Processing Therapy (CPT) has received growing attention for its’ potential effectiveness for Veterans (Alvarez, McLean, Harris, Rosen, Ruzek, and Kimerling, 2011, p. 590). Bares (2015) recently published a systematic review of CPT studies featuring Veterans’ health and well-being. Alvarez, et al. compared veterans living in residential treatment settings who participated in CPT rather than other forms of therapy. The results

showed “more symptom improvement at discharge”, as well as a greater incidence of patients considered “recovered” or “improved” (2011, p. 1).

2.4.2.2 Comorbidity. Dunn et al. (2007) studied psychoeducational group therapies for the veteran population with comorbid chronic PTSD and Major Depressive Disorder. The purpose of this research was to test the treatment plan of prioritizing depression treatment to hopefully lead to a positive impact on their PTSD. In their randomized trial of self-management psychoeducational models, 101 male veterans’ responses were measured against a control treatment modality. Their results showed “no difference on symptoms or functioning” (Dunn et al. 2007, p. 222) between the two treatments, conducted with participants from VA programs. The self-management therapy in this sample “produced no clinically significant effect on depression comorbid with chronic PTSD” (Dunn et al., 2007, p. 222).

Joseph and Masterson (1999) examined if PTSD and Traumatic Brain Injury (TBI) are mutually exclusive syndromes, or if they have shared traits that could impact treatment. At the time of the article (1999), the authors noted that several TBI veteran-patients “seem to develop PTSD” (Joseph and Masterson, 1999, p. 437). The research pair summarized that this pattern seems to develop through either 1) “nonconscious processes” in individuals who are later amnesiac, but who were “conscious at the time of the traumatic episode” (Joseph and Masterson, 1999, p. 437), or 2) patients who were unconscious during the traumatizing event (and later through the medical appraisal process). The comorbidity of PTSD and TBI has been found in various other studies (ex. Seal et al., 2017, Depue et al., 2014).

PTSD often presents clinically as comorbid with other diagnoses, such as adjustment disorder, and depression, even in the general population. Gradus, Antonsen, Svensson, Cash, Resick, and Hansen (2015) conducted a longitudinal study of a national cohort, to evaluate the “cumulative incidence of trauma events and psychiatric diagnosis, following the diagnosis of severe stress and adjustment

disorder" (p.1). The study corroborated the notion the that stress-related diagnoses have "long-lasting and potentially severe consequences" (Gradus et al.,1).

2.4.3 Adjustment Disorders

The core features of Adjustment Disorders are "stress-related, short-term, nonpsychotic disturbances…which causes significant discomfort, distress, turmoil, and anguish, with potential suicidality" (Friedman, 2013, p. 1), and were not altered from the DSM-IV. The DSM-V defines Adjustment Disorder criteria as: medical category "characterized by an emotional response to a stressful event" (Patra and Sarkar, 2013, p. 1) that is shown by an individual's "subjective distress and emotional disturbance" (Patra and Sarkar, 2013, p. 1). This stems from a person's adaption of stress responses to "significant life changes, stressful life events, serious physical illness, or possibility of serious illness" (Patra and Sarkar, 2013, p. 1). Although stress is common in most people's lives, if an individual's "coping mechanisms fail to ameliorate stress effectively, adjustment disorder is precipitated".

The correlation between veterans, trauma, and mortality following severe stress substantiates the serious nature of adjustment disorders in the context of these descriptions (Gradus, Antonsen, Svensson, Lash, Resick, Hansen, 2015).

To provide effective treatment on this population of veterans, Scholes, Turpin, and Mason (2007) conducted a randomized control trial to assess the effectiveness of providing self- help information after traumatic injury. In this study, the authors wished to analyze the effect of psycho-education to "reduce the risk of post-injury" disorders (Scholes, Turpin, and Mason, 2007, p. 2527). Patients (n=116) were either given a self-help booklet or nothing (n=111) during their stay (in United Kingdom 'Accident and Emergency' units). The patients were assessed at 1-month, 3-mon, and 6-month post-injury. The results demonstrated that there were no significant differences in how the patients self-reported their quality of life. However, the same patients rated the usefulness of self-help guides as "very high" (Scholes, Turpin, and Mason, 2007, p. 2527).

On the other hand, the following showed significant reduction over time of "anxiety and depression" (Scholes, Turpin, and Mason, 2007, p. 2527). Perhaps due to these confounding results, the authors state that the trial "failed to support the efficacy of providing self-help information as a preventative strategy to ameliorate PTSD" (Scholes, Turpin, and Mason, 2007, p. 2527). It seems that this type of support (written materials/self-help) may need to be provided as an adjunct to "additional therapist and input" (Hirai and Clum, 2006; Marrs, 1995; qtd. in Scholes, Turpin, and Mason, 2007, p. 2527).

2.4.4 Apps and e-health

Kuhn et al. (2014) developed a study on PTSD Coach, a smartphone app for post-traumatic stress symptoms. This app was designed to help individuals suffering with PTSD through learning about and cataloguing their own symptoms. Kuhn et al., studied "user satisfaction, perceived helpfulness, and usage patterns of PTSD Coach in a sample of 45 veterans receiving PTSD treatment" (2014, p. 1). PTSD Coach was used for under a week, and then the participants completed a survey about helpfulness of the app. Focus groups about the app's practical uses and benefits were also conducted. The data "indicate PTSD Coach …. as being moderately to very helpful with their PTSD symptoms", in the areas of "management of acute distress and PTSD symptoms, at scheduled times, and to help with sleep" (Kuhn et al., p. 1).

Although the results are preliminary, the ***researchers explain that apps do have potential as an effective self-management tool for the veteran population.*** There were no evaluations made regarding the use of PTSD Coach within a psychoeducational group setting or if the veteran-participants were also receiving other treatments. This potentially poses the problem of skewed epidemiological results based on outside motivators that may exist as those with a higher predilection for using such services may also be seeking help through additional channels.

Several researchers have found that adjustment disorders could possibly be partially addressed with to e-health based treatments. Maercker, Bachem, Lorenz, Moser, and Berger (2015) summarized evidence-based interventions and

concluded that “E-mental health….is uniquely suited for offering early intervention after the experiences of stressful life events that potentially trigger adjustment disorders” (p.1). The researchers posit that e-health (through apps, online meetings, etc.) may be an appropriate option for patients with Adjustment Disorder, since e-health is more accessible that in-person treatments (Maercker, Bachem, Lorenz, Moser, and Berger, 2015, p. 10). Although the study didn’t specify veteran-status, the researchers concluded that e-health is by far, an “under-represented territory” (Maercker et al., 2015, p. 11) in mental health care.

2.4.5 Community Integration

McColl, Carlson, Johnston, Minnes, Shue, Davies, and Karlovits (1998) studied and defined community integration with a consumer-patient, focus. The research team defined community integration by the following macro-categories: “general integration, social support, occupation, and independent living” (McColl and Carlson, et al., 1998, p. 22). Through interviews with TBI patients, this team identified the following additional important areas “conformity, orientation and acceptance” (McColl and Carlson, et al., 1998, p. 22). The study was significant in that it laid foundation for metrics of community integration. Although this early study was not rooted in veteran research, it is significant that the themes of being integrated into a community were identified and defined.

McColl et al. (1998) clarified three broad aspects to community integration, most simply explained by the phrases: “relationships to others, independence in one’s living situation, as activities outside of work, and those activities that fill one’s time” (p. 16). Defining community integration is essential to measuring and understanding progress and quality of life of veterans, as well as their self-concept. The Community Integration Measure (CIM) and the Community Integration Questionnaire (CIQ) were two of the early instruments for determining a variety of related factors relative to veterans’ integration. The CIQ is a 15-item questionnaire that measures an individuals’ integration into the home and family life. Since the instrument’s early usage, factor analysis has revealed that there are three subscales of high relevance to Community integration studies: “home integration,

social integration, and productive activity" (Sander, Fuchs, High, Hall, Kreutzer, and Rosenthal, 1999, p. 1304).

Sander et al. (1999) conducted principal component analysis (PCA) on Community Integration Questionnaire items, followed by correlational analysis of CIQ scores. The purpose of the study was to investigate the CIQ and outcomes measures such as the Functional Assessment Measure (FAM), and the Disability Rating Scale (DRS). The CIQ scores showed significant correlation with the Family Integration Measure (FIM), the FAM and the DRS. This study established that the factor structure of the CIQ is "clinically and theoretically meaningful" (Sander, Fuchs, High, Hall, Kreutzer, and Rosenthal 1999, p. 1303).

Reistetter, Spencer, Trujillo, and Abreu (2005) studied areas such as life satisfaction within The Community Integration Measure (CIM). They set out to "examine instrument reliability, validity, factor structure, and conceptual underpinnings" of the CIM, CIQ-R (Community Integration Measure-Questionnaire-Revised), in comparison to The Satisfaction with Life Scale (SWLS). The researchers concluded that the CIM is a reliable measure of individual perception of community integration.

Despite injury, many patients (and assumedly, veterans) will seek greater social integration as a main facet of community integration and an improved quality of life. This means that veterans will seek increased autonomy and self-direction. Therefore, McColl et al. (1998) "operationalized" community integration as "independent living, occupation, and social support" that features "client-centered definitions" (p. 17). To quantify these areas, McColl et al. (2001) led a research team to further develop this important field within only a few years.

In 2001, McColl, Davies, Carlson, Johnston, and Minnes provided the Community Integration Measure (CIM) through a validation study of 92 participants. The sample was comprised of brain injury survivors (n= 41), their significant others (n=36), and college students (n=15). This study emphasized the CIM's psychometric properties such as "factor structure, distribution, validity of context and construct" (McColl, Davies, Carlson, Johnston, and Minnes, 2001, p. 429). After conducting principal factor component analysis, the CIM was deemed

as a psychometrically reliable, easy to administer, measure of community integration.

The CIM is known for accurately measuring community integration. Because rehabilitation and other treatment aims to assist in community integration, it is essential to have a measurement to gauge increments of growth. With respect to obstacles, Butler (2016) found that many college-aged veterans report three main themes and challenges: “communication, trust, and support” within the contexts of their “personal lives, the college experience, and the VA” (p. 2).

2.5 Conclusions

The investigation of the lived experiences of military veterans as they reintegrate into their communities has been identified by the VA as a topic for attention. Never before has the need for clinical and community responsiveness as well as program effectiveness been greater for veterans, given the high prevalence rates of depression, PTSD, and suicidality they face. The investigation of this research could provide information to many stakeholders: the veterans, the VA system and military charged with their medical care, families and communities.

Veterans have identified reintegration as a difficult issue, and desire information and assistance to be provided to them over the internet or through apps. ***The user needs, obstacles, and context considerations of this population to address the reintegration issue are unspecified at the time of this research effort.*** There is some agreement among the medical community with regards to diagnostic criteria for mental health diagnosis plaguing combat veterans coming home. Yet, the treatment options remain an imperfect science.

While phenomenological approaches to understanding a population are widely used in the sociology, anthropology, and psychology fields, they have remained widely untapped as a tool for user-centered design, with some notable exceptions. This research effort attempts to bridge the gap between phenomenology and user-centered design in a variety of settings and provides qualitative and quantitative reflection on phenomenological application to user-centered design in the military veteran population.

CHAPTER 3. ELICITATION OF VETERANS' LIVED EXPERIENCES + FIRST-CYCLE CODING

Recall there were four main objectives of this study in an effort to contribute to the user-centered design field, as well as the field of veteran/military research:

(1) investigate the lived experiences of young military veterans as they reintegrate into civilian society, using a phenomenological approach. **(*described in Chapter 3)***

(2) scope the design space by assembling a design space criteria list via the identification of user needs, user obstacles, and context of use considerations of the young military veteran population. ***(described in Chapter 4)***

(3) construct military veteran design personas for designer use. ***(described in Chapter 4)***

(4) compare phenomenological approaches to participatory design with a traditional participatory design approach, and provide insights about phenomenological approaches to design. ***(described in Chapters 4 + 5)***

In this chapter, RQ1 is addressed: What are the experiences of young military veterans with reintegration into civilian society? Note that the results of first-cycle coding described in this chapter became input data for further analysis that is described in Chapter 4 (and in turn address RQ2 and RQ3). This chapter focuses on the details of the elicitation processes, during which the reintegration experiences of military veterans and their ideas for technology were captured. Additionally, the analysis of the elicitation output, and the emergent themes that

the veterans discussed with respect to reintegration are presented in the form of a phenomenological summary to address RQ1.

As a methods overview, the elicitation process was not kept constant across participants. More specifically, the content of the scripts used for elicitation was kept relatively constant, but the ***order*** in which the interview session and design session were conducted alternated depending on treatment assignment. Additionally, veterans completed the sessions individually, or with another veteran (group setting), depending on treatment assignment. Sessions were audio recorded and transcribed. Coders utilized thematic analysis guidance from Kurasaki (2000) and Grbich (2013) to create a codebook for use in categorizing important transcript excerpts (meaning units). Transcripts were then analyzed using the codebook, and a final corpus of meaning units was generated. Meaning units were categorized by participant, codebook theme, and session (interview or design) during which it was spoken by the participant. The outputs of elicitation and first-cycle coding analysis were:

(1) descriptive statistics to describe participant attributes,

(2) identification of independent variables that impact quantity of meaning units elicited.

(3) the set of meaning units, which:

a. served as input for second-cycle coding to identify design space components (see Chapter 4)

b. served as a foundation for a phenomenological summary.

3.1 Method

Research Question 1 (RQ1) stated: What are the experiences of young military veterans with reintegration into civilian society? This research question was addressed using a mixed methods approach. In order to understand participants' experiences with community reintegration, the themes of community integration developed by McColl et al. (1998) were utilized to generate the questions posed to the participant in the interview session. A traditional participatory design session was also conducted to gain access to participant

opinions about smartphone app requirements to assist with community reintegration. Also, a survey was administered to collect demographic and Community Integration Measure (CIM) responses to identify any potential confound regarding homogenous balance of the four treatment groups. Participant responses were audio recorded and later transcribed. Participant transcripts were examined and analyzed with a codebook developed from the annotation of a sample of transcripts which led to the creation of emergent themes. The codebook creation process was completed in accordance with a methodology presented by Kurasaki (2000). Each transcript was examined by two coders, who tracked their agreements and disagreements on coding decisions, and disagreements were resolved by a coding judge. After this analysis was complete, statements from all participants that were thematically grouped could be viewed concurrently, as they were coded and identified with the same code number from the codebook. This provided clarity when ideating the phenomenological summary of the veterans' lived experiences with community reintegration. Also, the resulting set of meaning units from first-cycle coding became the input for second-cycle coding discussed in the following chapter. After qualitative analysis, statistical methods were utilized in order to investigate the differences in the quantity of meaning units collected across the four treatment groups, as well as to investigate descriptive and inferential information about participant attributes. An overview of the process from elicitation through first-cycle coding is presented in Figure 3.

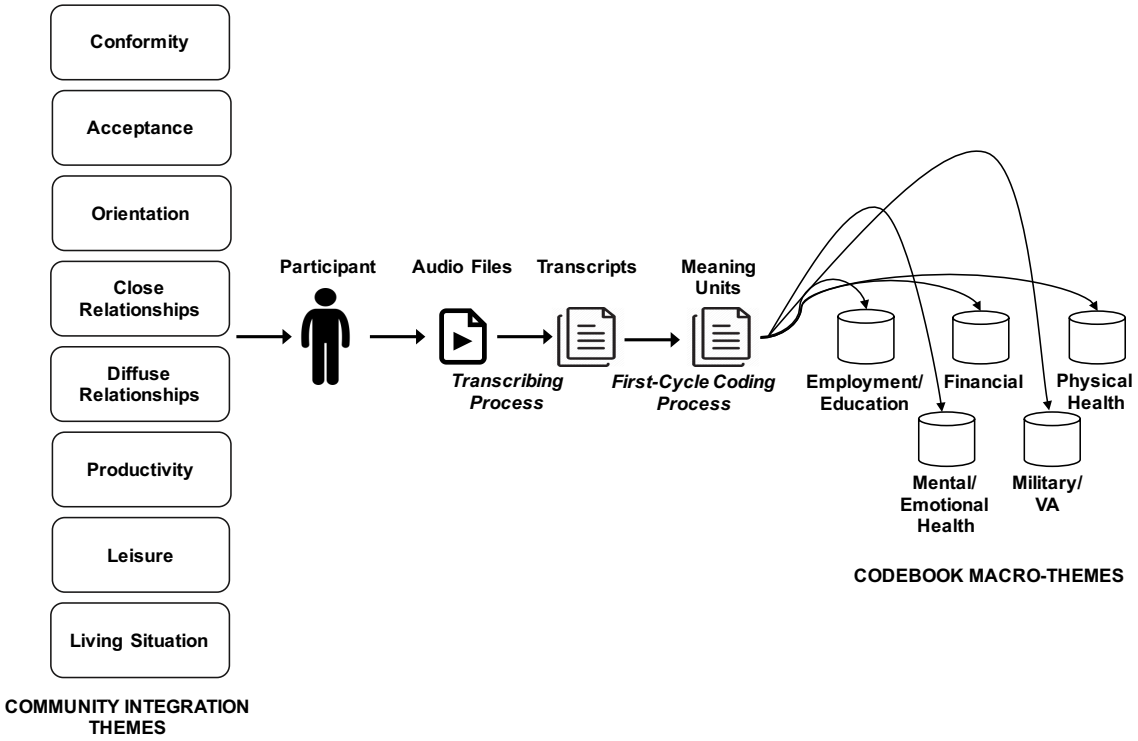

Figure 3. Participants were queried about their lived experiences with the community integration themes. Community integration considerations were also utilized as a prompt in a participatory design exercise. Important excerpts (meaning units) from participant transcripts were identified categorized with a codebook.

3.1.1 Experimental Design

The ability to investigate the influence of an individual or group setting on both meaning units quantity (first-cycle coding results, outlined in this chapter) and design space criteria quantity (second-cycle coding results, outlined in Chapter 4) was desired. Additionally, the impact of the order in which participants experienced the sessions was also examined. Thus, the research design used for the elicitation phase was a 2 x 2 (setting x order) between-subjects design. Participants were assigned to one of the four treatments based on availability and preference. Effort was made to balance treatment groups such that each treatment group would contain an equal number of participants who had been diagnosed with PTSD with participants who had not been diagnosed. The four treatment groups were named:

Treatment II-ID: Individual setting interview session first + design session second

Treatment GI-GD: Group setting interview session first + design session second

Treatment ID-II: Individual setting design session first + interview session second

Treatment GD-GI: Group setting design session first + interview session second

Table 1 details the specific independent and dependent variables utilized for first-cycle coding and analysis.

Table 1
Independent and dependent variables used in elicitation and first-cycle coding

Variables	Description
Independent Variables	
Session Setting	Two level categorical: Individual Group
Session Order	Two level categorical: Interview First Design First
Dependent Variables	
Meaning Units	Quantity of total meaning units elicited
Interview Meaning Units	Quantity of meaning units elicited in the interview session
Design Meaning Units	Quantity of meaning units elicited in the design session

The dependent variable “Meaning Units” for a participant was defined as the sum of that participant’s interview meaning units and design meaning units. “Interview Meaning Units” and “Design Meaning Units” for a participant represent the meaning units elicited from the participant during that respective session in the experiment.

3.1.2 Recruitment

3.1.2.1 Flyer Distribution. After Virginia Tech IRB approval was obtained (Appendix A.1.1), flyers were distributed (Appendix A.2) around the Virginia Tech Blacksburg campus and the downtown Blacksburg area. Additionally, other area college campus IRB offices were contacted before distributing the flyer to students of those campuses via a listserv announcement. Veteran-related organizations

such as VFW, Virginia Veteran Family Support, and the Virginia Employment Commission also assisted with flyer distribution. The local Veterans Affairs Hospital required a full IRB process, and after approval was obtained (Appendix A.1.2), flyers were distributed to various employees of the hospital to distribute to their patients who upon discharge, met participation criteria.

As the elicitation phase was ongoing, the researcher was able to hear from local veterans directly where they (and potentially other veterans) frequently visit for work or leisure. Flyers were also placed at these locations (such as gun shops, sporting goods stores, police stations, manufacturing companies, and home improvement stores) with permission from the business owners or managers.

Nearly 1/4 of the total participant pool was recruited by other participants who had completed the experiment sessions. Flyers were provided to participants as they left the session, such that they could pass them to other veterans they knew, who in turn could contact the researcher if they were interested in learning more about the research and potentially participating. Alternatively, some participants were eager to complete the elicitation phase in the group setting, and contacted a friend who was a veteran about the research. This veteran then contacted the researcher to gain insight about the study and could then agree to participate in the group setting with the other veteran, if desired.

3.1.2.2 Exclusion Criteria. Initially, the intent of this research focused on the investigation of community integration challenges faced by young male military veterans with PTSD. However, when PTSD was listed as one of the *requirements* to participate in the study on the earlier version of the recruitment flyer, no potential participants contacted the researcher. When the researcher removed the requirement of being diagnosed with PTSD, several potential participants began contacting the researcher, *including* participants who had PTSD, which was determined by the on-phone/over-email screening questionnaire (Appendix A.3). Rather than exclude this highly stigmatized group from the research, they were included, and an attempt was made to balance distribution of PTSD-diagnosed participants among the four treatment groups.

In order to participate in this research, participants were required to be male military veterans between the ages of 18 and 35 years old. There were no other exclusions, but information about the participant's technology use was noted as well. All participants (likely due to the factor of their age) were comfortable using technology, and had experience with apps on their cellular telephones.

During the administration of the screening questionnaire, participants were asked if they preferred to interview one-on-one or with another veteran, or if they had no preference. Most had no preference and agreed to be interviewed one on one or with another vet; however, several had a preference to be interviewed with a veteran from the *same branch of service* if they were assigned to a group setting. Accommodations were made for these participants: either they attended an individual session, or were assigned to a group session with another veteran from the same branch of service. One participant requested to be interviewed alone, and thus was assigned to an individual setting.

3.1.3 Participants

Participants were young male military veterans residing in Virginia's New River Valley area. They selected one of two possible interview locations (Virginia Tech campuses in Blacksburg and Roanoke, Virginia). Table 2 summarizes the demographic characteristics of N = 40 participants. They ranged in age from 23 to 35 years. The age distribution was not normal, but skewed, because most of the participants (n = 23, 57.5%) were 31 to 35 years old (*Median* = 31.0 years). The marital statuses included married, single, or divorced/separated, and the majority (n = 21, 52.5%) were married. The most frequent ethnic group was Caucasian/White (n = 33, 82.5%) and the remainder were ethnic minorities. The participants represented four branches of the military service, of which the most frequent was the Army (n = 27, 60.0%).

Table 2
Demographic Characteristics of Participants

Characteristic	Category	*n*	%
Age Group (Years)	23 to 25	3	7.5
	26 to 30	14	35.0
	31 to 35	23	57.5
Marital Status	Married	21	52.5
	Single	14	35.0
	Divorced/Separated	5	12.5
Ethnicity	Caucasian/White	33	82.5
	Asian/Pacific Islander	3	7.5
	Hispanic/Latino	2	5.0
	African American	1	2.5
	Native American	1	2.5
Branch	Army	27	60.0
	Air Force	7	17.5
	Marine Corps	5	12.5
	Navy	4	10.0

Effort was made to balance treatment groups by PTSD diagnosis. Equal numbers of participants not diagnosed with PTSD (n = 5) and diagnosed with PTSD (n = 5) were represented in three treatment groups: II-ID, GI-GD, and ID-II. In treatment group GD-GI, the number of participants not diagnosed with PTSD (n = 6) was greater than the number diagnosed with PTSD (n = 4). The sampling design matrix in the form of a cross-tabulation of the frequencies within each of the four treatment groups x diagnosis of PTSD is presented in Table 3.

Table 3
Sampling Design Matrix (Treatment Group x PTSD)

Treatment Group	Diagnosed with PTSD		Total
	No	Yes	
II-ID (Individual, interview first, then design)	5	5	10
GI-GD (Group, interview first, then design)	5	5	10
ID-II (Individual, design first, then interview)	5	5	10
GD-GI (Group, design first, then interview)	6	4	10
Total	21	19	40

3.1.4 Experiment Materials

Information about each participant's lived experience with community reintegration and their ideas for technology design was elicited using the appropriate interview and design session scripts (Appendix A.6). The scripts used for all four treatments were nearly identical, however, the *order* of the two-part session was different depending on whether the participant(s) completed the interview first or the design session first. There were slight adjustments made in the scripts for the group setting to ensure that both participants had opportunities to contribute. For example, interview questions were re-iterated in the group setting to allow both participants to respond. All participants were provided a glossary of the community integration themes (Appendix A.5) at the beginning of their first session, be it the interview session or the design session.

3.1.4.1 Interview Sessions. As one of the objectives of this research was to understand the lived experiences of veterans relating to community integration, question prompts in the interview session were formulated from pre-identified community integration themes. Additionally, given the objective design space criteria of user needs, user challenges, user barriers, and context of use considerations, questions were structured in order to elicit information that could be translated into the design space (see Chapter 4). An example interview prompt is presented in Table 4 on the following page.

Table 4
Example interview question objectives and corresponding prompts (Acceptance)

Interview Question Objectives:		Interview Prompt:
Define the theme		The next question I'm going to ask you is about acceptance. In this session, think of acceptance as your perception of being welcomed by the people of the community you are trying to integrate into.
Elicit experience **Elicit Needs** **Elicit Challenges and Barriers** **Elicit Needs**	**Elicit Context of use considerations**	1) Do you feel a good sense of acceptance in your community? Do you feel like you belong there? Please answer yes or no. 1a) *IF YES:* What are some examples of how you felt accepted by your community after becoming a veteran? 1b) *IF NO:* What are the issues, maybe on both your part and the community's part, that prevented you from feeling accepted? What would need to happen for you to feel accepted?
Elicit Challenges and Barriers		2) What challenges can you think of, that may prevent a veteran from feeling accepted?

Interview prompts were structured in order to capture information that could be formulated into eventual design space criteria. For example, if a participant did feel a good sense of acceptance, he was asked to provide examples of how his acceptance was enabled. If the participant did not feel a good sense of acceptance, he was asked to offer barriers to his acceptance as well as ideas to potentially improve acceptance. These meaning units, once coded in second-cycle coding, would produce needs, obstacles (challenges and barriers) and context of use information (see Chapter 4). In order to glean additional information about challenges and barriers, a second question was posed to ask the veteran if he could think of any challenges the veteran population in general may face with each community integration theme. This question was posed to assure that challenges and barrier-type information would be collected, as well as any issue that the veteran may have been too embarrassed to discuss in question 1 but could now be discussed in question 2 as the focus was taken off of him personally and placed on the population as a whole.

3.1.4.2 Survey. After participants completed the interview session of the elicitation, they completed a survey (Appendix A.8) that was presented using Virginia Tech's

Qualtrics system. This tool gathered demographic information, participant ranking of the community integration themes with respect to difficulty as well as importance, and the Community Integration Measure (CIM), a self-report Likert-type subjective measure for community integration (McColl et al., 2001), which was used in further analysis.

3.1.4.3 Design Sessions. The design session script contained three modules: a KJ design exercise, a wire-framing exercise, and a persona review. The KJ design exercise was open-ended in accordance with a traditional participatory design KJ session. The questions “Imagine you are designing an app to help veterans with community integration, what features or capabilities would this app need? What topics would it need to address?” were posed, and participants were encouraged to brainstorm all ideas that they could generate. Participants were given as much time as they needed to complete the KJ design exercise. Participants completed a wire-framing exercise, which was also structured in an open-ended fashion, prompting participants to provide verbal guidance as they mocked up the layout design and highlighted features that would be important to them if they were to use an app for community reintegration. Scripts for the design session are available in Appendix A.6. Participants were given as much time as they needed to complete the wire-framing exercise. As a final module of the design session, two personas (Appendix A.7) representing two different veterans were provided to the participants. One of the personas used was created from research by the Veterans Affairs Center for Innovation (VACI, 2014). The other persona was generated by the researcher from the analysis of the pilot participant’s data using first and second-cycle coding. These personas were provided to the participants as the last prompt of the design session as a reflection mechanism for participants. Participants were instructed to verbally relay how each persona would utilize the hypothetical app created by the participants, and were permitted to adjust their app requirements from the KJ and their wire-framing layout if they deemed it necessary to enhance the personas hypothetical use of the app.

3.1.5 Instruments

Interviews were recorded using two recording devices: the primary being a MXL AC404 USB Conference Microphone that plugged directly into the researcher's laptop, and the second being the iOS app "Voice Recorder" by TapMedia Ltd, which was used on the researcher's iPhone 6. QuickTime Media Player version 10.4 was used to record audio received from the MXL AC404 microphone. The backup audio files created using the iPhone "Voice Recorder" app were transferred to the researcher's laptop using the AirDrop feature. All audio files were uploaded to Virginia Tech's Scholar (a cloud-based storage service), into a project site created specifically for this research.

An iPad and iPad Pro were used to administer the post-interview questionnaire. Two iPads were used such that participants in the group setting did not have to share an iPad, they could both take the survey synchronously on their own iPad.

During the design session of the elicitation, participants utilized post it notes and markers provided by the researcher, and a white board was used as a space to organize the post-it notes and was also a writing surface to capture any additional ideas.

3.1.6 Procedure

Potential participants contacted the primary research by phone or by email in response to recruitment. During the initial phone or email contact, a screening questionnaire was used to ensure demographic qualifications were met. If a participant did not want to be assigned to a group setting treatment with other participants, their request was honored and they were placed in an II-ID or ID-II treatment (thereby guaranteeing an individual setting). At this point in the process, the session was scheduled. Participants were required to travel to meet the researcher at a campus location most convenient for the participant. A few days before the session, participants were contacted using their preferred contact method to confirm the session time and location.

Upon arrival to the session, participants were greeted and given two copies of the informed consent. Participants consented to (1) participate in the interview and design sessions and (2) have their session audio recorded. Participants received a glossary of the community integration themes that were the focus of the research. Prior to the participant's first session (be it the interview session or the design session), an icebreaker exercise was conducted. The icebreaker was a semi-structured conversation to establish rapport and give the researcher opportunity to ask about the motivations the participant had for joining the military. This also provided time in the group setting for participants that may not be acquainted to familiarize themselves with the other participant's military backstory. An overview of the experiment order by treatment is provided in Table 5. Participants were given a break between the first and second session.

Table 5
Experiment session order by treatments

Treatments	Experiment Session Process					
II-ID **GI-GD**	Informed Consent	Glossary	Icebreaker	Interview Session with Participant(s)	Demographic + CIM Questionnaire	Design Session with Participant(s)
ID-II **GD-GI**	Informed Consent	Glossary	Icebreaker	Design Session with Participant(s)	Interview Session with Participant(s)	Demographic + CIM Questionnaire

All experiment sessions were facilitated by the primary researcher. Participants were compensated a prorated $15 per hour rate at the conclusion of their session.

All audio files were saved on a password-protected computer and uploaded to a password-protected site on Virginia Tech's Scholar system. These audio files were then transcribed into Microsoft Word. Post-it notes from the design session were retained and placed in a file folder with the participant number(s) as an identifier. Specifics of these processes are described in the following sections.

3.1.7 Transcription

In this research context, *transcription* is defined as the process of transposing the audio files collected in the interview into printed form. This is not a trivial procedure. There are some limitations to the transcription process, including the fact that occasionally the participant's audio was indecipherable, and the challenge of audio files not containing any supplemental visual information to potentially clarify aural nuance. This could be important since gestures and facial expressions were not documented. However, using transcription guidance (Bailey, 2008), a transcribing scheme was adopted in order to provide some context (for example, word emphasis) to those be reading the transcripts. Specifically, emphasis was designated in a transcript by capitalizing an emphasized word, distinguishable in the audio file by participant volume, annunciation, etc. Pauses were noted as well. These additional clarifications provided some dimension to transcripts.

3.1.7.1 Transcription procedure. Each experiment session resulted in two audio recordings (one recording for the interview session and one recording for the design session) and thus two transcripts. As participants in a group setting often spoke to each other as well as engaged in cohort prompting, their session appeared on the same interview and design transcripts, rather than separating those transcripts by participant. Transcribers reviewed Bailey (2008) as a training guide for transcription and attended a training session that involved transcribing example audio excerpts. Directions for indicating the speaker, noting pauses, long pauses, speed of speech, and emphasis or volume were provided.

The process used to transcribe data involved three phases. For a given experiment, the interview and design sessions were initially transcribed by one analyst. This transcript contained the word "Transcribed" in the file name extension (ex. P3P6_I_Transcribed.docx). This file was uploaded to the Virginia Tech Scholar project site into a folder for that session. A different analyst downloaded the transcribed file, and read it while listening to the audio recording. This analyst would make modifications and corrections as necessary to the first draft transcript.

The file would be saved and uploaded to the project site, with the extension "Verified" (ex. P3P6_I_Verified.docx). Finally, the primary researcher examined the verified transcript while listening to the audio file, in an attempt to address any errors in the verified transcript. The primary researcher also had access to back-up audio files (from the iPhone recording), to attempt to resolve any indistinguishable participant speech. Any excerpts that were obscure were marked "(indecipherable)". This final transcript was saved and uploaded to the project site with "Final" as the extension (ex. P3P6_I_Final.docx). The final transcript was downloaded by coders and used for first-cycle coding analysis.

3.1.8 Codebook Development

The guiding objectives for first-cycle coding were to:

(1) isolate and extract important statements spoken by participants (i.e., identify participants' meaning units)

(2) categorize the meaning units such that statements that are similar in nature across participants could be examined, regardless of phrasing and word choice.

In order to categorize participant meaning units, a coding scheme was necessary. A codebook was generated using a grounded theory approach (Strauss and Corbin, 1998) to identify emergent themes. This section examines the method for the development of the codebook for meaning unit categorization.

3.1.8.1 Personnel. The primary researcher plus three analysts developed the codebook for the first-cycle coding process. The process for codebook development is described in the following sections. The analysts attended training sessions where were trained in annotation (Kurasaki, 2000) as they were not expected to be proficient in qualitative analysis prior to this research. To preemptively avoid biasing the personnel, analysts were not given access to research questions.

3.1.8.2 Instrument. The primary researcher and analysts retrieved five random interview transcripts and audio files (if desired) from the Scholar project site in accordance with the procedure outlined by Kurasaki (2000). The random transcripts were chosen using a random number generator from Microsoft Excel. These transcripts were printed on hard-copy for the codebook development process.

3.1.8.3 Codebook Development Process. Coding is not only used to organize data, rather it links data: "It leads you from the data to the idea and from the idea to all the data pertaining to that idea" (Richards & Morse, 2013 p. 154). The approach used for codebook development incorporated the annotation process outlined by Kurasaki (2000), with the caveat that the annotation list was compiled, sorted, and developed into the codebook using an approach adapted from KJ session methodology. The process is outlined below.

Each member of the research team examined the five random interview transcripts and annotated them, in accordance with the first steps of the method outlined by Kurasaki (2000). A grounded theory approach (Strauss and Corbin, 1998) was utilized to identify overarching themes by identifying and grouping patterns in the data. Annotations were written in the margins of the transcript page; these are generally high-level summaries of what is being said by the participant. After the first five interview transcripts had been annotated individually by the team, a meeting was held to examine, compile, and sort annotations.

The researcher and three analysts met to review all of the annotations. Each annotation was written on a sticky note by the author of the annotation. Once all annotations had been written, the sticky notes were placed on a large conference room table. The team walked around the table, silently reading each annotation that had been written. Once this step was completed, the team began moving the sticky notes from the conference room table to the white board. Sticky notes that were similar in topic were grouped using proximity of placement. Descriptive labels were written on orange sticky notes to note the emerging overarching themes of

grouped items. Orange sticky notes that could be consolidated or nested into a higher-level theme were removed in order to develop two levels of hierarchy: an overarching macro-theme, and all of the themes (annotations) within, see Figure 4.

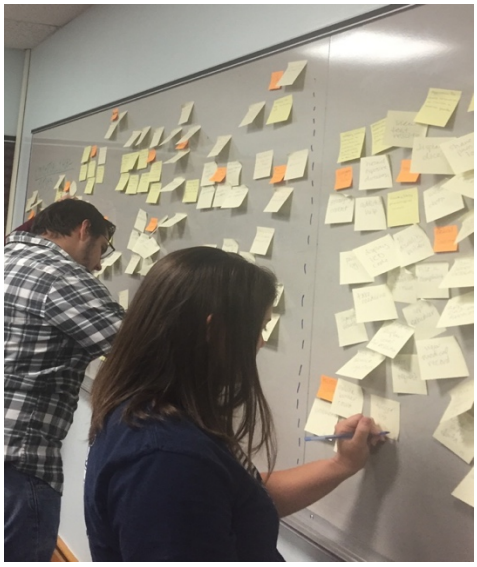

Figure 4. Grouping the annotations into themes in order to generate the codebook.

Once all of the sticky notes had been sorted into groups, the team paused to silently re-read all of the sticky notes to ensure each annotation was placed in a group with similar annotations. Annotations were moved to another group if necessary, or a new group was created.

After this step, redundant annotations were noted and consolidated by stacking the sticky notes of those annotations. This step ensured that the 2-dimensional view of the board was of uniquely different annotations. Each sticky note within a group was marked with the same numeric identifier in order to facilitate easy examination of note groups once the sticky notes were removed from the board. For example, “Employment and Education” topic sticky notes were marked with a “1”, “Financial” topic sticky notes were marked with a “2”, etc.

Discussion was permitted at this point. Team members created a list similar to an annotation list (Kurasaki, 2000) by placing sticky notes of each category into a vertical arrangement. Pairwise comparisons were done in order to arrange similar sticky notes to be closer together than vastly different sticky notes within

the same category. For example, all sticky note annotations regarding physical injury were placed in a sequential fashion in the “Physical” category list, which also included sticky note annotations about weight gain and sleep issues. The results of this exercise served as the foundation for the codebook.

3.1.8.4 Codebook Finalization. The results of the codebook KJ session discussed in 3.1.8.3 provided a hierarchical view of the information by grouping similar annotations together and then labelling them with a descriptive category name termed a “macro-theme”. All macro-themes were included in the codebook in order to ease the search effort required of the coders. A decimal numbering system was used to note the different hierarchical levels of the themes, as well as their categorization. For example, all themes within the macro-theme “4. Mental and Emotional Health” were numbered 4.x. The digit after the decimal specifies the exact theme of categorization (for example, 4.4 Suicidal thoughts/attempts was categorized inside the macro-theme of 4. Mental and Emotional Health).

As the codebook was based solely on the annotations from 5 transcripts, it was possible that the first draft would not adequately categorize all important meaning units from all interview transcripts. Therefore, 5 additional transcripts were annotated by the research team, and an additional codebook KJ session was held for only those verbatim excerpts that could not be adequately coded by the first version of the codebook. The sticky notes for these annotations were no longer placed in emergent categories, but were forced into the existing macro-themes from the first iteration of the codebook: Employment and Education, Financial, Physical Health, Mental and Emotional Health, Relationships, or Military and VA. The codebook was revised to include 1.13 Having an “all business” approach to college/getting a degree, 5.6 Racism, 5.17 Ease or Difficulty relating to older/Vietnam vets, and 6.10 Guilt for receiving more benefits than another “more deserving” vet. The final codebook containing macro-themes, themes, and numeric identifiers is presented in Table 6.

Table 6

Codebook used to categorize meaning units

Code Number	*Macro-Theme/Theme*
1.	**Employment + Education**
1.1	Difficulty finding employment
1.2	Not ideal employment (ex. not interesting, not fulfilling)
1.3	Overqualified for job obtained
1.4	No clear translation of skills to civilian world
1.5	Need to avoid stressful or traumatic jobs
1.6	Discrimination
1.7	Favoritism/ease of finding employment
1.8	GI Bill issues
1.9	Rule bending/rule breaking/tardiness issues
1.10	Civilian attitude towards school + job (ex.: lazy, partying, dog eat dog)
1.11	School environment/culture issues
1.12	Feeling “back at square one” when military employment ends
1.13	Having an “all business” approach to college/getting a degree
2.	**Financial**
2.1	Strain or difficulty
2.2	Housing issues
2.3	VA Disability-related monetary issues
3.	**Physical Health**
3.1	Injury occurred + evident during service
3.2	Delayed onset injury (manifests after discharge)
3.3	Dietary/weight management/exercise
3.4	Sleep issues
3.5	Drug/Alcohol abuse by self or other vet
4.	**Mental + Emotional Health**
4.1	Emotional difficulties connecting with loved ones
4.2	Anxiety + PTSD + Traumatic experiences
4.3	Issues with feeling like a valuable member of society
4.4	Suicidal thoughts/attempts
4.5	Anger with civilians or close relationships
4.6	No desire to be in large crowds/bars/movie theaters; threat assessment
4.7	Enjoyment of leisure time, “me time”
4.8	Fulfillment through helping others/community and volunteer work
5.	**Relationships**
CIVILIANS	
5.1	Difficulty relating to or interacting with civilians
5.2	Disrespect or criticism by civilians
5.3	Have you ever killed anyone?
5.4	Civilians are materialistic/worried about trivial things
5.5	Vet-phobia, stigma, and stereotypes
5.6	Racism
5.7	Praise or appreciation by civilians
5.8	“We know things about the world that the average civilian doesn’t”

FRIENDS AND FAMILY

5.9	Support from friends and family
5.10	Leisure time, spending time with friends and family
5.11	Issues/lack of support from friends and family
5.12	Drug/alcohol abuse by friends or family
5.13	Separation from spouse/kids (ex. divorce, missing kid's milestones)

GOD/CHURCH

5.14	Relationship with spiritual/religious figure

OTHER VETS + THEN VS. NOW

5.15	Support through interaction with other veterans
5.16	Lack of brotherhood/support after military
5.17	Ease or difficulty relating to older/Vietnam Vets

6. Military and VA

6.1	Discrepancy between regimented life and veteran/civilian life
6.2	Difficulty transitioning to independent adulthood
6.3	Military helped with autonomy/independence
6.4	Lack of empathy from military
6.5	Lack of empathy from VA
6.6	Difficulty obtaining VA benefits
6.7	VA accountability/competence and communication
6.8	Anger with other vets who malinger/game the system
6.9	Think highly of other vets (ex. vets are hardworking)
6.10	Guilt for receiving more benefits than another "more deserving" vet
6.11	The Reserves

This final codebook was not revised again, and was systematically applied to code all of the transcripts. The process for coding the transcripts with the codebook follows.

3.1.9 First-Cycle Coding

The process of first-cycle coding involved the examination of all transcripts, the identification of important excerpts (meaning units), and the classification of those excerpts using the codebook. The completion of first-cycle coding transformed raw transcripts into a more concise reduced data set, organized by macro-theme and theme to facilitate generation of phenomenological summary, as well as to serve as an input to the second-cycle coding process outlined in Chapter 4. The first-cycle coding process for this research took roughly 2.5 months to complete. The guiding objectives for first-cycle coding were to:

(1) isolate and extract important statements spoken by participants (the participant's meaning units)

(2) categorize the important statements such that statements that are similar in nature across participants could be examined, regardless of phrasing and word choice.

The benefit of the first-cycle coding method selected was that it was both structurally and thematically analytic in one step. As data was being reduced by extracting only the meaning units from the transcripts while discarding the rest, those meaning units were also being categorized using the codebook in order to facilitate identification and grouping of meaning units by over-arching theme.

3.1.9.1 Personnel. Eight coders, including 3 of the analysts from the codebook development process, served as the personnel to extract and categorize the meaning units. Personnel were not given access to research questions in order to guard against potential bias. Coders were required to be undergraduate students in the Industrial & Systems Engineering Department at Virginia Tech, and participated as part of a 3-credit undergraduate research course offered at Virginia Tech. Consequently, they each allocated 9 hours every week to work on the analyses for this research. The same coders were utilized for the second-cycle coding process to translate the meaning units into design space language (see Chapter 4). As coders were not required to be familiar with qualitative research methods a priori, they attended several training sessions on first-cycle coding conducted by the primary researcher. They were provided several training materials (Appendix B.1), including coding instructions and background on thematic analysis (Appendix B.1.1), the codebook itself (Appendix B.1.2), as well as guides for the coder meeting (Appendix B.1.3) and reconciliation meeting with the judge (Appendix B.1.4). The instrumentation and processes used by the coders is described in the following sections.

3.1.9.2 Instrument. After completion of coder training, the coders used Microsoft Word to view transcripts and coded them by using the highlighter function to select and distinguish the intended meaning unit. Coded transcripts were saved in

Microsoft Word with the coder's last name as the extension (ex. P3P6_I_Lisle). Coded transcripts were uploaded into the coder's folder in the Virginia Tech Scholar project site. Microsoft Excel was used to generate a disagreement template (Appendix B.2) for the reconciliation process. The disagreement list for a session, which was the list of instances where coders disagreed on coding, was also uploaded to the Virginia Tech Scholar project site into the folder that contained all populated disagreement lists. The list of reconciled meaning units took the form of a Google sheet, such that all coding personnel would have access to the most up to date version, and could continuously populate the sheet with newly reconciled meaning units.

3.1.9.3 First-Cycle Coding Process. The two transcripts from each experiment session (both the interview and design sessions components) were independently coded by two self-assigned coders. Coding involved the identification and isolation of the meaning units, and categorizing those meaning units with the codebook in accordance with coding instructions (Appendix B.1). Coders scheduled a coder meeting and noted their coding agreements (and placed them in the reconciled codes google sheet) and disagreements (and placed them in the disagreement template). Coders brought their disagreements to a judge in a separate meeting, called the reconciliation meeting. The judge had final authority on how a disagreement was coded (or if it was coded at all), and codes reconciled by the judge were placed in the reconciled meaning units list. After the reconciliation meeting with the judge, coding for that experiment session was complete. Once a coder had completed the reconciliation process, he/she immediately signed up to code another session transcript set, using a google sheet that listed all available participant sessions. Rather than use the researcher to assign coders to sessions, it was decided to be a better use of time to allow coders to self-select transcripts and begin coding them immediately after a reconciliation was complete.

An overview of this process is presented in Figure 5.

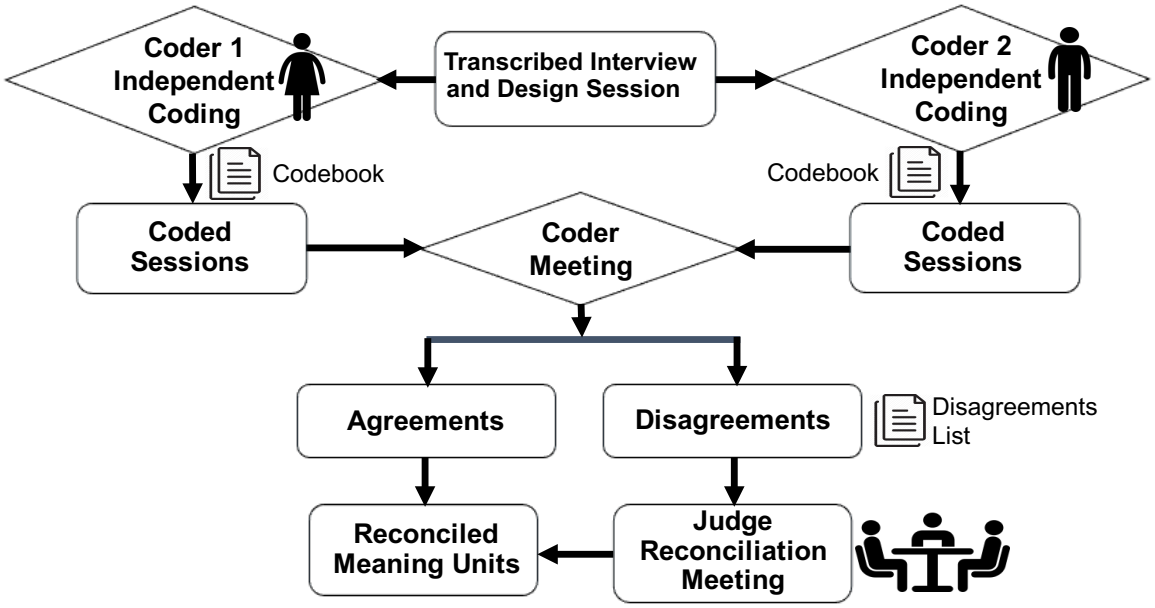

Figure 5. First-cycle coding process. After independent coding, agreements between coders were automatically placed in the reconciled meaning units list. Disagreements were resolved by a judge, and then placed in the reconciled meaning units list.

The details for the structure of the coder meeting and reconciliation meeting attended by the coders and the judge follows.

3.1.9.3.1 Coder meetings. Coders met in person after they had independently coded their assigned transcripts. Coders reserved meeting rooms with projection capability. During this meeting, they projected one coder's coded file onto the wall, while viewing the other coder's coded file on a laptop. Coders compared their meaning units, as well as their coding for those meaning units.

Coder training documents provided the metrics by which to classify the coding of an examined meaning unit as an "agreement" between the two coders or as a "disagreement". There were no degrees of disagreement (i.e. no weightings). This scheme is summarized in Table 7.

Table 7
Criteria for coder agreements and disagreements

Coder 1 Action	Coder 2 Action	Classification	Result
Coded meaning unit	Coded meaning unit with same macro- and theme	Agreement	Meaning unit placed in reconciled corpus
Coded meaning unit	Coded meaning unit with same macro- but different theme	Disagreement	Meaning unit placed in disagreements list
Coded meaning unit	Did not code meaning unit, but agrees it should be coded, and agrees with coder 1 categorization	Agreement	Meaning unit placed in reconciled corpus
Coded meaning unit	Did not code meaning unit, believes coder 1 meaning unit is irrelevant	Disagreement	Meaning unit placed in disagreements list
Coded meaning unit	Did not code meaning unit, but agrees it should be coded, but disagrees with coder 1 categorization	Disagreement	Meaning unit placed in disagreements list

This meeting resulted in a list of coded meaning units that the two coders agreed on the coding for, along with a list of disagreements, instances where they disagreed on the coding for a meaning unit. Agreements were placed in the final reconciled meaning units list contained in a Google sheet, while disagreements were tracked on a local excel file (Appendix B.2) that was presented to the judge at the reconciliation meeting in accordance with procedures adapted from Capra (2006).

3.1.9.3.2 Reconciliation meetings with the judge. Reconciliation meetings were attended by the coders who had coded an interview and design session for a participant (or pair of participants from the GI-GD and GD-GI treatments), as well as a judge. Coders rotated judge positions to promote work flow and rapport. For each disagreement on the disagreements list, the coders presented their rationale for their categorization of the meaning unit to the judge. In events where the coders were able to reach an agreement during the meeting, these agreements were placed in the reconciled meaning units file, and were not considered to be coded by a judge decision. However, when the coders were unable to reach agreement on meaning unit status or code assignment, the judge made the final coding decision. All meaning unit classifications that were determined by a judge received a stamp by typing “J” in a judge column of the Google sheet in that meaning unit’s

row. This assisted with facilitating inter-coder reliability calculations, discussed in the following section.

3.1.9.4 Inter-coder reliability. Using Cohen's (1960) coefficient of coder agreement (the Kappa coefficient, $\boldsymbol{\kappa}$), a measure of inter-coder reliability was calculated. This coefficient was calculated for the data from each "coding team" (defined as the accumulation of data from every instance when 2 defined coders coded a session). There were 8 total coders, and since coders were not pre-assigned into coder-pair teams, (rather, they were encouraged to sign up for sessions and code available sessions on their own schedule), 14 unique pairings of coders resulted. The reconciled meaning units were examined for each unique pairing of coders. Meaning units that were coded as a result of a judge decision were tagged with a "J". The agreement for each team was calculated before the reconciliation meeting with the judge and after the reconciliation meeting. Agreement $\geq$ 0.995 was noted as 1. Note that agreement after the reconciliation meeting with the judge was not always equal to 1, as Cohen's coefficient takes into account agreement due to chance. The agreement per team, before and after reconciliation, is displayed in Figure 6.

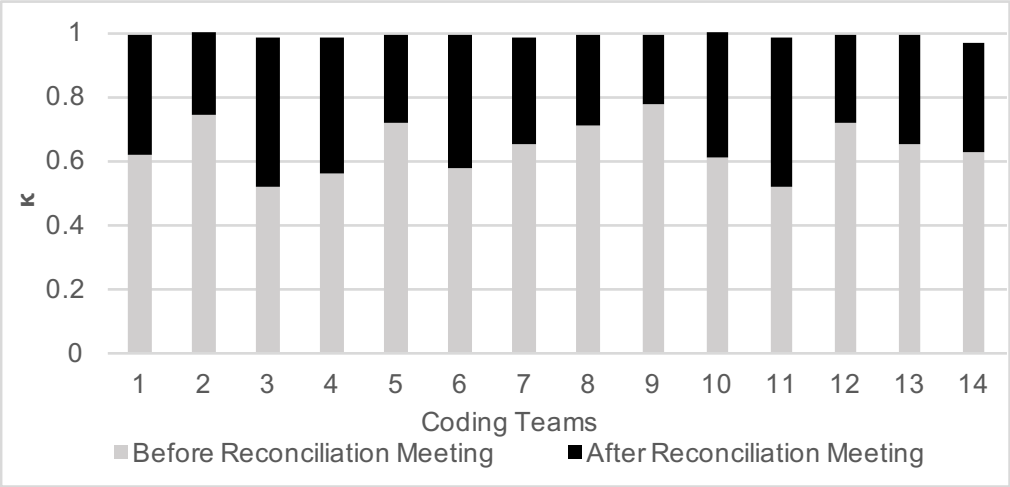

Figure 6. Agreement per unique pair of coders before and after reconciliation

Based on the guidelines for interpretation of Cohen's coefficient provided by Landis and Koch (1977), Teams 3, 4, 5, and 11 had moderate agreement (κ_{initial}

= 0.52, 0.56, 0.58, and 0.52, respectively). Teams 1, 2, 5, 7, 8, 9, 10, 12, 13 and 14 had substantial agreement (κ_{initial} = 0.62, 0.74, 0.72, 0.65, 0.71, 0.78, 0.61, 0.72, 0.65, 0.63, respectively). Alternatively, these coefficients groups could have been interpreted as "weak" and "moderate", respectively, using McHugh's (2012) more rigorous interpretation of Cohen's coefficient. After the reconciliation meetings facilitated by the judge, agreement improved to approach perfect levels of agreement ($0.98 \leq \kappa_{\text{final}} \leq 1$).

3.1.10 Selection of statistical analyses: dependent variables

Statistical analyses of dependent variables were conducted to determine (1) if dependent variable data followed a normal distribution and later, (2) main and interaction effects of independent variables and (3) differences between treatments with respect to dependent variable results. These statistical tests were conducted using Microsoft Excel, using Real-Statistics add-on functionality.

3.1.10.1 Fit Statistics. Dependent variables Interview Meaning Units (meaning units elicited during the interview session), Design Meaning Units (meaning units elicited during the design session), and Total Meaning Units (total meaning units from both sessions) were examined to determine their fit to a distribution. As a first step, all dependent variables were tested for Normality. Shapiro-Wilk has the best power for a given significance when compared to an Anderson-Darling test (Razali, N., Wah, Y.B., 2011), but an Anderson-Darling test is more sensitive (Stephens, 1974), therefore both tests were utilized to examine the data for normality. Normality was supported by an Anderson-Darling test (Stephens, 1974) and a Shapiro-Wilk test for 2 of the 3 dependent variables: Total Meaning Units and Interview Meaning Units. Consequently, it was supported that Interview Meaning Units and Total Meaning Units follow a Normal distribution, while Design Meaning Units does not (see Table 8).

Table 8
Fit statistics test results for Normality

alpha = 0.05 **Dependent Variables**	**Anderson-Darling** Ho: the data follows a Normal Distribution Ha: the data does not follow a Normal Distribution **Decision Criteria:** p > alpha, fail to reject Ho	Decision:	**Shapiro-Wilk** Ho: the data follows a Normal Distribution Ha: the data does not follow a Normal Distribution **Decision Criteria:** p < alpha, reject Ho	Decision:
Total Meaning Units	A^2=0.253 , n=40 , p=0.717	Fail to reject Ho	W=0.981 , p=0.731	Fail to reject Ho
Interview Meaning Units	A^2=0.184, n=40, p=0.903	Fail to reject Ho	W=0.970, p=0.684	Fail to reject Ho
Design Meaning Units	A^2=1.381, n=40, p=0.001	Reject Ho	W=0.896, p=0.002	Reject Ho

Table 9
Statistical tests selected

Dependent Variables	**Independent Variables:** Setting, Order **Tests selected to assess main and interaction effects:**	**Treatments:** II-ID, GI-GD, ID-II, GD-GI **Tests selected to assess treatment differences for significance:**
Total Meaning Units	**ANOVA**	**Fisher LSD**
Interview Meaning Units	**ANOVA**	**Fisher LSD**
Design Meaning Units	**Kruskal-Wallis**	**Mann-Whitney**

3.1.10.2 Parametric and nonparametric test selection. Parametric statistics were utilized for Interview Meaning Units and Total Meaning Units analyses. Nonparametric statistics were utilized for Design Meaning Units analyses (Table 9), as Design Meaning Units data was positively skewed. See section 3.2.4 for the details of these calculations.

Circumspect inspection of all results was necessary given that meaning units are unstandardized, as they are verbatim excerpts from participants. Using a segmentation approach (Grbich, 2013) to identify the data and categorize it can become unwieldy, with more information being contained in a single meaning unit than another meaning unit when performing pair-wise comparisons of meaning units. This may be due to coder decisions to keep a meaning unit intact rather than splitting into smaller meaning units, such that context of the meaning unit is retained. The functional goal of first-cycle coding was to provide the means to examine information of similar theme from each participant and across participants. It also generated the meaning units corpus which became the input data for second-cycle coding. Interpretation of any significant findings after first-cycle coding implies statistical information about the *quantity of meaning units*, not necessarily the *quantity of information*. The results of first-cycle coding and accompanying analyses follows.

3.2 Results

Forty-one military veterans participated in a total of 31 experiment sessions. The 31 sessions consisted of 21 individual sessions and 10 group sessions (containing two participants each). Participant 1's session was discarded prior to analysis, as his post-experiment feedback led to modifications in the design session script. Therefore, the final data set for analysis consisted of the interview and design sessions of 40 military veterans, 20 of who participated in individual settings, and 20 of who participated in group settings (which yielded 20 individual sessions and 10 group sessions).

3.2.1 Participant age by treatment

Participants were assigned to treatments based on availability and preferences, while balancing treatment groups with equal participants with a PTSD diagnosis and without a PTSD diagnosis. Ages of participants were noted, and a Kruskal-Wallis test was conducted to determine if the median ages varied between the groups.

There was a significant difference in the ages of the four treatment groups ($H(3) = 9.750$, $p = .021$). The GI-GD treatment contained the youngest participants (*Median* = 27 years) whereas the II-ID treatment, ID-II treatment, and GD-GI treatment medians were 32 years, 32 years, and 31 years, respectively. Consequently, the four groups were not equivalent with respect to the age distribution of the participants (Appendix B.4.1). The fact that the four treatment groups were not age balanced should be considered when interpreting results.

3.2.2 Community Integration Measure

The Community Integration Measure (CIM) is a 10-question normally distributed continuous 5-point Likert Scale (McColl et al., 2001) and therefore parametric statistics were appropriate to analyze the response data. The maximum possible CIM score, indicating the highest level of community integration is 10 x 5.0 = 50.0. The CIM results from participants were examined to determine if there were any major differences between treatment groups that should be considered

when interpreting meaning unit analyses results, or if the groups were homogenous with respect to CIM scoring. The highest observed individual item mean scores (M > 4.0) on the 5-point scale, representing the highest levels of overall community integration were for the following items:

- 5: I can be independent in this community (M = 4.38, SD = 0.93);
- 2: I know my way around the community (M = 4.35; SD = 0.92); and
- 3: I know the rules in the community and I can fit in with them (M = 4.18, SD = 1.01).

The lowest mean scores (M < 3.8) representing the lowest levels of overall community integration were for the following items.

- 1: I feel like part of my community, like I belong there (M = 3.55, SD = 1.26);
- 7: There are people I feel close to in my community (M = 3.78, SD = 1.10); and
- 10: I have something to do in my community during the main part of my day that is useful and productive (M = 3.73, SD = 1.28).

The descriptive statistics (mean and standard deviation) and the reliability statistics if each item was deleted (Cronbach's alpha) for the ten items across N = 40 participants, with no missing values, are summarized in Table 10.

Table 10
Descriptive and Reliability Statistics for Ten items in the CIM

Item	*M*	*SD*	Cronbach's alpha if item deleted
1: I feel like part of my community, like I belong there.	3.55	1.26	.882
2: I know my way around the community.	4.35	0.92	.896
3: I know the rules in the community and I can fit in with them.	4.18	1.01	.884
4: I feel that I am accepted in my community.	4.00	1.20	.879
5: I can be independent in this community.	4.38	0.93	.890
6: I like where I live in my community.	4.08	1.21	.892
7: There are people I feel close to in my community.	3.78	1.10	.891
8: I know a number of people in my community well enough to say hello and have them say hello back.	3.98	1.14	.892
9: There are things that I can do in my community for fun in my free time.	4.05	1.20	.895
10: I have something to do in my community during the main part of my day that is useful and productive.	3.73	1.28	.890

The internal consistency reliability of the 10 items (Cronbach's alpha = .899) was high, and deleting a single item did not improve the reliability. Consequently, the combined items measured a unifying construct, and it was appropriate to operationalize the CIM as an unweighted sum of the scores for the ten items (McColl et al., 2001).

Table 11 presents the descriptive statistics for the CIM classified by the four treatment groups and also the diagnosis of PTSD. The scores of the 50-point CIM scale with respect to the four treatment groups were highest in the GD-GI group (*M* = 45.40) with the lowest variance (*SD* = 2.59). The CIM scores were lowest in the II-ID group *(M* = 36.70) with a higher variance (*SD* = 11.47).

Table 11
Descriptive Statistics for CIM by Treatment Group and Diagnosis of PTSD

Treatment Group	Diagnosis of PTSD	*M*	*SD*
II-ID	No	35.80	12.40
	Yes	37.60	11.84
	Total	36.70	11.47
GI-GD	No	41.60	3.97
	Yes	40.60	4.34
	Total	41.10	3.96
ID-II	No	41.80	4.09
	Yes	32.20	10.40
	Total	37.00	9.01
GD-GI	No	44.17	1.47
	Yes	47.25	2.99
	Total	45.40	2.59
Total	No	41.00	6.91
	Yes	39.00	9.49
	Total	40.05	8.19

Levene's test for homogeneity of variance indicated that the variance in the CIM was not equal across the four treatment groups (Levene's F (3, 36) = 4.351, p = .010).

The CIM scores with respect to PTSD were highest in the group not diagnosed with PTSD (M = 41.00) with the lowest variance (SD = 6.91). A high score of CIM is desirable, indicating a good sense of integration. The CIM scores were lowest in the group diagnosed with PTSD (M = 39.00) with a higher variance (SD = 9.49); but Levene's test indicated that the variance in the CIM was equal across the two groups (Levene's F (1, 38) = 2.588, p = .116). ***This could imply that veterans who do not have PTSD have higher CIM scores, and thus a better sense of community integration than veterans with PTSD.***

A two sample t-test was conducted to compare the mean scores for the Community Integration Measure with respect to the PTSD-diagnosed participants

(M = 39.00) vs. participants not diagnosed (M = 41.00) with PTSD. No significant difference was found between the two groups (t (38) = .767, p = .448).

In addition, it was investigated whether age had any impact or trend with respect to the CIM scores. This calculation was completed since GI-GD participants had a younger median age than participants in the remaining treatment groups. Figure 7 displays a scatterplot, illustrating the relationship between the scores for the CIM and the ages of the 40 participants.

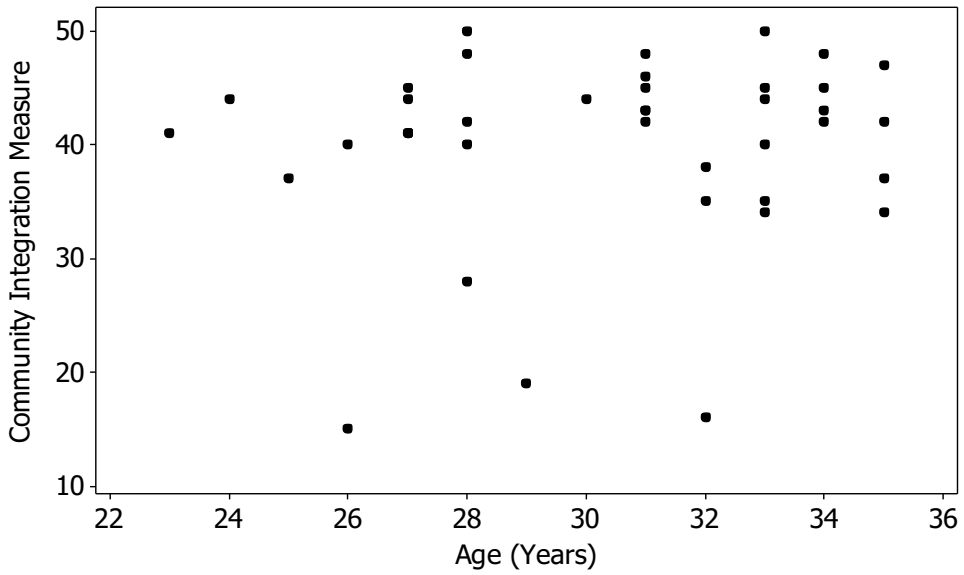

Figure 7. Scatterplot of CIM scores vs. age of participants.

Visual examination of the scatter plot indicates no apparent correlation or linear relationship between CIM and age.

3.2.3 The importance and difficulty of achieving each integration theme

3.2.3.1 Descriptive Analysis. The participants were asked "Please rank these community integration themes from most important (#1 position) to least important (#9 position) to you". In a separate query, the participants were also asked "Please rank these community integration themes from most difficult to achieve (#1 position) to least difficult to achieve (#9 position) for you". The 9 themes were ranked into a hierarchy, and therefore the importance of integration and the difficulty of achieving integration were measured using ordinal scales. Table 12

presents the descriptive statistics for the participant's ranking of the importance of the 9 themes, including the frequencies of each rank from 1 to 9, and the median rank for each theme. The larger the median rank, then the less important was the theme to achieve for the 40 participants as a whole. The smaller the median rank, then the more important was the theme.

Table 12

*Frequency counts: Ranking of the **Importance** of the Nine Integration Themes*

Rank	Acceptance	Close Relationships	Conformity	Diffuse Relationships	Independence	Leisure	Living Situation	Orientation	Productivity
1 Most important	3	16	2	0	2	1	5	3	8
2	6	7	0	0	9	2	9	0	7
3	8	5	4	0	4	4	3	1	11
4	4	6	1	5	6	6	5	1	6
5	7	1	3	2	4	10	6	3	4
6	4	3	8	6	6	8	2	2	1
7	3	0	12	8	4	3	2	7	1
8	5	2	4	10	1	2	6	9	1
9 Least important	0	0	6	9	4	4	2	14	1
Median	4.0	2.0	7.0	7.0	4.0	5.0	4.0	8.0	3.0

The median ranks were the lowest (< 6.0) for Leisure (5.0); Acceptance (4.0); Independence (4.0); Living situation (4.0); Productivity (3.0); and Close Relationships (2.0), implying that these themes were perceived to be more important for integration. The median ranks were higher (> 6.0) for Conformity (7.0); Diffuse relationships (7.0); and Orientation (8.0) implying that these themes were perceived to be less important for integration.

Table 13 presents the descriptive statistics for the participant's ranking for the ***difficulty*** of achieving the 9 themes, including the frequencies of each rank from 1 to 9, and the median rank for each theme. The higher the median rank, then the less difficult was the theme to achieve for the 40 participants as a whole. The lower the median rank, then the more difficult was the theme to achieve.

Table 13

*Frequency counts: Ranking of the **Difficulty** of the Nine Integration Themes*

Rank	Acceptance	Close Relationships	Conformity	Diffuse Relationships	Independence	Leisure	Living Situation	Orientation	Productivity
1 Most difficult	5	1	3	1	4	4	3	2	10
2	9	2	6	2	3	3	2	1	2
3	11	7	6	7	1	0	2	1	6
4	3	5	4	5	6	1	7	6	5
5	4	5	9	5	5	7	6	0	0
6	1	9	2	9	6	8	3	4	4
7	2	6	3	6	9	5	7	5	1
8	4	3	4	3	2	7	6	8	4
9 Least difficult	1	2	3	2	4	5	4	13	8
Median	3.0	2.5	5.0	5.5	6.0	6.0	5.5	8.0	4.0

The median ranks were the lowest (< 6.0) for Diffuse relationships (5.5); Living situation (5.5); Conformity (5.0); Productivity (4.0); Acceptance (3.0); and Close relationships (2.5) implying that these themes were perceived to be the most difficult to achieve. The median ranks were higher (≥ 5.0) for Independence (6.0); Leisure (6.0); and Orientation (8.0) implying that these themes were perceived to be less difficult to achieve.

The relationship between participant scores for importance and difficulty of theme was explored. Figure 8 displays a scatterplot, illustrating the relationship between the median ranks for the nine themes concerning the importance of integration and the nine themes concerning the difficulty of achieving integration. Recall that low values indicate high importance or high difficulty, while high values indicate low importance or low difficulty. Visual examination of the scatter plot indicates an apparent ***linear relationship between importance and difficulty***. The linear relationship is statistically significant, indicated by Spearman's rank correlation analysis (Spearman's *rho* = .674, *p* = .047). Consequently, integration themes that were perceived to be less difficult to achieve were also perceived to be less important (e.g. Orientation = 8.0, 8.0). In contrast, integration themes that were perceived to be more difficult to achieve were also perceived to be more important (e.g., Close Relationships = 2.5, 2.0).

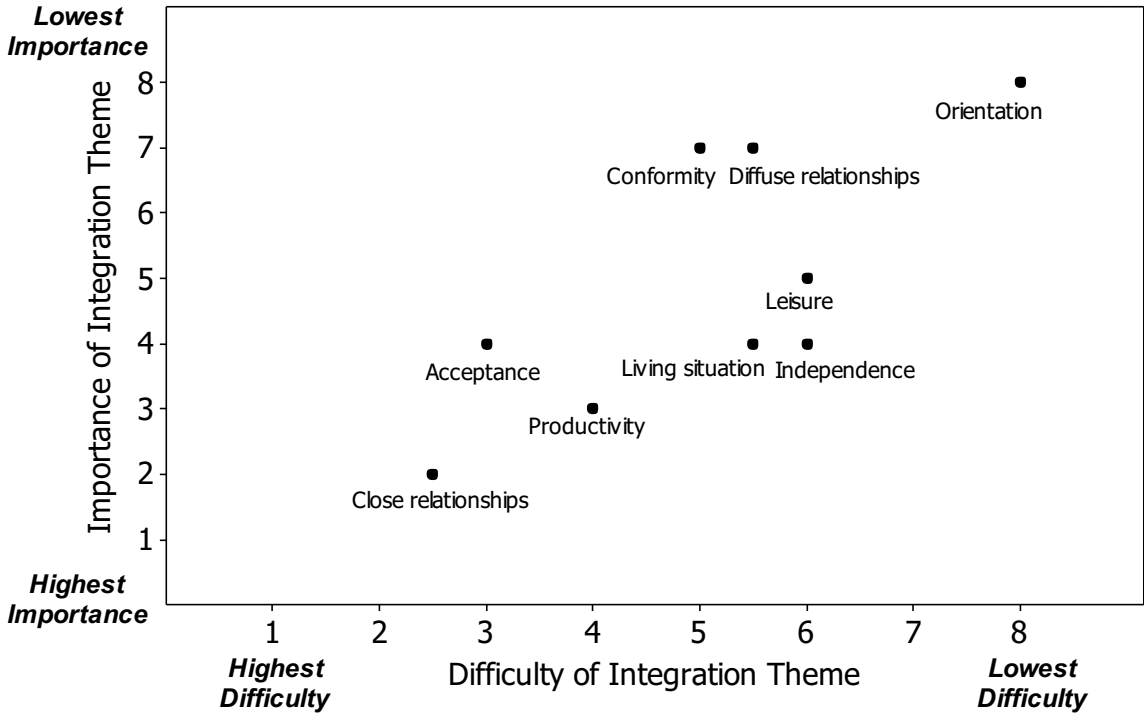

Figure 8. Median Ranks of Importance and Difficulty of the Community Integration Themes.

This observation supports the need for development of technology to assist veterans with community integration, as the veterans surveyed perceived ease

with those community integration themes that are less important to them, but struggled with community integration themes that were most important to them. With advances made in app focus from self-improvement (ex. Diefenbach et al., 2016) to mental health (ex. Bakker, et al., 2016), an opportunity exists to foster improvement in integration, especially for important yet difficult-to-achieve themes.

3.2.3.2 Inferential Analysis. Inferential statistical analysis was utilized to compare the rankings of participants who had a PTSD diagnosis versus participants who did not. Additionally, analysis was utilized to examine differences in rankings between participants in different treatment groups. Additionally, importance and difficulty ratings were examined for an age effect.

3.2.3.2.1 Comparison of participants with and without PTSD diagnosis. Mann-Whitney U tests were used to compare the median ranks for the importance and difficulty of integration with respect to the PTSD diagnosed participants vs. participants not diagnosed with PTSD. The results (Appendix B.4.3.1) indicated no significant differences ($p > .05$).

3.2.3.2.2 Comparison of participants in 4 treatment groups. Analysis of variance was conducted to compare the mean scores for the Community Integration Measure with respect to the four treatment groups (Appendix B.4.3.1). No significant difference ($p > .05$) was found between the four groups ($F (3, 36) = 2.851$, $p = .051$).

Kruskal-Wallis tests were used to compare the median ranks for the importance and difficulty of integration with respect to the four treatment groups. No significant differences ($p > .05$) were found (Appendix B.4.3.2).

As the 4 treatment groups did not have any differences with respect to their CIM scores and their ranking of community integration themes by importance and difficulty, they were deemed to be satisfactorily homogenous groups, and any differences found amongst the 4 treatment groups as far as information they

contribute relating to community integration are assumed to be an effect of treatment, not due to participant influence or differences.

3.2.3.2.3 Post-hoc examination for age effect. Spearman's rank correlation coefficients were computed between the individual ages from 23 to 35 and the ranking of the importance and difficulty of each theme of integration, as well as the Community Integration Measure. The results of the correlation analysis are presented in Table 14.

Table 14
Difficulty and Importance of Themes Correlations with Age

Theme	Spearman's *rho* (*N* = 40)	*p*
Difficulty of Acceptance	-.097	.551
Difficulty of Close Relationships	.201	.215
Difficulty of Conformity	.002	.988
Difficulty of Diffuse Relationships	-.089	.586
Difficulty of Independence	-.077	.636
Difficulty of Leisure	.104	.524
Difficulty of Living Situation	**-.333**	**.036***
Difficulty of Orientation	.085	.601
Difficulty of Productivity	.213	.187
Importance of Acceptance	.165	.310
Importance of Close Relationships	-.080	.625
Importance of Conformity	.249	.122
Importance of Diffuse Relationships	.132	.415
Importance of Independence	-.285	.074
Importance of Leisure	.026	.875
Importance of Living Situation	-.255	.112
Importance of Orientation	.119	.466
Importance of Productivity	.058	.723
Community Integration Measure	.099	.544

No significant correlations *(p* > .05) were found, with one exception. There was a significant negative correlation between Difficulty of Living Situation and age (Spearman's *rho* = -.333*, p* = .036) implying that younger participants perceived that it was more difficult to achieve integration into their living situation than older participants.

3.2.4 Examination of Meaning Units

A total of 3,063 meaning units deduced from elicitation of the experiences of 40 military veterans are examined below. An overview of total meaning units elicited per treatment by session in which they were elicited (Interview session, Design session) is presented in Figure 9. Of these, 2,222 meaning units were elicited during the interview sessions, and 841 meaning units were elicited during the design sessions.

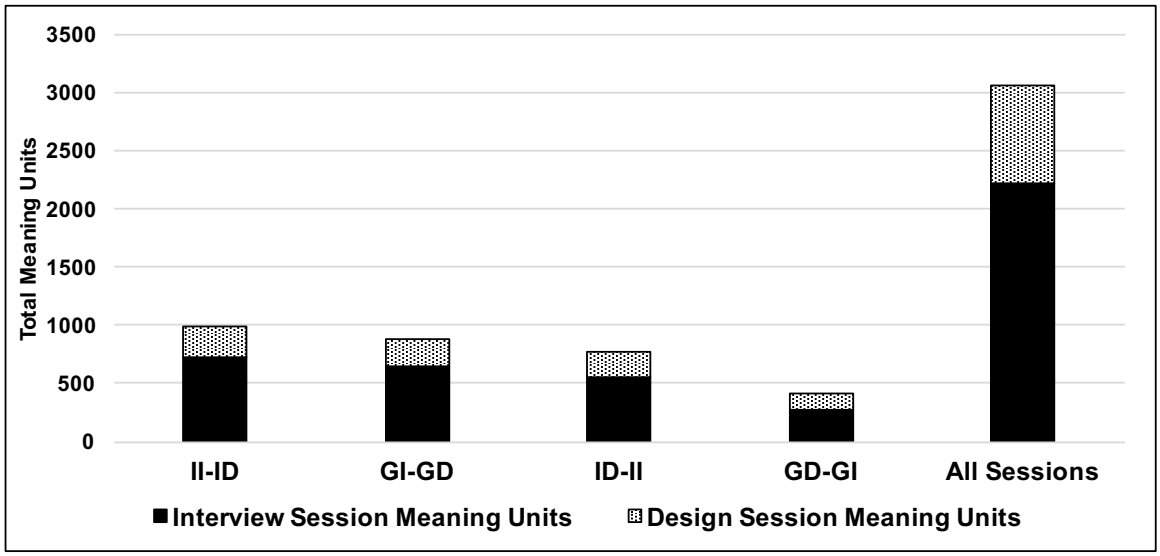

Figure 9. Total meaning units elicited in this research per treatment group. More meaning units were discovered in interview sessions than design sessions, and participants in interview-session-first treatments provided more total meaning units.

Additionally, these meaning units were categorized based on a codebook that was developed by evaluating a sample of the transcripts (see section 3.1.8). Identification and categorization of each meaning units was subject to examination by two coders and if necessary, a coding judge (see section 3.1.9.3). Of the 3,063

total identified meaning units, 409 were categorized as *Employment and Education*, 240 as *Financial*, 102 as *Physical Health*, 452 as *Mental and Emotional Health*, 1044 as *Relationships*, and 816 as *Military and VA*. The meaning units for the combined interview and design session, per codebook theme, per treatment group is presented in Figure 10.

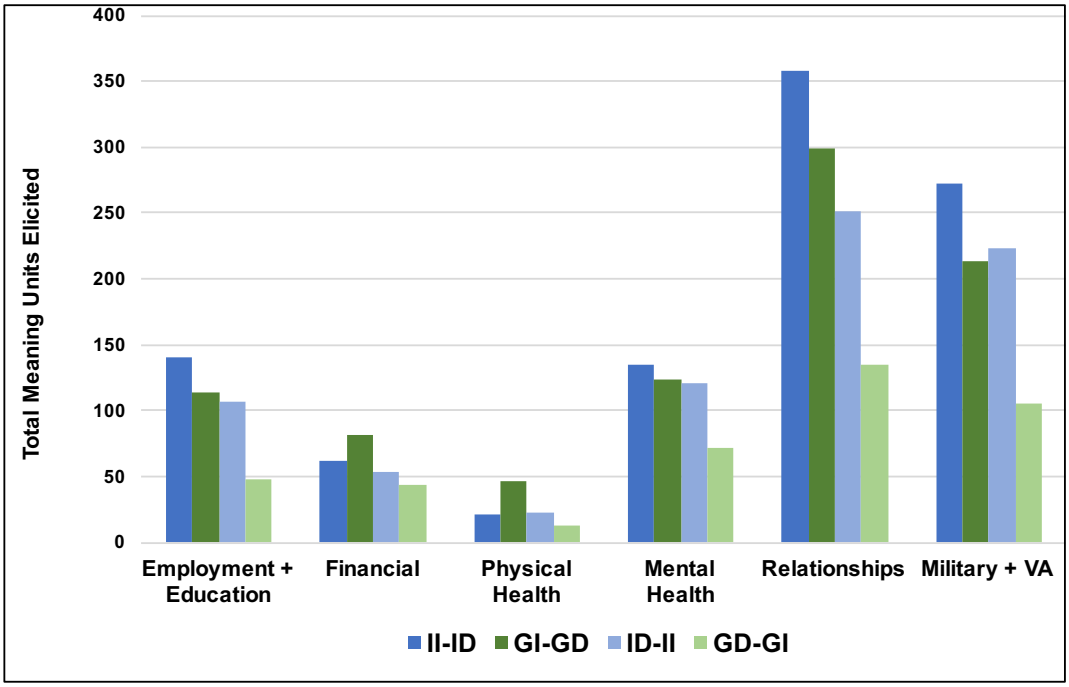

Figure 10. Meaning units elicited in each treatment group, by codebook theme.

The next three sections investigate the effects of the independent variables (Setting and Order) on the Dependent Variables (Total Meaning Units, Interview Meaning Units, Design Meaning Units), and examines differences in quantity of meaning units among the four treatments in this research. Bear in mind that a meaning unit is not a standardized unit of analysis, i.e., two compared meaning units may contain different quantities of design space criteria (developed in Chapter 4). Comparison of elicitation methods by quantity of meaning units is for informational purposes only, and does not necessarily indicate results pertaining to quantity of design space criteria (which is presented in Chapter 4).

3.2.4.1 Total Meaning Units. The variable "Total Meaning Units" was defined as the meaning units obtained in both the interview session and the design session from the participants within a treatment. Type II-ID participants provided the most meaning units (*M* = 99, *SD* = 22) on average when compared to the meaning units provided in each of the other types. Type GI-GD provided an average of 88 meaning units (*SD* =15), Type ID-II provided an average of 78 meaning units (*SD* = 21), and Type GD-GI participants provided an average of 42 meaning units (*SD* =11).

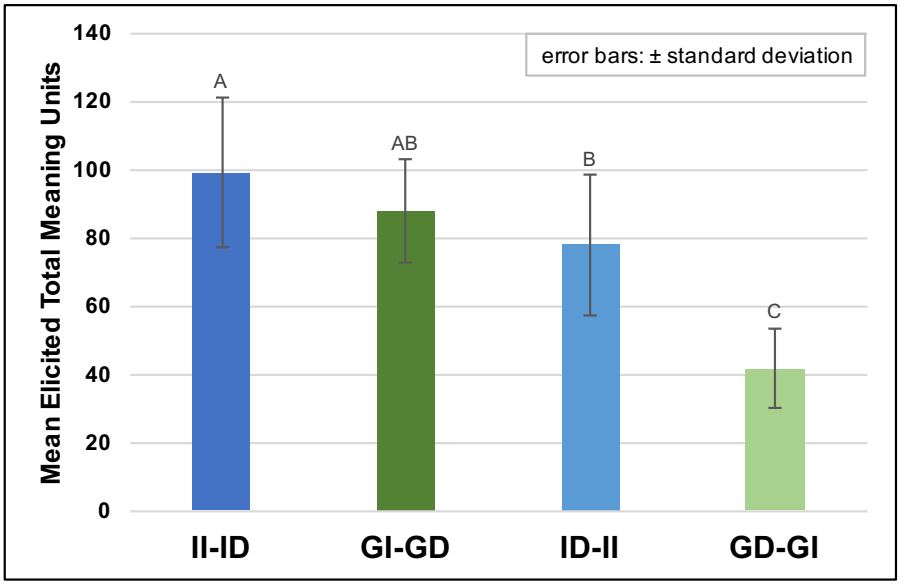

Figure 11. Mean elicited quantity of total meaning units per treatment. Different letters indicate significant differences in means from Fisher's LSD test.

An ANOVA was conducted in order to examine the data for main and interaction effects for the quantity of the total meaning units elicited per treatment (Appendix B.5.1.2). Session setting was identified as a main effect, with significantly higher meaning units from treatments of the individual setting $F(1, 36)= 15.729$, $p=0.000$. Session order was identified as a main effect, $F(1, 36) = 34.394$, $p=0.000$. The main effect for order showed significantly higher meaning units when the interview was completed first. The interaction of session setting and order was significant as well, $F(1, 36)=4.881$, $p=0.034$. Order had a larger effect in the group setting than in the individual setting.

The results of a post-hoc Fisher LSD test indicated significant differences between the mean quantity of total meaning units in the II-ID and ID-II treatments, the II-ID and GD-GI treatments, the GI-GD and GD-GI treatments, and the ID-II and GD-GI treatments. A significant difference was not detected between the means for the II-ID and GI-GD treatments, or the ID-II and GI-GD treatments (Appendix B.5.1.3).

3.2.4.2 Interview Session Meaning Units. On average, participants who completed the interview session first provided more meaning units in their interview than those participants who completed the design session first, and then the interview (Figure 12). II-ID participants contributed 73 meaning units on average (*SD* =13) in their interview session, GI-GD participants contributed 65 meaning units on average (*SD* =17) in their interview session, while ID-II participants contributed 56 meaning units on average (*SD* =11) in their interview session, and GD-GI participants contributed only 28 meaning units on average (*SD* =8) in their interview session.

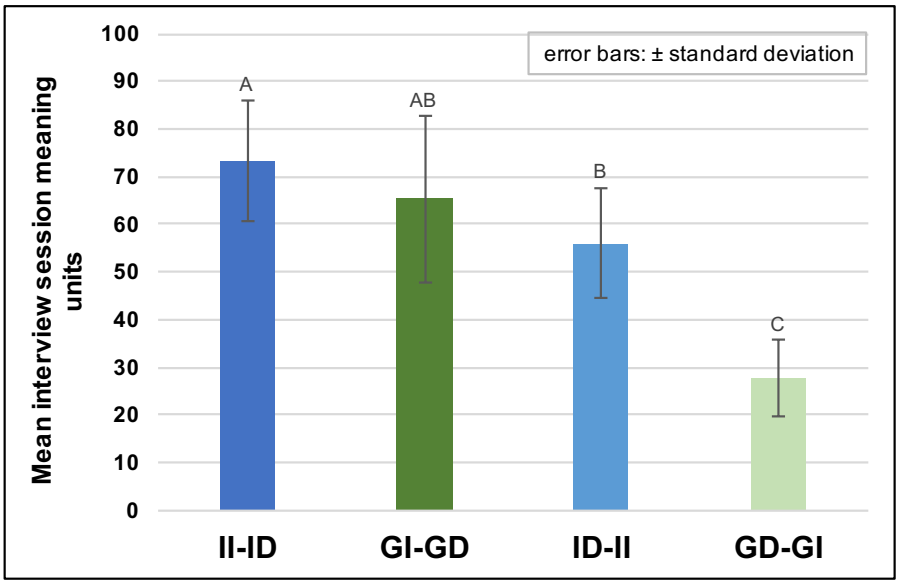

Figure 12. Mean interview session meaning units per treatment. Different letters indicate significant differences in means from Fisher's LSD test.

An ANOVA was conducted in order to examine the data for main and interaction effects for the quantity of the total meaning units elicited per treatment (Appendix B.5.2.2). Session setting was identified as a main effect, with significantly higher meaning units from treatments of the individual setting $F(1, 36) = 20.061$, $p=0.000$. Session order was identified as a main effect, $F(1, 36) = 46.307$, $p=0.000$. Similarly to the total meaning units composite, sessions in which the interview was completed first yielded significantly more meaning units than design session first sessions. The interaction of session setting and order was significant as well, $F(1, 36)=6.246$, $p=0.017$, with a larger impact in the group setting.

The results of a post-hoc Fisher LSD test indicated significant differences between the mean quantity of interview meaning units in the II-ID and ID-II treatments, the II-ID and GD-GI treatments, the GI-GD and GD-GI treatments, and the ID-II and GD-GI treatments. A significant difference was not found between the means for the II-ID and GI-GD treatments, or the GI-GD and ID-II treatments (Appendix B.5.2.3).

3.2.4.3 Design Session Meaning Units. On average, participants in an individual setting who completed the interview session first provided more meaning units in their design session than those participants who completed the design session first, and then the interview in an individual setting (Figure 13). The same was true on average when comparing participants in a group setting. II-ID participants contributed 26 meaning units on average (*SD* =13) in their design session, GI-GD participants contributed 23 meaning units on average (*SD* =7) in their design session, while ID-II participants contributed 22 meaning units on average (*SD* =12) in their design session, and GD-GI participants contributed only 14 meaning units on average (*SD* =8) in their design session.

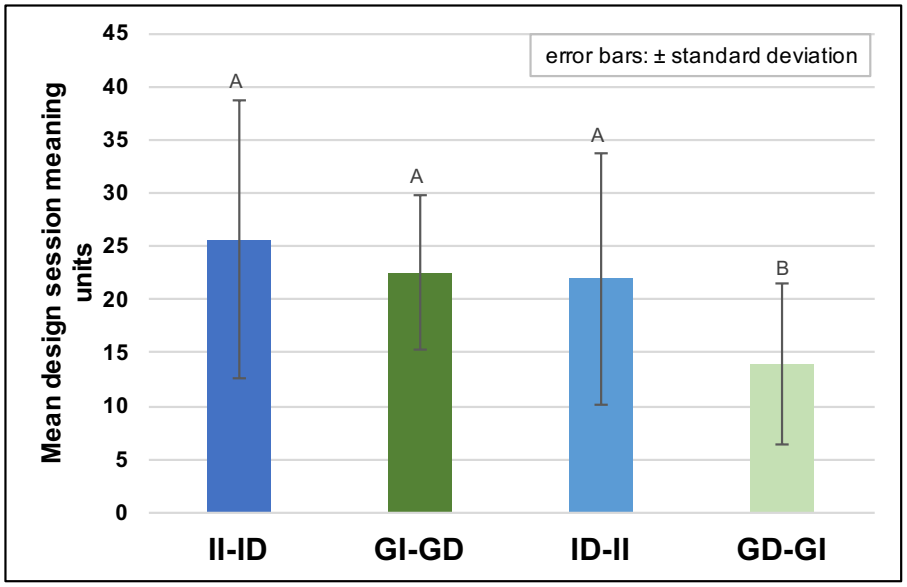

Figure 13. Mean design session meaning units per treatment. Different letters indicate significant differences in means from Fisher's LSD test.

As the dependent variable Design Meaning Units did not fit a Normal distribution (see section 3.1.10), nonparametric statistics were utilized to examine the differences in design meaning units quantity between treatment groups.

A Kruskal-Wallis test (Appendix B.5.3.1) determined the treatment groups were significantly different $H(3) = 8.957$, $p=0.029$. Comparisons of the treatment groups by post-hoc Mann-Whitney tests indicated significant differences in quantity of design meaning units elicited between GD-GI and each of the remaining 3 treatments.

Inspection of design meaning units results indicates a large standard deviation for each accompanying mean from the 4 treatment groups. This could be due to a variety of factors, including chunking of meaning units that could have been split, but weren't for concern of context loss. First-cycle coding results do not indicate significant differences regarding *information* elicited, or *scope of information* elicited in the context of each treatment group, rather, it illustrates the differences in quantities of meaning units elicited. Chapter 4 examines the treatment groups with the data set resulting from second-cycle coding, which is more standardized in comparison to the meaning units data set examined here, which are simply the coded verbatim excerpts from participant transcripts.

3.2.5 Phenomenological Summary

Research Question 1 asked: What are the experiences of military veterans as they reintegrate into civilian society? The meaning units data subset within each codebook macro-theme and theme were examined to generate a phenomenological summary. The purpose of this summary is to present the lived experience of veterans as they reintegrate into a civilian society. The summary is presented below, and organized into sections by codebook macro-theme, a widely-used structure first championed by van Manen (1990). Note that sequential participant statements that are bulleted indicate the participants cited were not in a session together.

3.2.5.1. Employment and Education. The transitory process of leaving the military and deciding what the next step in a life plan is daunting for many veterans. Finding a job or choosing a school and major while navigating the GI Bill process are 2 of the major paths discussed by veterans, but a third quandary emerged: deciding what to do after service.

The military is a well-structured, routine driven, hierarchical culture, where lower-enlisted personnel don't need to make that many decisions. They are aware of who is in charge, they are aware of where to go eat and where to sleep, what to wear, and what the schedule is that they are expected to keep. Therefore, exiting that structured life and gaining complete independence and decision-making authority proves challenging for several veterans. Veterans who entered the military at 18 years old went from living with their parents directly into the military, so their first time of truly living as an independent adult is experienced after service. Participant 34 notes:

> ***I was looking for jobs but also trying to figure out what I wanted to do and really just trying to relax…I ummm I went back home to my parents' house and I spent about half a year just doing nothing and trying to figure out what I wanted to do.***

Veterans who were high ranking and in charge decision making while in the military seemed more at ease when discussing post-military career life decisions than

those lower-enlisted. Some veterans, while still active duty, struggled to balance the passing of decision-making authority from self to military as Participant 28 describes:

> ***"…fill out your 96 packet. Tell us where you're driving and what you're doing. Where are you stopping", this and that, it's like, dude, you trust me with a gun and enough ammunition to blow up an entire city when I was 18, 19 years old. But now you can't trust me to drive Myrtle Beach on the weekend? You got to be kidding me, right? It's that. I HATE IT.***

Veterans described rose-colored glasses mirage that many enlisted military personnel imagine: that employers would be fighting over them after the military because of their unique skills and leadership experience obtained during military service. But in reality, they struggled with finding a job, especially a job that they liked. One of the older veterans, Participant 4, recalls:

> ***There was no place to go where you can go ahead and like, start looking for jobs back home or anything like that. Or a place where people start helping you, maybe even write resumes. None of that, there's NOTHING.***

While younger veterans mentioned the Transition Assistance Program, which perhaps Participant 4 was not exposed to, there is room for program growth. Many vets spoke of TAP (and the similar ACAP) as a "box that needs to be checked" before discharge, and that many veterans do not pay attention to the class because they are anxious about gaining independence, seeing their families, and being able to relax for a couple of weeks. They were angered when they realized after discharge that they could not access the TAP/ACAP materials and tools later, that they were only available to them during the class and while they were active duty.

Other than resume building and job-finding assistance, veterans expressed a desire to communicate their strengths and skills to civilian job interviewers, but often lacked the ability. The military lingo and descriptors become a barrier sometimes, and veterans wanted assistance translating their military skills into phrases more practical for civilian applications. They noted that interviewing for

jobs was difficult, and explaining their capabilities to civilian interviewers was much more difficult than they thought it would be. As Participant 22 states:

> ***I was a tanker in the military and we don't have tanks in the civilian sector so there's not really an easy transfer.***

and Participant 6 noted:

> ***What job skills can translate over here? Some are easier….like, intelligence. Yeah you can go work for the CIA or something like that, but what does it mean at the local or state level?***

Another issue is potential employers don't always understand military accomplishments, as Participant 15 recalls:

> ***Just because of all the accomplishments I did in the military. I led teams of 20 plus. I had people under my command. I was one of the few people, well not few, but I made it from the rank of E1 to E5 in 4 years with chance of early promotion to E6 and that's not normal. I received 2 Navy achievements medals. And any employer I go to basically treats me like I am fresh out of high school.***

Many veterans who received job offers/employment lamented how the employment was not ideal, or how the veteran was overqualified for the employment they had to accept in order to make ends meet. As Participant 41, a military intelligence analyst laments:

> ***I worked at Sears selling washers and drawers and I was just thinking "this sucks but I need money." I mean you do…you do what you can to make ends meet, you know. But you know it's kind of a drag, it's kind of depressing, but it is what it is. And a lot of other vets I know have this issue, it's not just me.***

Participant 11, who was stationed in Haiti after a massive earthquake, and gained experience delivering babies, amputating limbs, administering IVs, etc. as an Army medic. He recalls:

> ***Um, because like I remember applying to Carilion Health and I applied to like forty positions that I'm qualified for, and all I got back was, "You can work at our kitchen, we need a cook." It's insulting.***

In addition to issues with job match, working with civilians is a culture shock to some veterans. For example, being on time was very important in the military, as Participant 32 describes:

There are 2 times in the military: on time, and late.

By working in the civilian sector, some veterans became angered and took it as a sign of disrespect when civilian co-workers showed up late to meetings or took short cuts to accomplish a task.

Some veterans expressed a need to avoid stressful or traumatic job positions, such as police officer, security, or air traffic controller, even though these civilian jobs would match cleanly to their military skills. This issue is examined in section 3.2.5.4.

Many veterans joined the military because they wanted to receive an education after service. Due to their low high school GPA, financial restrictions, or hesitation to choose a major, they saw the military as a way to both access and afford college, and give them time to decide on a college major while receiving real-world experience. As veterans begin attending college classes after their military service, they often find that they are much older than their classmates. In addition to the age difference, there is a maturity difference based on stringent requirements of military life and experiences such as combat that veterans were exposed to during their military tenure. Striking up conversation with civilian classmates can be cumbersome and awkward, and many veterans don't bother with it. The college mindset varies between veterans and how they perceive their civilian student counterparts. As Participant 7 describes:

They're more worried about sorority and frat and getting hammered.

Young civilian college students are perceived by veterans as people who attend college to have fun and party, while receiving the education and degree is a more secondary goal. All of the veterans disclosed an "all business approach" to college; Participant 28: ***I'm in school to get school done.***, Participant 10: ***Get a degree***

and get out. Participant 12: ***Keep your head down, get work done, and graduate. I haven't gotten too involved with student groups because I don't want to distract myself from school.*** Participant 13: ***Sometimes we do get tunnel vision. Like, is talking to this student accomplishing my goal of graduating?*** Participant 32: ***Pretty much nonstop work on school.*** This can make social interactions/gatherings with civilian students awkward and avoided by veterans.

Veterans have administrative issues with college as well. GI Bill issues and college credit issues abound. Many veterans feel they have to take classes for disciplines they already mastered, and that they don't receive credit for everything on their military transcripts. In addition, there's no way to qualify all of the skills that veterans know how to *do*, and an academic setting feels much more *theoretical* to a veteran who has been in the field. As Participant 8 states:

> ***Why should I have to take this intro mechanical engineering course, when I know how to fix pretty much anything that's wrong with an Apache helicopter?***

Participant 39 highlights the difficulty of leaving the military and returning to an academic setting to learn new skills by saying:

> ***It's...having to learn something new and like again after going YEARS with just operating and learning new tasks by DOING rather than like an academic setting. It's a LOT different. It's a lot of different to learn from hearing and seeing rather than actually doing.***

The GI Bill provides tuition and a stipend to veterans as they attend college. The veteran can also transfer the benefits of the GI Bill to their spouse or child, although the process and stipulations of use and transfer are often unclear to veterans. As Participant 24 described it:

> ***It's extremely hard to use my veteran's benefits, like the money they gave me for college. I don't know how to use it. I'm supposed to have 30 thousand extra or something from my sign up bonus, I have no idea how to use it. Where is it?***

Participant 29 lamented the difficulty of using the bill as well as the gap between leaving the military and the bill stipend payments:

> ***You know, using your GI Bill is NOT easy. There's a lot of steps and hoops you have to jump through to get that money. Get it set up with the school for them to take payment. A lot of times they don't get the payment in time and you gotta like pay the school money until the GI Bill gets back and then the school will pay you a refund, but that could be, you know, you could be 5-10 thousand dollars in the hole before you even start being able to pursue an education or have your benefits kick in.***

Aside from the issues of ensuring communication between the GI Bill office and the college of choice, sometimes the GI Bill will not cover the desired education. For example, Participant 8 worked on helicopters in the military, and wanted to continue that career in the civilian world. He discovered that his military certification to repair and maintain helicopters was not sufficient and did not transfer to a civilian certification. When I asked why he didn't pursue the civilian helicopter repair and maintenance certification, he answered:

> ***Uh, because it's expensive and your GI bill doesn't cover it.***

Finally, some veterans who have endured mental and/or physical distress due to their military service and were forced to retire struggle to rectify their retirement status with their young age. Participant 37, who is 28 years old, states:

> ***I mean I TRIED to go back to school while I was going through rehab. I had another 2 and a half, 3 years left while I was doing rehab. While I was in the process of medically discharging I tried to go to school but I couldn't handle it, there was too much stuff going on. I was trying to rehab, my brain wasn't strong enough to handle it. So I had to stop. I wasted money and had to pay it back. I sit at home all day and can't do anything.***

3.2.5.2. Financial. Finances can be an important factor any person's life. Several military veterans enlisted in the military because they were from low income households and did not have the high school grades for a scholarship, nor the money to afford college. Indeed, one of the major motivators for joining the military

was finances: be it in the form of paychecks, benefits, housing, and/or the GI Bill. When asking Participant 15 during the icebreaker exercise why he joined the military, he answered:

> ***My fiancé at the time needed a very expensive surgery, and we did not have health insurance. So I joined the military, married my fiancé, and they paid for most of her surgery.***

During service, many military members spent their money, rather than save it. Reasons for spending their money varied, and could be due in part to age and inexperience. As Participant 28 recalls:

> ***Financial guidance would have helped. Yeah I think, you know, when you're young, dumb and you come out....when I came back from Afghanistan, I was 19 years old, $14,000 in my bank account. It's something I've NEVER seen before in my entire life you know what I mean? So of course I went wild. I went partying. I had a great time. I mean I wasn't reckless and irresponsible with it per se. Maybe I was... maybe a little bit. (laughing) Okay I DEFINITELY was. But I had fun I had a great time. And you know if I could go back, I probably would do the same thing again, I had a great time. Well I'd save a little more of it (laughing). But you know it's just that, when you come out at 19, I came from nothing, the rural farmlands of Virginia, there is nothing out there. And to have that much money it's nice. I thought I was the richest man in the world, you know, but that money quickly goes away if you're not...you're not smart about it. So and I mean yes the financial, I mean we got, you know, we got financial guidance per se. But I mean hell, things got worse. Even you know, after my divorce and all that, filed bankruptcy and you know financial-wise, I wasn't very good; my credit...I'm still trying to rebuild my credit. So yeah. Like veterans, I mean we received financial guidance, but the majority of us didn't give a shit, because you're like, "That's nice. But I'm 19. Look at this car. Let's go to the beach this weekend."***

Additionally, some veterans spent money during or between deployments, deciding to enjoy life to the fullest in case they were killed in action. The exchange between Participant 38 and Participant 40 provides excellent insight:

> P40: ***Every bonus or employment money….I blew all my money.***

P38: ***I would take trips mainly. When I was in Iraq and we got a week of leave. Instead of going back to the United States which basically everybody did, me and 2 buddies traveled around Europe. And I spent A LOT of money.***

P40: ***And I'm like, yeah, do that, do travel. (pause) That budget thing. A lot of the younger guys when they're in, you walk into a barracks room. Which is maybe about the size of this room. And the television is about the size of that white board. And it's like, "WHY?!" And they're like, "I dunno. There's nothing else to spend the money on." It's burning a hole in their pocket.***

P38: ***But you don't think about it. You're young then, you don't think about it. And everything is taken care of. Medicine, food, housing allowance if you live off base. You didn't have to come up with that money.***

P40: ***As a single soldier in the barracks, you can walk on base, sleep in your bed, eat at the chow hall, there was no worry. You aren't going to be homeless and starving.***

Ali: Why do you think people don't have the forethought: Okay, this is all going to end one day, maybe I should start saving this money? I mean why do you guys blow your money on the Mustang GT or the big truck as soon as you get out?

P40: ***Lack of maturity and lack of training. I signed up, $12,000 bonus, reenlist: $20,000 bonus. And I HAVE NOTHING TO SHOW FOR IT. I didn't invest it, no one came and talked to me about it. I came from a poor family, I don't know how to handle money. Your typical Hispanic family in Texas. In hindsight, I have x-ray vision and can see all my mistakes.***

P38: ***Well and the Army does a really piss-poor job training them. You know they'll tell you the story, "So and so bought this mustang and went bankrupt." But 20 year olds don't care. All they hear is "MUSTANG."***

P40: ***Inevitably, they will be a civilian and they're not prepared and it starts from the day they join the Army. That's something else for the app. A fricking financial planner. Money is the most important thing ever, it can solve so many problems. A lot of soldiers are very very bad at it, myself included. As I got older, I learned about real estate and it is just a painful lesson to see all the mistakes you made.***

> P38: ***I also had the attitude of when I was in the Army, I was in Iraq, I was in dangerous places, and it's like, "Who knows? What if I don't live until I'm 30? I'm going to have a good time now. Worry about the rest later."***
>
> P40: ***Then you get to tomorrow…***
>
> P38: ***Dammit, I didn't plan. That's what the Army does. This fantasy that life is going to be like this forever, and you don't plan.***

With the lack of experience with budgeting and living as an independent adult and handling the associated expenses combined with lack of planning, many veterans live with a parent or other loved one immediately after service. This can cause relationship issues, discussed in 3.2.5.5. Budgeting inexperience also impacted veterans in their housing search and what they could afford. Two of the veterans were homeless, and they blamed inability to budget and understand what they could afford as far as housing and other expenses as the culprit for their homelessness.

3.2.5.3. Physical Health. Several veterans who participated in this research effort were physically injured during their time in the military. While most were injured during combat scenarios, some were injured in training and didn't have their injury addressed, and some were injured from falls, loads they had to carry, etc., and what one veteran (Participant 26) referred to as "wear and tear":

> ***I have some neck stiffness from a helmet…well, number 1 from getting chucked out of a truck, 2 from having this night vision assembly that hangs on one side of your helmet. And you wear that for 8-hour night shifts for months and it starts to wear on you. I just, there's general wear and tear that comes out of that.***

Some physical injuries and issues did not manifest until after discharge. These included knee and back issues, nasal issues, and general concerns about physical ailments that may be connected to hazards they were exposed to during military service, namely, burn pits. One participant discussed sleeping on depleted uranium to keep warm, and at the time was not concerned about hazard exposure because he was cold.

One noted physical injury that was both immediate and long-lasting was traumatic brain injury (TBI). After months of rehabilitation, participants noted that certain parts of their memory can no longer be accessed, or can only be accessed at certain times. Additionally, retention of information is difficult, short term memory issues, etc., and thus they are unable to function in a job or at school. The two participants with TBI also noted issues with motor function and at times temporarily lose balance while walking.

When the veterans left the military, many of them gained a considerable amount of weight. The physical demands of service were such that they were able to eat whatever was available, because of their non-sedentary lifestyle. As Participant 6 noted:

> ***Like I gained 30 pounds since getting out. I used to not weigh over 167. And now I weigh 198 so I gained about 30 pounds. But also lifestyle's changed. I've sat at a desk all day. So, ummm, I'm not out running, working out in the mornings like I used to.***

And Participant 20:

> ***…you start seeing a lot of soldiers putting on a weight as soon as they get out cause, again, it just comes back to – they don't know how your body is going to react to being sedentary.***

Many veterans struggle to address weight gain through exercise given the limits of their body due to injury they sustained during service, as Participant 13 described:

> ***Like when I go to the gym, you know, I can't really go heavy anymore. I can't do certain exercises like cross fit. I look at it and I go, "that just, that hurts me to watch." Or uh, you know, lifting heavy.***

Sleep is another noted physical health issue that veterans raised in their discussions. During deployments, a set schedule was not practical. Many veterans spoke of "catching naps" rather than getting acceptable amounts sleep in one sleep cycle. They found breaking that habit was difficult once they returned. As Participant 3 notes:

> ***I have difficulty gauging how I sleep…I mean after years of Army fighting and operating and living in it and catching naps in the day. My parents think I'm weird because I'm "asleep all the time" but I'm not. I'm just awake when THEY'RE asleep.***

Some veterans described combat nightmares during sleep that influence them to try to avoid sleeping altogether, or as a reason that they do not get restful sleep at night. Others received diagnoses of conditions such as sleep apnea, and many were prescribed items such as sleeping pills or CPAP to assist them with sleep.

Additionally, the military has an issue with alcohol and drug use in ranks. Participant 21 noted:

> ***And we chaptered out probably 25 soldiers using heroin. Like I said, we have a heroin epidemic in America, that's trickled over to the military.***

Sometimes, these vices carry over into the civilian lifestyle after service, as Participant 25 states:

> ***So there's a big component of like you know excess alcohol consumption in the military. So when you when you no longer have to get up at 6:30 in the morning for PT, you don't have to be sober like on the weeknights. That could be the excuse for you to just overindulge. Because I mean when I was in, even when I was in, I knew people who were really serious alcoholics.***

Participant 36 described using alcohol as a coping mechanism once he became a veteran:

> ***And I just DRANK. I drank from morning until night. I drank until I passed out. And that's how I readjusted.***

Many participants noted the lack of structure after military life led them to laziness as well as drug use. Veterans remarked that after service, they no longer have to answer to anyone or meet certain criteria if they don't want to. The structure and

accountability of the military lifestyle was no longer present, as Participant 24 remarked:

> ***Without a structure, you're just holed up sitting here doing drugs all day.***

Several veterans discussed the need for awareness while drinking and to note how many drinks they had ingested. Many believed they became alcoholics because they hadn't noticed the gradual increases in how frequently they consumed alcohol or how much alcohol they had consumed.

3.2.5.4. Mental and Emotional Health. After the experience of military service, especially combat experience, a range of emotional and mental changes confront the veteran. Often there is difficulty connecting to a loved one back home after a combat experience. Participant 40 describes:

> ***Like a firefight or a whole combat tour, you're closer to that person who did that with you, in some ways, than your own spouse. I think that creates a big gap between veterans and civilians, you had this experience, they didn't. Even your parents don't understand you when you get back. You went through this with this person, but not with your spouse. Speaking mostly because I talk to a lot of guys who go through this…they want to be alone, they don't connect with anyone.***"

Participant 14 struggled to pinpoint why there is variation in how connected he feels in his close relationships:

> ***But I, it's just like the connection, it breaks. It's THERE but it's not there, like all the time. It's just like, it comes and goes, and I HATE myself for that.***

Participant 16 details his issues with trust and being open in relationships:

> ***I think that I isolate myself. I'm scared to trust people. Ummm. I've been hurt a lot. I think it's a me thing. It isn't really them. It's more me. I have difficulties with trust and ….I really don't know what happened. It wasn't like that before the military.***

Participant 19 details his issues with numbness and regulating his emotions:

> ***when it comes from somebody who's recently come back from deployment emotions either can become either erratic or, and this comes from personal experience, nonexistent. And you know for me, I'm just emotionally numb because you just gotta keep it all – you don't talk about your emotions at least in my experiences. It's just all closed up because when you're deployed you know, you've got all your emotions going on at home and I never really shared that with anyone on deployment. I'm just use the holding it in then when I get home you know it's not easy to just drop it. I know it's all bottled up and then if I try to feel the emotions again a little bit it comes out VERY hard and VERY heavy.***

Participant 37 laments the relationship he used to have with his wife:

> ***Like even your wife is not as close as you were before you left. You've kind of faded away like….sand. It sounds really bad, but that's what it's like.***

Participant 6 describes issues with emotional shutdown during conflict with his wife:

> ***Back to my PTSD stuff, is, when I get confrontation…like when confrontation comes, emotionally ((snaps fingers)) like emotionally I shut down. Like I go straight to logic and straight to, you know, getting the problem fixed. I don't, I don't work on emotion at that point it's more logic and straight, let me fight the problem. And my wife, she has a master's in counseling so she understands that, but it still frustrates the bejeezus out of her.***

Additionally, anger and frustration were issues that many veterans raised during the session.

- P14: ***I, you know, when I do, I go from zero to a hundred, you know. It builds and builds and builds, and it becomes very problematic.***

- P16: ***Why don't they understand me? They're my own family! If anybody should understand me, it should be them! You know, they should know that I went to a war.***

- P23: ***And you see things. You know. "Why is this person like staring at me LIKE that?" And you get mad.***

- P37: ***When I first came back, and I was in ICU, I mean I was handcuffed to the bed. Cuz I was so angry. And just everything was***

messed up with me. I'm still messed up. I don't go out in public by myself. I go to the bowling alley and places like that. Places I KNOW. Places where I will see people I KNOW. I go by myself. But anywhere else, I go with my wife so I don't get arrested. Because I'm just not sure what I'm going to SAY. I mean, I could haul off and just destroy somebody…but the fact that I don't know what I'm going to SAY scares me more.

- P39: ***They say you know, "I would do anything for that guy" like. You.... They say "man, I would drive out of my way to go get him" like, and when you've seen people give up their lives for others, like, do you really think you would do ANYTHING for him?***

While roughly half of the participants interviewed had been diagnosed with PTSD, nearly all participants described issues with their mental state after exposure to combat. One participant went so far to describe how he feels PTSD in the military is different from other cases of PTSD:

> P3: ***PTSD in the military is different from other PTSD. And I think that is because they aren't mentally prepared for violence. Hurricanes, car crashes, rape, and so on. But most military training is preparing you to accept that that violence will come. So it's like you have this other layer of "this was expected, this is what is supposed to happen" and it leads to so much inner-conflict.***

Participant 4 described sitting alone, replaying events from deployments like a movie, and analyzing everything that had happened and every action he took. He blamed this habit for his addiction issues.

> ***When I was in and everything was happening, you feel like you're doing the right thing. And when you get out a few years later and you, the truth start trickling in about what was really going on and you start questioning… you know, "was I doing the right thing? Did I do the right thing? Was that the right thing to do?"***

Many participants spoke of the strangeness of trauma as it was unfolding. That it was "unreal" and like watching a movie.

- P14: ***There's like all this blood and crap all over the front where the guy had been shot. We had just shoved them into a vehicle and***

drive away and talk about like just totally, totally surreal, it's just mind blowing. Like you can't believe the stuff is happening, it's like you're somebody is like pulling you out of your own body.

- P26: ***I had a RPG hit me in the windshield. No kidding didn't explode. But it bowed in the entire windshield. Yeah well I actually saw the guy shoot the rocket and then I saw the nose cone get REAL big. I thought I died. I thought, it felt, it hit the windshield so hard. It was like a movie. Like, "this isn't really happening"…but it was.***

Another aspect of deployment that was discussed was the high amount of adrenaline that became part of everyday functioning. It became difficult to keep adrenaline in check as a veteran. Participant 17 and Participant 6 (from separate sessions) provided examples:

- P17: ***The biggest problem I had was due to the fact I was an infantry man, I had been in Fallujah, we were getting blown up a lot, mortared a lot, shot at a lot. Adjusting to the lack of adrenaline was the most difficult part.***

- P6: ***I am bored all the time now. Bored is the wrong word, but, just not, alive to the fullest. I remember the adrenaline that was a necessity. It was like, "if you mess up, just a little bit, you're dead." So everyone was paying close attention. But it's hard to sustain that all the time. Now back in the States, you don't need it at all. It's deflating.***

Participant 14 provided a compelling statement on the impact deployment can have on mental state. He described his detail as going out and searching for IEDs ahead of convoys that were delivering supplies. He said at first, it was easy to pay meticulous attention to detail, a strange hole in the road, a dead animal on the side of the road, a rock that looked misplaced, etc. But soon, that sort of attention became consuming. Everything looked suspicious and suspect, and his adrenaline was on high alert all of the time.

> P14: ***and I got so fed up and I remember my buddy, he was a sergeant, he was my driver, we would start rolling over what we thought were IED's just to see if they're going to, going to go off because we wanted to be in control of our death.***

All of the veterans with PTSD discussed the difficulty of public outings. It was difficult to enjoy themselves because they were constantly assessing their environments for threats.

- P6: ***Yeah. You look at people's hands. Do they have anything in their hands? You don't want your back to the door. You want to be able to see the doorway. You know, just, situational awareness...of understanding where everything is.***

- P15: ***I can't do things that I enjoyed before the military like going out to a bar or going to a club….going to a concert, because now I have to sit in the back corner and make sure that nobody's going to come in and start shooting people.***

- P16: ***If you go to a crowded place, you know, that's uncomfortable for a veteran. They don't,…it's like you're…I can't, I can't relax. And they're looking at me like, "What's wrong?", and I'm looking at them like, "Don't you know!? This is a crowded place! There's no way to assess threat and control for danger."***

Participants with and without PTSD indicated that they didn't like fireworks, thunder, or other loud noises that they weren't prepared for. They specifically took issue with *triggers*: some sort of prompt (usually unexpected) that causes a veteran to endure an unpleasant or heightened reaction. There seemed to be two classes of triggers discussed: known and unknown. Veterans were especially frustrated with triggers they didn't understand or were unprepared for (unknown). As Participant 19 describes:

> ***I thought I was over it but my daughter did a umm... like a musical – err, she was participating in like a musical recital this Spring and there was a couple kids playing instruments and I think the one kid did like a violin solo or something and it was just like *whew*. I couldn't handle it, it was just pouring out of me and I couldn't stop it. WHY?***

Some of the veterans had attempted suicide or knew other veterans who had committed suicide. Several detailed the weight of the trauma experienced while deployed was too much to take. But combat trauma was not the only identified culprit for suicide:

- P3: ***And you see angry vets at the VA all the time, and you have 22 guys a day shooting themselves…that's what happens when you can no longer contain your frustration. These guys eat a gun.***

- P20: ***that's why there are a lot of the suicide issues veterans are having right now. Because we isolate ourselves – it's easy to isolate yourself when you move to somewhere you don't know – a lot of people – and that self-isolation just becomes suffocating till it's like too much.***

One of the homeless veterans identified the despair of "never crawling out of this financial hole" as being the motivator of his suicide attempt. While PTSD remains an important issue and causal factor for veteran suicides, it is important to note that it isn't the only factor.

Veterans spoke of their military service as purposeful, and sometimes struggled to identify their new purpose in life after service. The military life is fast-paced and veterans spoke of always feeling like they got a lot done. The slower pace of the civilian life, coupled with issues finding employment, or finding a major in college, or simply finding a passion or hobby to pursue, is problematic for veterans.

> P3: ***when you get out in the civilian world if you're lucky you get a job that you feel motivated and enjoy enough that you feel like you have a mission…but you don't. There's no drive and purpose in your life, there's no mission anymore.***

To mitigate this, many veterans turn to leisure activities and volunteer work. Veterans enjoyed their hobbies, especially ones that took them outdoors, like fishing, hunting, golf, etc. Many felt that being outside and getting fresh air was physically good for them. Others enjoyed more isolated indoor activities, like video games and movie streaming. Volunteer opportunities were important to several veterans, including Participant 7 who explained:

> ***They'll get out and they do kind of have that still, that nagging want, that urge to want to still serve even though they ARE out.***

Several veterans desired to help people or help their community through some sort of volunteer work, and wished that they had more centralized access to volunteer

opportunities. Volunteering helped Participant 16, who has struggled with his self-worth after service:

> ***And ummm most people think that's work but that's leisure for me. I enjoy going up there and sitting on the riding lawnmower and just mowing, and plus I get that sense of helping people in the process. So what seems like what might be work to some people is leisure for me.***

3.2.5.5. Relationships. The topic of veteran relationships with other people was a major topic in the interview sessions. Many veterans chose to attend college after service. As indicated in the Employment and Education section, many where shocked at how noticeable the age and maturity difference was between them and their civilian classmates.

- P2: ***I'd meet somebody in class and talk to them and like 'oh yeah let's hang out, let's go grab a beer sometime' and they're like 'I'm eighteen'.***
- P10: ***The age difference is like, man, I'm like ten years older than most of these guys and I don't even know what they're talking about. It's like a whole new lingo going on. I feel like an old man. I'm like a rocking chair away from retiring or something like that. To add insult to injury, you're having to listen to some frickin' eighteen-year-old tell you about how the world works in class.***

Even at times when the age gap was relatively small (around 2 years), the difference in age still felt large because of the veteran's military experience. Similar reactions were experienced by veterans who entered the work force.

> P9:***I guess you see in the military your leaders, in one way or another, have proven themselves, and then in the civilian world, your leaders could be a twenty-three year old kid that has no experience but he just went to school and this is your leader.***

Many veterans placed some of the blame on themselves when it came to strained relationships with civilians:

P9: ***don't get bent out of shape with the fact that you're a veteran and you know, you've been held to this rigorous standard and they HAVEN'T, like it's not their FAULT.***

while others disclosed some of the strangest interactions they'd had with civilians:

- P14: ***My coworker out of the blue goes, "I had a very horrible dream about you," she says, "I felt like you came in and shot up the place and I was very scared." Ummm…what was I supposed to say to that?***

- P36: ***This one time I was at work and my boss had this idea that my coworkers didn't really like, I thought it was a good idea and agreed with him. And after the meeting this girl comes up to me like, "How many babies did you kill? How do you sleep at night? Get a brain and think for yourself instead of following orders."***

- P37: ***For 6 months, I had to wear a helmet. When I was in Northern Virginia, I was up at Walter Reid. And we were at the mall up there, and two guys ummm were driving by in a car and they rolled down the window and asked…they were talking to me, I kept walking, but they asked me, "Why are you wearing a helmet? You're walking!" And um, my wife, said uhhh, "He was shot in the head protecting your freedom" and went OFF on them.***

- P17: ***Literally in the same sentence, he goes, "hey thank you for your service, hey did you kill anybody?" I felt like I had whiplash.***

- P16: ***Then like after they ask you if you killed someone and you tell them you did, then they want to know the whole story, what happened, you know, it's REALLY sensitive. It's not something I'm proud I've done. It's not something I want to talk about.***

- P15: ***So company policy is if there is a spill, you have to go clean it up to avoid lawsuits from someone slipping. So I went to clean it up. A customer asked me for help on my way to clean up the spill, and I told her I needed to clean the spill first and could she wait, and she said yes. Then later the lady complained to my boss, and my boss fired me for getting into an argument with him, when it is company policy to clean up the spill first.***

- P16: ***My boss told me to unload the truck. He specifically said, "if anyone asks you for help with something, tell them I told you to unload the truck first." Well, someone of course asks me for help in the stockroom. I told them I had been told by my supervisor to***

unload the truck. Later, I got fired for not helping. I got fired by my boss for doing what he told me to do. It's so frustrating. And so different from the military. It's things like that in the civilian world I just….can't understand.

Some veterans spoke of feeling ostracized when they attempted to share military experiences with civilians in hopes of building a relationship:

- P6: ***I try to share a story with someone and they don't care.***

- P2: ***when I was like 'oh yeah back when I was in the Army' and they would just kinda roll their eyes.***

- P41: ***And yeah once he told one of his professors he was a veteran, the professor kind of almost trying to play against him as far as like trying to be unfavorable to him as far as temperament. But he wasn't acting like that before he knew.***

Several veterans spoke of the stereotypes they encounter after service. Many believed that civilians approached them with caution because "maybe I have PTSD and will go off on them". Others spoke of being "babied" or treated as if every encounter requires "walking on egg shells", when really that emphasized to them that civilians didn't perceive them as "normal" or capable of a normal conversation or stress. Others spoke of employers and coworkers wondering if the veteran could complete simple tasks like sending an e-mail, and that they were often given step by step instructions for tasks that are simple to complete. These issues further the challenge of reintegrating as a civilian. Additionally, many veterans felt the media and entertainment industry perpetuate veteran stereotypes in movies and TV shows.

P20: ***Orange is the New Black is like my favorite show. I can just mindlessly watch it and laugh and unwind after a long day. Well, this season, they hired new prison guards and they were military veterans, which isn't outrageous. But they are all evil. Like they are all dealing with this weird version of PTSD that isn't really PTSD at all, and one of them is all sick and twisted and trying to rape this girl in the show or get her to do gross things like eat a live mouse. It's like…great…hope none of my coworkers watch this show…***

An additional barrier to civilian interaction (as observed by the veterans) was the issue of triviality. Civilians seem to emphasize worry on relatively trivial things. As veterans explained:

- P10: ***Oh man, so like, you know, I get back home or something like that and they'll be like (mocking tone) "Oh yeah, I got finals, wahhhh" and I'm thinking, "My friend just got killed".***
- P15: ***We're more concerned with Kylie Jenner's hair color than the people who are getting slaughtered…it's so strange to me.***
- P31: ***I just can't identify with the level of stress you are feeling over your minuscule problems.***

Veterans were quick to identify a major factor in their lives was how holistically they viewed the world after their military experiences.

- P7: ***after working at higher levels of government, it definitely makes me question things a whole lot more. Somebody like me with the clearances I had and some of the things I saw and everything. I know we could get hit at any time. I just deal with it.***
- P3: ***Whenever there is a story on the news, it's either a spun version of the actual events, or it's there to cover up something bigger that's happening somewhere else.***

Veterans really missed the brotherhood of the military, and found it difficult to replicate that level of closeness in their civilian relationships. Simultaneously, they often found it difficult to relate to older veterans from previous conflicts (ex. Vietnam veterans), simply due to the age difference. Veterans expressed interest in meeting other veterans around their age, but were unsure of how to proceed with that process, as several veteran organizations seemed to be frequented by older veterans. As Participant 16 explains:

> ***Yeah. And don't get me wrong, us younger veterans can learn a lot from Vietnam veterans, it's not that I don't want them to be there it's just for me personally, I tried to go to one meeting and when I walk in there and everyone's thirty years older than me it's really complicated. Even though we both have something in common, we both served in***

the military, we both served in war, the age difference makes it really hard to be on their level. Not to mention I'm half-Asian and when you're half-Asian and talking to someone who was in Vietnam that kinda makes them a little bit uncomfortable.

Racism was an issue, particularly discussed by ethnic minority veterans. Encounters with law enforcement and civilians were discussed as complicated examples.

I always give cops my military ID. I wish I didn't have to play that card, but I feel like it's the safest thing to do when I get pulled over.

As another example, an African American veteran talked about how he was glad to be out of the military, but missed how people treated him when he was in uniform.

When I wear that uniform, they assume the best about me. Now they assume the worst.

Finally, relationships with close family members and close friends was a topic addressed by veterans during the session. Many veterans who isolate themselves during reintegration stay close to their family members and close friends, people they feel they can trust. However, it is not easy to reintegrate into the family unit after service. Many veterans described difficulty "finding your place" in the family after they had become self-sufficient without the veteran there. The whole dynamic of family life changed once they reinserted themselves into the family unit. Some veterans dealt with discovering infidelity, or enduring divorce. Other's described the feeling of missing out on their family's milestones:

- P18: ***And you're never prepared for the first time coming back from a 12-month deployment, in a way. Like I said, my son was one – came back – he's two. So we had some folks who missed their baby being born and their first birthday so it depends on the things you do miss. Those are the things you come back and are like "okay"***

or if you're in your teenager years – the kids are basically changing so fast in a year from a teenager to a young adult and they'll of course hold it against you.

- P21: ***The time away. While serving the...I missed not only two of his birthdays but his Christmas as well. And you know those are important holidays that need to be celebrated. I don't ever want to miss another one.***

Other veterans struggled with becoming a full-time parent at home.

> P36: ***I worry about being a good dad. Well, over a year of your life, in combat, like EVERYTHING while you're deployed is like life or death. Wrong turn? You're dead. Wrong door? You're dead. Wrong weapon? You're dead. Take too long, make a decision using up too much time, you're dead. It's just wrong or right. That's it. We have to realize...mistakes…mistakes aren't "this or that"…mistakes ARE actually acceptable...it can be a simple mistake...especially from a child. I've been out 11 years, it's still a THING. It's still a problem. This is huge thing. I've upset my kids, and then I look back and see that is why I was so hard on them. But they're just kids.***

3.2.5.6. Military and VA. Veterans described the notable differences between military life and civilian life. Despite the difficulties associated with deployments, combat, and separation from family, much of the military structure and life on base was described as "easy living" by veterans. There is no need to understand the concept of paying for electricity, for example. Doctor's appointments, down to teeth cleaning, was scheduled for military personnel and they simply followed notifications when it was time to attend an appointment. Health insurance was not required. Schedules and structure for an upcoming day were well understood ahead of time. After settling into this type of culture, may veterans found it difficult to transition to civilian life and gain their complete independence and responsibility for themselves, as Participant 2 noted:

> ***I haven't really made the mental transition to 'I kinda control what I'm doing, when I'm doing it.'***

And leaving the cocoon of a military base is sometimes difficult for veterans (Participant 5):

> ***the hardest part for me was the sense of security you had as a member of the military living on base***

Others who had a family and returned home from deployments noted how strange coming home felt:

> ***I mean it just takes some time to get back into. I haven't driven a car in like several months and spent money for several months and haven't paid bills and you have a family back home doing all those things.***

Coupled with this phenomenon is the perception that the military no longer cares about personnel as they are separating from the military and becoming veterans. Lost paperwork and incorrect records are not a military priority as personnel are seen as "almost veterans", and frankly are no longer an asset or providing any sort of service to the military. One veteran spoke of being "processed out" incorrectly, and despite multiple attempts through multiple agencies, is unable to access his GI Bill benefits. Similarly, ACAP and TAP programs which serve as a way to assist personnel with transition are riddled with issues:

> P40: ***They are classes for the lowest common denominator. They don't really help anyone who didn't join the military right out of high school.***

Others lamented the narrow focus of the program:

> P15: ***Umm..The military provides "transitioning". They help you learn you how to write resumes, and they teach you how to do job interviews. They basically try to teach you how to get a job, they don't really teach you how to get back into civilian life. They kinda only want to make sure you get a job more than reintegrate you back into civilian life, it seems like, to me.***

One veteran's perspective of the ACAP/TAP programs was even darker:

> P10: ***My feeling on the ACAP program is that it's a massive cover-your-ass program, and basically what it is if you got these guys that are out there and it's like "I don't know how to get to my benefits" or "I am***

> ***homeless" the military can be like, "Well we sent them to ACAP, it had an explanation, it's on them." it's a check in the box it is the easiest path of least resistance the military can utilize to say that they told these guys and it is not on us.***

After veterans transition out of the military, the military effectively "cuts ties", and they must seek assistance through the Department of Veterans Affairs. This process is very unclear to many veterans, and some veterans are unaware of the benefits they have already received or are already entitled to, as Participant 10 outlines:

> ***The money…I mean a lot of people aren't using it because they don't know about it. So once you find out what's available to you, which is a whole other issue, it would be nice to have a dumbed down explanation of the requirements and who to file with specifically because….. like a lot of these benefits are overly verbose and they have these weird loopholes and this works at a certain percentage and all this stuff. Just like a Layman's dumb down version of it because let's all pretend like we don't speak Bureaucrat. And that is a lot of the hang up is I just don't know what is available to me, so like something that simple.***

Participants raised well-known issues such as wait times and quality of care, as Participant 3 summarized:

> ***I'm having a serious medical issue. And after 4 months I'm finally getting an MRI on the 18th. After 4 months. Because of a botched VA procedure, my brain, I may be leaking cerebral spinal fluid from my spine. I'm having such bad problems and headaches and issues because my brain may be sagging against my skull! It's taken them FOUR MONTHS to get me a freaking MRI. They've cancelled my appointment 3 times already, and didn't notify me until I had already driven to the VA.***

Some participants took issue with the employees of the VA, and detailed several interactions with employees there.

> P4: ***Trying to remember what she said, literally quote what she said. Yeah I said "Ma'am I'm in so much pain, I'm literally willing to sit there all day long to somehow get worked in as soon as possible and she said: "Haha, Probably because you have nothing better else to do" And laughed at me.***

And in a separate session:

> P34: ***So I called up the VA....wondering, wanting more information about this. So I called up the Richmond Center, the McGuire Richmond Medical Center, and the guy that I contacted there...ummm.. was just being rude. And it sounded like from the tone of his voice, that I was annoying HIM. But one of the things is that I was asking was like "Well how long am I covered?" And he said "Until you die." And I felt that was really insulting. I mean you can say "for your whole life" you can't put that in better words? And so I mean when someone blatantly says it like that you're really upset and you don't trust the organization at all.***

The pushback for these types of interactions include the exaggeration of symptoms by veterans, in the hopes that they will be taken more seriously by appointment makers. Despite anger with veterans who malinger and game the system, the same participants often malingered in order to get benefits they felt they deserved. Participant 6 explained that if a veteran is honest about the benefits he is requesting, the VA “counteroffers” (which really isn’t an offer, it’s the initial level of benefits) a much lower benefit level. Then that level has become the baseline for future negotiations. Rather, a strategy employed by many of the veterans was to request a high level of benefit, and then the counteroffer would be something closer to what was actually deserved. Many of the veterans were very frustrated by this, and wished that it was easier to get what they were promised – benefits they deserve after service – without the process being riddled with dishonesty.

Conflict resolution with the VA, be it the matter of appointment wait times, appointment scheduling, benefits calculation, benefits distribution timeframe, etc., takes a lot of time. Veterans lamented the time commitment required to address these matters, during a fragile time when they were trying to get their next chapter in life established, which often involved finding a place to live, enrolling in a school, interviewing for jobs, spending time with family, relaxing, etc. These activities which were considered part of the reintegration process were often truncated or reprioritized in order to address pressing matters with the VA. This could add an

additional layer of complexity to the reintegration problems that veterans face. As Participant 4 described:

> ***You have to travel pretty far. I had to take off work. I went to my appointment, I waited for my appointment, after 2 hours in the waiting room for a SCHEDULED appointment, the same lady who checked me in is now telling me that my appointment is canceled and needs to be rescheduled for a different day, and yes, a work day. So I've missed work, have to go back, tell my employer I need another day off for my appointment. All the while the pain in my hand is so bad it feels like someone is sawing my finger off.***

3.2.5.7 Understanding the Lived Experience. Some of the results of the phenomenological summary were surprising to the researcher, such as joining to avoid jail time or joining so a spouse could receive a medical procedure. Although motivators for joining the military were not necessarily scoped in the considerations of reintegration after service, some of those motivators undoubtedly retain impact on the veteran as he reintegrates. Additionally, while the epidemic of PTSD is well documented and cause for concern, the frustration that veterans experience with their coworkers, family members, and the VA may be root causes of some veteran suicides, and future research could explore the investigations done after veteran suicide and how cause or motivator of suicide is established by investigators. Finally, the civilian ineptitude that veterans must sustain every day is troubling. Civilians seem unaware of how impactful their words are, or simply don't understand that their words are inappropriate. Veterans spoke of social situations (which are already awkward) being taken to new heights when civilians asked them if they had killed anyone, or demanding the "highlight reel" of their war and combat experiences. This is not something veterans want to discuss, certainly not with someone they've only just met. One veteran went so far as to comment when he did begin answering the civilian's questions, the civilian became bored and began interrupting him to change the subject, all while the veteran was sharing something sensitive and important. While there is ample opportunity for technology to address

some veteran issues (see Chapter 4), it could also be impactful for civilians to revise their schemas to guide their interactions with veterans.

3.3 Discussion

The elicitation and first-cycle coding processes, the subjects of this dissertation chapter, were important initial steps in the research effort and resulted in some notable discoveries. The meaning units were organized by participant and by theme, which was conducive to (1) the production of a phenomenological summary of the veterans' lived experiences with community reintegration, and (2) observations about treatment effect on meaning units quantity. The meaning units data set also served as an input data set to code in second-cycle coding processes, outlined in Chapter 4. The phenomenological summary (section 3.2.5) presents a variety of considerations for designers creating products for this population, and provides information about young veterans' experiences that could provide implications for other stakeholders, such as family members, psychiatrists, employers, policy makers, etc. Designers could view this phenomenological summary as an introduction to the design space criteria lists, as a way to "set the scene" for the design population. Future work could explore the impact of exposing designers to a phenomenological summary of the experiences of their target user group.

In addition to qualitative methods utilized to identify and categorize the meaning units, quantitative methods were used. Main and interaction effects were identified for both Setting and Order. Post-hoc tests indicated some notable differences between treatment groups with respect to quantity of meaning units elicited. An overview of these results is presented in Table 15. An "M" indicates a significant difference between the means of Total Meaning Units treatment groups of the matrix, found using Fisher's LSD test. An "I" indicates the same for interview meaning units, and "D" for design units, with the caveat that design meaning units were analyzed using a Mann-Whitney test, due to the non-normal distribution of quantity.

Table 15
Significant differences found between groups for Total Meaning Units (M), Interview Meaning Units (I), and Design Meaning Units (D) by treatment

Treatment	II-ID	GI-GD	ID-II
GI-GD	none		
ID-II	M, I	none	
GD-GI	M, I, D	M, I, D	M, I, D

No differences in means were discovered in quantity of interview or design meaning units or their composite elicited from participants between the II-ID and GI-GD treatments, or the GI-GD and ID-II treatments. Differences in quantity of meaning units and interview meaning units were found between ID-II and II-ID treatments. Differences in quantities of all dependent variables were discovered when comparing GD-GI treatment with the remaining 3 treatments. The GD-GI treatment performed the worst with respect to quantity of meaning units elicited.

This could be due to a myriad of factors. First, GD-GI participants completed the design session first while in a group setting. Despite the ice breaker, perhaps rapport was not as high as it was when completing the interview session. Furthermore, meaning units were calculated on a “by participant” basis, therefore each treatment group had 10 participants and their associated meaning units for calculations. It would have been possible to calculate meaning units by session instead, with 10 sessions in II-ID and ID-II treatments, and 5 sessions in GI-GD and GD-GI treatments. For practical reasons, this analysis was not performed, as it is desirable to understand the conditions in which a single user will disclose optimal information about experiences and the design space. This is investigated further in Chapter 4.

Since meaning units are not standardized units of information, statistical analyses of the dependent variables, which examine quantity of meaning units, require conservative interpretation of significance. Significant differences in quantity of meaning units, quantity of interview meaning units, and quantity of design units among treatments do not imply significant differences regarding *amount of information* elicited. For example, perhaps the analysis of a participant

more curt and specific in verbiage resulted in fewer meaning units than a participant that was very wordy and illustrative. However, the succinct participant may have contributed as much information relevant to reintegration problems of veterans as the more verbose participant. The analyses of this chapter does not consider that potential, or how it may bias results or impact interpretation of results with respect to treatment group. However, this analysis does provide results to benchmark against results found in Chapter 4. Chapter 4, which details the procedure for second-cycle coding to define the design space and compares the various elicitation methods to the resulting quantity of design space criteria begins on the following page.

CHAPTER 4. SECOND CYCLE CODING: IDENTIFICATION OF USER NEEDS, OBSTACLES, AND CONTEXT OF USE CONSIDERATIONS

This chapter provides an overview and results of second-cycle coding processes to identify the design space criteria: the user needs, obstacles, and context of use considerations. These design space criteria were essential for the development of representative personas. Additionally, investigations were conducted to determine which experiment condition(s) produced optimal design space criteria results.

After completion of the elicitation process, the audio recordings of experiment sessions were transcribed. The transcripts were analyzed by coders using a codebook, and important meaning units were identified and categorized. A phenomenological summary was generated from this data set, which addressed RQ1: What are the experiences of young military veterans with reintegration into civilian society? See Chapter 3 for a review of these processes and results. The remaining research questions are investigated in this chapter:

- **Research Question 2 (RQ2):** What are the implications of these lived experiences on the scope of the design space?
    - (RQ2a): What are the *needs* of young military veterans reintegrating into civilian society?
    - (RQ2b): What are the *context considerations* of young military veterans reintegrating into civilian society?
    - (RQ2c): What *barriers* are present and what *challenges* do young military veterans experience with reintegration into civilian society?
    - (RQ2d): What *personas* can be generated from information elicited from the users (military veterans)?

- **Research Question 3 (RQ3):** What is the impact of select elicitation methods on depth and breadth of the design space criteria?
    - (RQ3a): What is the impact of session *setting* (individual or group) on *phenomenological design*?
    - (RQ3b): Is there a *priming* effect associated with a phenomenological approach to design?
    - (RQ3c): What differences exist between a *traditional participatory design* approach and a *phenomenological approach to design*?

The data set of meaning units, which was a direct result of first-cycle coding, served as the input data set for second-cycle coding, described in this chapter.

4.1 Method

While the identification of 3,063 meaning units was useful to provide an organized data set for the phenomenological summary, the meaning units were not articulated design space criteria. In their raw form, the meaning units were verbatim excerpts from the veteran oral responses, many of them personal anecdotes delivered during the interview. In order to identify design space criteria from each excerpt, thematic analysis using grammar rules was applied. The method is described in detail in the following sections.

4.1.1 Experimental Design

Recall from Chapter 3 the 2 x 2 experimental design (setting x order) used in the elicitation phase of this research. The four treatment groups are reproduced here for reference:

Treatment II-ID: Individual setting, interview session first + design session second

Treatment GI-GD: Group setting, interview session first + design session second

Treatment ID-II: Individual setting, design session first + interview session second

Treatment GD-GI: Group setting, design session first + interview session second

Some new dependent variable assignments are necessary to address the research questions of this chapter:

(RQ2): What are the implications of these lived experiences on the design space?

Table 16
RQ2 definition of variables

Variables	Description
Independent Variables	
Session Setting	Two level categorical: Individual Group
Session Order	Two level categorical: Interview First Design First
Dependent Variables	
All Needs	Quantity of total user needs elicited
Functional Needs	Quantity of functional needs elicited
Nonfunctional Needs	Quantity of nonfunctional needs elicited
Obstacles	Quantity of obstacles elicited
Challenges	Quantity of challenges experienced elicited
Barriers	Quantity of barriers elicited
Context of Use Considerations	Quantity of context of use considerations elicited
Design Space Total	Quantity of total of needs, challenges, barriers, context of use specs
Breadth	Coverage of codebook subthemes by design space criteria
Distinct Functional Needs	Quantity of distinct functional needs elicited (repetitions excluded)
Distinct Nonfunctional Needs	Quantity of distinct nonfunctional needs elicited (repetitions excluded)
Distinct Challenges	Quantity of distinct challenges elicited (repetitions excluded)
Distinct Barriers	Quantity of distinct barriers elicited (repetitions excluded)
Distinct Context of Use Considerations	Quantity of distinct context of use considerations (repetitions excluded)
Distinct Design Space Criteria	Quantity of distinct design space criteria (repetitions excluded)

(RQ3a): What is the impact of session *setting* (individual or group) on *phenomenological design*?

Table 17
RQ3a definition of variables

Variables	Description
Independent Variables	
Session Setting	Two level categorical: Individual Group
Dependent Variables	
All Needs	Quantity of total user needs elicited
Functional Needs	Quantity of functional needs elicited
Nonfunctional Needs	Quantity of nonfunctional needs elicited
Obstacles	Quantity of obstacles elicited
Challenges	Quantity of challenges experienced elicited
Barriers	Quantity of barriers elicited
Context of Use Considerations	Quantity of context of use considerations elicited
Design Space Total	Quantity of total of needs, challenges, barriers, context of use specs
Breadth	Coverage of codebook themes by design space criteria
Distinct Functional Needs	Quantity of distinct functional needs elicited (repetitions excluded)
Distinct Nonfunctional Needs	Quantity of distinct nonfunctional needs elicited (repetitions excluded)
Distinct Challenges	Quantity of distinct challenges elicited (repetitions excluded)
Distinct Barriers	Quantity of distinct barriers elicited (repetitions excluded)
Distinct Context of Use Considerations	Quantity of distinct context of use considerations (repetitions excluded)
Distinct Design Space Criteria	Quantity of distinct design space criteria (repetitions excluded)

RQ3a is specifically addressing the conditions under which a phenomenological approach to design is employed, meaning only those sessions where the interview took place first (i.e., the II-ID and GI-GD sessions). As order is not a consideration (since ID-II and GD-GI participants are not considered in this research question), it has been removed from the variable list.

There are three metrics by which the design space criteria elicited is measured: the total quantity of the design space criteria (including repetitions), the breadth of the design space criteria, and the distinct quantity of the design space criteria (excluding repetitions). This research question examines if the setting (individual or group) impacts the design criteria elicited. The dependent variable values for each of the 10 participants within the II-ID treatment and each of the 10 participants within the GI-GD treatment was tabulated with assistance from Microsoft Excel Filter function and Remove Duplicates function (to calculate the distinct dependent variable values).

(RQ3b): Is there a *priming* effect associated with a phenomenological approach to design?

Table 18
RQ3b definition of variables

Variables	Description
Independent Variables	
Session Setting	Two level categorical: Individual Group
Priming Status	Two level categorical: Primed (II-ID and GI-GD participants) Unprimed (ID-II and GD-GI participants)
Dependent Variables	
All Needs	Quantity of total user needs elicited
Functional Needs	Quantity of functional needs elicited
Nonfunctional Needs	Quantity of nonfunctional needs elicited
Obstacles	Quantity of obstacles elicited
Challenges	Quantity of challenges experienced elicited
Barriers	Quantity of barriers elicited
Context of Use Considerations	Quantity of context of use considerations elicited
Design Space Total	Quantity of total of needs, challenges, barriers, context of use specs
Breadth	Coverage of codebook themes by design space criteria
Distinct Functional Needs	Quantity of distinct functional needs elicited (repetitions excluded)
Distinct Nonfunctional Needs	Quantity of distinct nonfunctional needs elicited (repetitions excluded)
Distinct Challenges	Quantity of distinct challenges elicited (repetitions excluded)
Distinct Barriers	Quantity of distinct barriers elicited (repetitions excluded)
Distinct Context of Use Considerations	Quantity of distinct context of use considerations (repetitions excluded)
Distinct Design Space Criteria	Quantity of distinct design space criteria (repetitions excluded)

As the dependent variables remain the same as in RQ3a in measuring the design space, an independent variable *priming status* is added in order to examine differences in phenomenological and traditional participatory design with and without using the interview as a prime. This could have practical implications for designers who may have the time and resources to conduct the interview portion, but do not necessarily have the resources to analyze interview results. This research question seeks to clarify if conducting the interview impacts the results elicited in the design session. Therefore, dependent variables from the design sessions in II-ID and ID-II sessions will be compared, and a comparison between GI-GD and GD-GI sessions will be done to determine if the priming exercise (the interview in the II-ID and GI-GD sessions) elicited a detectable difference in depth and breadth of design space criteria when compared to the design sessions from ID-II and GD-GI sessions.

(RQ3c): What differences exist between a *traditional participatory design* approach and a *phenomenological approach to design*?

Table 19
RQ3c definition of variables

Variables	Description
Independent Variables	
Session Setting	Two level categorical: Individual Group
Approach	Two level categorical: Phenomenological (II-ID and GI-GD participants, all sessions) Traditional (ID-II and GD-GI participants, design session only)
Dependent Variables	
All Needs	Quantity of total user needs elicited
Functional Needs	Quantity of functional needs elicited
Nonfunctional Needs	Quantity of nonfunctional needs elicited
Obstacles	Quantity of obstacles elicited
Challenges	Quantity of challenges experienced elicited
Barriers	Quantity of barriers elicited
Context of Use Considerations	Quantity of context of use considerations elicited
Design Space Total	Quantity of total of needs, challenges, barriers, context of use specs
Breadth	Coverage of codebook themes by design space criteria
Distinct Functional Needs	Quantity of distinct functional needs elicited (repetitions excluded)
Distinct Nonfunctional Needs	Quantity of distinct nonfunctional needs elicited (repetitions excluded)
Distinct Challenges	Quantity of distinct challenges elicited (repetitions excluded)
Distinct Barriers	Quantity of distinct barriers elicited (repetitions excluded)
Distinct Context of Use Considerations	Quantity of distinct context of use considerations (repetitions excluded)
Distinct Design Space Criteria	Quantity of distinct design space criteria (repetitions excluded)

As the focal research question of this dissertation, this research question compares a phenomenological approach to design to the more traditional participatory design approach. In a real traditional participatory design session, the interview would not take place, rather, as the users are representative “experts”, their ideas and opinions on technology design would typically be the scope of information collected. This is procedurally represented in the *design sessions only* of the ID-II and GD-GI sessions, with the interview session excluded from the data set. The dependent variables measured from the ID and GD portions of the ID-II and GD-GI sessions will be compared to measures from the II-ID and GI-GD sessions (both interview and design session) to determine if there is added benefit to not only conducting an interview, but analyzing it to determine design criteria as well. Does the interview, which focuses on *experiences* alone, not *technology* ideas, offer design criteria that could be *applied to technology* by designers?

4.1.2 Identification of design space criteria using thematic analysis

Thematic analysis was utilized in this phase to identify the design space criteria (user needs, user obstacles, user context of use considerations) from the list of 3,063 meaning units described in Chapter 3. The purpose of this analysis was to develop the master set of design space criteria for RQ2, which could be closely examined by participant (and thus by treatment) to address RQ3.

4.1.2.1 Personnel. The same eight personnel, who worked as analysts to extract and categorize the meaning units in first cycle coding also converted meaning units into design criteria in the second cycle coding phase. Personnel were not given access to research questions, diagnosis status, or treatment information in order to guard against potential bias. Analysts were required to be undergraduate students in the Industrial & Systems Engineering Department at Virginia Tech, and participated as part of a 3-credit undergraduate research course. Consequently, they each allocated 9 hours every week to work on the analyses for this research. As first-cycle coding methods and second-cycle coding methods differed, the undergraduates attended several training sessions on second-cycle coding conducted by the primary researcher. They were provided training materials (Appendix C.1), including their assignments to meaning unit subsets (C.1.1) and instructions (Appendix C.1.2). Training sessions utilized select exemplar meaning units from the meaning units data set. The primary researcher identified design criteria from exemplar meaning units, and the team practiced identification with a different set of exemplar meaning units. Analysts worked in pairs for the first week of second-cycle coding, after which they independently analyzed the remaining meaning units data in accordance with the coder assignments (Appendix C.1.1). Due to time and resource constraints, each meaning unit was inspected by one coder. Ideally, two analysts would inspect and analyze each meaning unit and differences would be brought before a judge to be reconciled, similarly to the first-cycle coding procedure described in Chapter 3. Therefore, the individualistic assignment of personnel to a meaning units subset must be considered a limitation of this analysis process.

4.1.2.2 Instrument. The analysts were provided instructions to translate the meaning units into design space criteria (Appendix C.1.2), as well as how to grammatically format the design space criteria in their finished form. The coders used Google Sheets to manage all second cycle thematic analysis tasks. Upon completion of analysis, the primary researcher downloaded all Google Sheets from first-cycle and second-cycle coding and deleted the associated shared google sheets as an added security measure and in accordance with the procedure approved by Virginia Tech IRB.

4.1.2.3 Procedure. The process of determining design space criteria from the meaning units was expanded from previous work that explored storytelling as an elicitation method for medical device design (Gausepohl, 2012; Gausepohl et al., 2011) and on Grbich's "block and file approach" to thematic analysis (2013). The coders already were familiar with block and file from their first-cycle coding experience. In first-cycle coding (see Chapter 3), segmentation was used to identify beginning and endpoints of meaning units, while block and file was used to determine how the meaning units were categorized (Financial, Mental and Emotional Health, etc.).

For second-cycle coding, the meaning units were subject to a different categorization ontology. For example, meaning units tagged within the Employment and Education section of the codebook were categorized as part of the same data set at the end of first-cycle coding: the Employment and Education meaning units. However, for second-cycle coding, design criteria identified within a meaning units set were regrouped according to criteria type: need, obstacle, or context of use consideration. These criteria were grouped as such, regardless of codebook identifier. The data management platform used for all analysis after second-cycle coding completion was a Microsoft Excel spreadsheet. This spreadsheet retained information and identifiers from first-cycle coding results while incorporating identifiers of second-cycle coding results, thus, it was feasible to sort items by codebook categorization or design space categorization, allowing for several notable comparisons.

Grammar rules for user needs specifications were utilized to encourage standardized language structure of design criteria (Gausepohl, Beaton, & Winchester, 2011). The linguistic structures for design space criteria identification was expanded from past research to include addition criteria: challenges and barriers. A “master list” of all identified design space criteria was generated concomitantly with the analysis phase, such that consistent design space criteria verbiage could be utilized by multiple coders. The primary researcher examined the master list weekly, and consolidated any repetitive design space criteria that was the result of inconsistent phrasing or “carry over” from verbatim meaning units. Weekly meetings were held to make coders aware of these changes and receive feedback.

4.1.2.3.1 Procedure: Identification of design space criteria. Data coders utilized an iterative process to deconstruct a meaning unit into design space criteria components before analyzing the next meaning unit. Recall that meaning units were verbatim excerpts that could range from a few words to several sentences in length. Therefore, the amount of design space criteria that emerged from each meaning unit varied. The process that was used to determine the design space components involved iterative reading of the meaning unit being examined. The order of design space criteria identification was:

1) Read the meaning unit
2) Identify functional user needs
3) Identify nonfunctional needs
4) Identify barriers
5) Identify challenges
6) Identify context of use considerations

This process was informed by past research (Gausepohl, Beaton, & Winchester, 2011; Gausepohl, 2012) with the caveat that this research effort presents barriers and challenges as additional useful design space criteria.

Needs were the first items coders were instructed to identify. *Functional Needs* provide the simplest requirement of what the user or app should do.

Nonfunctional (usability) needs are used to describe the effectiveness, efficiency, and provided satisfaction of the functional needs. Separately, *barriers* and *challenges* are the negative aspects of integration/obstacles to integration that the veterans identified, which separates them distinctly from a desirable need. *Context of use considerations* were identified in the following iteration: factors that weren't necessary clearly identified needs or obstacles, but issues that may impact the user (positively or negatively) as they integrate.

After determining the classification of meaning unit (or meaning unit fragment) as a need, obstacle, or context of use specification, grammar rules were utilized to specify the design space criteria with consistent linguistic structure. Table 20 displays the grammar rules utilized for each design space criterion along with example results and the origin of the approach. Note that Table 19 also illustrates the context for one of the unique contributions of this work.

Table 20
Grammar rules for design space criteria identification with example formatted results.

Criterion	Grammar Rule(s)	Example Result	Origin
NEED: Functional Need	Active verb + object	Acquire job	Gausepohl, Beaton, & Winchester, 2011
NEED: Nonfunctional Need	Active verb + object + prepositional phrase Active verb + object + adverb	Acquire job in my city Acquire job quickly	Gausepohl, Beaton, & Winchester, 2011
OBSTACLE: Barrier	Object Adjective + object	Age gap Vision issues	Research Contribution
OBSTACLE: Challenge	Object + verb + object	VA cancels appointments VA ignores problems	Research Contribution
CONTEXT: Context of Use	Object + adjective Gerund + prepositional phrase Gerund + adjective	Land navigation easy Living in a homeless shelter Living alone	Gausepohl, Beaton, & Winchester, 2011

It was possible for a meaning unit to contain multiple design space criteria. Some of the shorter meaning units contained 1 criterion. After the components of a meaning unit were identified, coders were instructed to re-examine the meaning

unit and the accompanying design space criteria to ensure that the design components identified covered the complexity of each conveyed meaning unit.

For example, recall that meaning unit *x* was identified and coded by 2 coders during the first cycle of coding. It was placed in a google spreadsheet with several identifiers. The columns indicated theme of categorization, theme of subcategorization (both from codebook), participant number, the stated meaning unit, an “I” or “KJD” to mark the session in which it was spoken, and a line number of transcript for quick reference. Additionally, a “J” was placed in the final column if the coding of the meaning unit had been determined by a judge. These columns were expanded for second-cycle coding to include more identifiers, including the categorization of design space criteria and the stated design space criteria. Meaning units that resulted in multiple design space criteria components utilized the required number of rows; such that each row had a unique design space criteria from that meaning unit. Examples of this transition are displayed in Tables 21 and 22. Note: Treatment (1=II-ID, 2=GI-GD, 3=ID-II, 4=GD-GI) and PTSD (0=no PTSD diagnosis, 1 = PTSD diagnosis) were *not* included in the original google sheet in order to guard against coder bias. These identifiers were added after export by the primary researcher using the filter function in Microsoft Excel to apply each treatment and diagnosis identifier to the corresponding participants.

Table 21

Linking the meaning unit to the codebook, participant, and transcript

Participant #

PTSD diagnosis

Interview or Design Session

Macro-theme	Theme	P#	PTSD	Treatment	Meaning Unit	Session Type	Line #
4	406	14	1	3	I don't like being in very crowded places with just a lot going on. I seem to get overwhelmed at times.	KJD	748
4	406	15	1	1	So going to the bar, I can't enjoy myself, I am constantly observing and analyzing everyone else.	I	63
4	406	15	1	1	It's difficult, social environments…too many people.	I	88
4	406	15	1	1	I can't do things that I enjoyed before the military like going out to a bar or going to a club….going to a concert, because now I have to sit in the back corner and make sure that nobody's going to come in and start shooting people	I	513
4	406	16	1	1	If you go to a crowded place, you know, that's uncomfortable for a veteran. They don't,…it's like you're…I can't, I can't relax. And they're looking at me like, "What's wrong?", and I'm looking at them like, "Don't you know!? This is a crowded place! There's no way to assess threat and control for danger."	i	358

4. Mental + Emotional Health macro-theme

4.6 No desire to be in large crowds/threat assessment

Treatment group assignment

Verbatim Meaning Unit

Location in original transcript

Table 22

Expanding the data point to include design space criterion and criterion classifier

Macro-theme	Theme	P#	PTSD	Treatment	N, O, X	Type (F), (NF), (B), (C), (X)	Need, Obstacle, or Context of Use	Meaning Unit	Session Type	Line #
4	406	14	1	3	O	B	Crowded places	I don't like being in very crowded places with just a lot going on. I seem to get overwhelmed at times.	KJD	748
4	406	15	1	1	O	B	Hypervigilance	So going to the bar, I can't enjoy myself, I am constantly observing and analyzing everyone else.	I	63
4	406	15	1	1	O	B	Crowded places	It's difficult, social environments…too many people.	I	88
4	406	15	1	1	O	B	Social anxiety	It's difficult, social environments…too many people.	I	88
4	406	15	1	1	O	B	Hypervigilance	I can't do things that I enjoyed before the military like going out to a bar or going to a club….going to a concert, because now I have to sit in the back corner and make sure that nobody's going to come in and start shooting people	I	513
4	406	15	1	1	O	C	Military experiences hinder leisure time	I can't do things that I enjoyed before the military like going out to a bar or going to a club….going to a concert, because now I have to sit in the back corner and make sure that nobody's going to come in and start shooting people	I	513
4	406	16	1	1	O	B	Crowded places	If you go to a crowded place, you know, that's uncomfortable for a veteran. They don't,…it's like you're…I can't, I can't relax. And they're looking at me like, "What's wrong?", and I'm looking at them like, "Don't you know!? This is a crowded place! There's no way to assess threat and control for danger."	I	358
4	406	16	1	1	X	X	Relaxation difficult	If you go to a crowded place, you know, that's uncomfortable for a veteran. They don't,…it's like you're…I can't, I can't relax. And they're looking at me like, "What's wrong?", and I'm looking at them like, "Don't you know!? This is a crowded place! There's no way to assess threat and control for danger."	I	358
4	406	16	1	1	O	C	Military experiences hinder leisure time	If you go to a crowded place, you know, that's uncomfortable for a veteran. They don't,…it's like you're…I can't, I can't relax. And they're looking at me like, "What's wrong?", and I'm looking at them like, "Don't you know!? This is a crowded place! There's no way to assess threat and control for danger."	I	358

Identified criterion is a need (N), obstacle (O) or context of use consideration (X)

Additional criterion classifier: functional need (F), nonfunctional need (NF), barrier (B), challenge (C), context of use consideration (X)

Actual criterion, created using appropriate linguistic structure

4.1.2.3.2 Procedure: Identification of needs. Coders were instructed to read meaning units and identify needs prior to searching for obstacles or context considerations. There were two types of needs identified in this research context: functional needs and nonfunctional (usability) needs. Functional needs could stand alone without a nonfunctional need if appropriate. However, all nonfunctional needs were tied to functional needs they described.

Functional needs were structured to complete the sentence: “The veteran will____” or “The app will___”. This adaptation was made in order to identify functional needs from both the interview and the design sessions. Any functional needs that could not be constrained to the {active verb + object} structure were identified in the second iteration as associated nonfunctional needs that included specificity of how the functional need was accomplished, and was worded as an extension of the functional need to promote standardization (Table 23).

Table 23
Functional and nonfunctional needs definitions

Criterion	Definition	Grammar Rule(s)	Example Result	Origin
NEED: Functional Need	**What the user or system needs to do** “THE VETERAN WILL ____” “THE APP WILL_____”	Active verb + object	Acquire job	Gausepohl, Beaton, & Winchester, 2011
NEED: Nonfunctional Need	**Describes the functional need, the “how”** **Level of accuracy and completeness by which a user meets goals** **Amount of resources used to meet goals** **Perceived comfort level to work towards meeting goals** “THE VETERAN WILL <FUNCTIONAL NEED>_____” ”THE APP WILL <FUNCTIONAL NEED>_____”	Functional need+ prepositional phrase Functional need+ adverb	Acquire job for spouse Acquire job in private security Acquire job locally Acquire job quickly Acquire job with benefits	Gausepohl, Beaton, & Winchester, 2011

Definitions of the nonfunctional needs was based on the ISO 9241-11 usability standard definitions of effectiveness, efficiency, and satisfaction (Gausepohl et al., 2011).

4.1.2.3.3 Procedure: Identification of obstacles. Challenges and barriers were defined for this research to note the obstacles encountered by the user population and use these identified items to expand the design space scope and designers’ understanding of the population. Grammar rules were generated to take into account barriers (nouns) and challenges (situations) that emerged from meaning

unit analysis. During meaning unit analysis, several meaning units did not contain needs or goals, and did not contain context observations, but rather were more "user grievances" of issues they wanted addressed, but didn't necessarily know or speak the corresponding meaning unit that would become an eventual user need. Rather, the participant identified the issue, and wanted to make note of the issue, but offered no solution to resolve the issue. Any identified issues were coded as obstacles, using corresponding grammar rules (Table 24).

Table 24
Obstacle definitions

Criterion	Definition	Grammar Rule(s)	Example Result	Origin
OBSTACLE: Barrier	**What the user encounters/lives with that is undesirable** "THE VETERAN HAS ____" "THE VETERAN ENDURES___ " "THE VETERAN STRUGGLES WITH____"	Object Adjective + Object	Age gap Knee issues Poverty Sleep apnea	Research Contribution
OBSTACLE: Challenge	**Describes an undesirable occurrence between two entities, caused by the veteran or other entity, which has a negative impact on the veteran's quality of life**	Object + verb + object	Alcohol hinders adjustment Benefits differ by state Civilians lack discipline Military ages veteran VA ignores problems	Research Contribution

When viewing a particular meaning unit, once any user needs had been identified (what the veteran/app will do, and how it will be done), the meaning unit was reexamined for anything *undesirable* that was important enough to be mentioned by the veteran. These were coded as barriers and challenges.

4.1.2.3.4 Procedure: Identification of context of use considerations. The final iteration explored the meaning unit for the context in which the needs or the obstacles occurred. Therefore, context of use considerations contained both "positive" and "negative" contexts, which can be viewed as a more accurate representation of a user's reality. According to Dey (2001), *context* is any information that can be used to characterize the situation of an entity. An entity is a person, place, or object that is considered relevant to the interaction between a user and an application, including the user and applications themselves. One of

the coder training sessions was specifically dedicated to context of use considerations. The coders, already familiar with the meaning units as a result of first-cycle coding, brainstormed various context of use criteria based on their analysis. This activity assisted coders in their discovery that context of use was not only the physical environment in which the veteran exists, but included the scope of every impactful facet of the interaction. Table 25 provides a definition and example context of use considerations.

Table 25
Context of use definition

Criterion	Definition	Grammar Rule(s)	Example Result	Origin
CONTEXT: Context of use	**Describes in what context the functional need or obstacle occurs**	Object + adjective Gerund + prepositional phrase Gerund + adjective	Adjusting to lack of adrenaline Living alone Struggling to build relationships USAA trustworthy Video games enjoyable	Gausepohl, Beaton, & Winchester, 2011

4.1.2.3.5 Procedure: Team Meetings. Throughout second-cycle coding, the team met every one to two weeks to review (1) newly identified design space criteria (2) the revised master list of unique design space criteria and to search for duplicates (3) issues with meaning unit component identification for that week's assigned meaning units. The team meetings were pertinent in consolidating the design space criteria list week by week, rather than wait until second-cycle coding was complete. For example, "Get job" and "Acquire job" were separately identified as functional needs by two different coders. During the team meeting, coders unanimously decided that "Acquire job" would be used, and all instances of "Get job" were replaced by "Acquire job".

The resolutions weren't always so simple. For example, during one meeting, deliberations were held over whether to code "offensiveness" as a challenge: "civilian offends veteran", a barrier: "offensive civilians", or a context of use consideration: "civilians offensive". Instances of this type were decided by coder vote, and coders were instructed through e-mail to consistently code items with

respect to the vote winner. The primary researcher and coders agreed that as long as the design criteria was noted and consistently coded across instances, the categorization of the design space criteria and grammatical structure (to comply with how it was defined) was of little consequence. Future work could explore decision support tools for categorization and structure of design space criteria when multiple categorization schemes are possible.

The master list of all design space criteria was revised after each team meeting in order to consolidate criteria and ensure appropriate linguistic structure rules were being met. Coders were instructed to complete second-cycle coding of the meaning unit corpus by codebook theme, in hopes that exposure to similar topics would be conducive to a consolidated set of design space criteria. A process flowchart of the approach to second-cycle coding is presented in Figure 14.

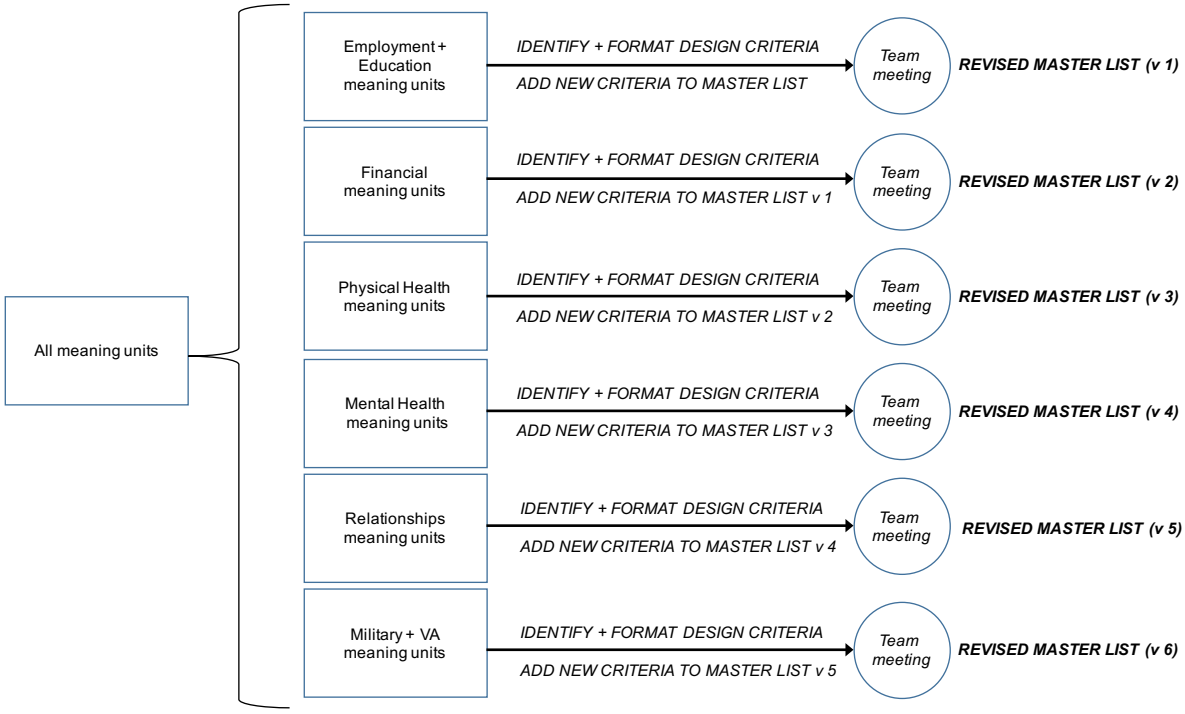

Figure 14. Second-cycle coding (and master design space criteria list revision) approach.

4.1.3 Persona Generation

Recall that personas are theoretical users or user archetypes (Cooper, 2004). They exist to give life and personality to the hypothetical users designers imagine as they design a product. Cooper and Reimann (2003) provide the following detail to describe how personas help designers:

- Determine what a product should do and how it should behave,
- Communicate with stakeholders, developers, and other designers,
- Build consensus and commitment to the design,
- Measure design effectiveness, and,
- Contribute to other product-related efforts, such as marketing.

Current research in the persona field dictates focus on designing for 1 person, or a primary persona. As Hartson and Pyla (2012) describe, “Common sense might dictate that a design for a broad user population should have the broadest possible range of functionality, with maximum flexibility in how users can pick the parts they like the most, but Cooper tells us this thinking is wrong,” (p, 266). Cooper’s strategy entails creating a design that provides complete satisfaction for a small percentage of the user population, rather than one where the whole user population is somewhat satisfied or not satisfied at all.

Hartson and Pyla (2012) caution to avoid making a persona that is a mixture or average of the users examined, as this creates a persona that isn’t a true representation of any one person. The concern of a persona not representing a real person is echoed in other areas of the literature (ex. Pruitt and Grudin, 2003).

Sinha (2003) proposed using quantitative methods to achieve a stronger link between user research and the generated personas. Sinha believes other persona creation techniques are too dependent on subjectivity. To achieve accurate personas, Sinha proposes principal components analysis on quantitative material to identify groups of correlated variables. Through principal components analysis of responses to Likert-type surveys, user clusters were identified. Information

architects who were familiar with persona generation were provided the clusters along with the questionnaire, design task, etc. Persona drafts were created and refined based on interviewing different people for personal details. These people were selected based on their "match" of survey responses to the previously identified user data clusters. However, all clusters were of needs (did not include obstacles or context), and the persona details that were comprised of interview responses were generated from interviews that were conducted with a *new* set of participants*, not* the participants from the original cluster analysis. This approach somewhat ignores the practice of avoiding the creation of "imaginary" or "piece-meal" personas.

4.1.3.1 Linking Personas to Design Space Criteria. How are personas made? In the original presentation made by Cooper in 1999, there is no detail on what type of data should be used to create personas. Later research indicated that relevant characteristics and goals of personas should be tied to data from actual users (Sinha, 2003; Goodwin, 2002; Grudin and Pruitt, 2002). But what exactly is the "data" that informs a persona? Goodwin (2002) suggested qualitative interview data. Cooper and Reimann (2003) echoed Goodwin's view and championed contextual inquiry (Beyer and Holzblatt, 1998) as a method guide for persona creation. Cooper and Reimann specifically focus on the *goals* of the user.

Conversely (and nearly 10 years later), Hartson and Pyla (2012) indicated that a persona should not necessarily be comprised of only the user's goals. Rather, information about their "work role, goal, tasks, usage stories, ***problems encountered, concerns, biggest barriers***" (p. 269) are also essential. Upon examination of the design criteria sets (Appendix C.2) a linkage of design criteria categorizations to the Hartson and Pyla's required persona components was conceptualized:

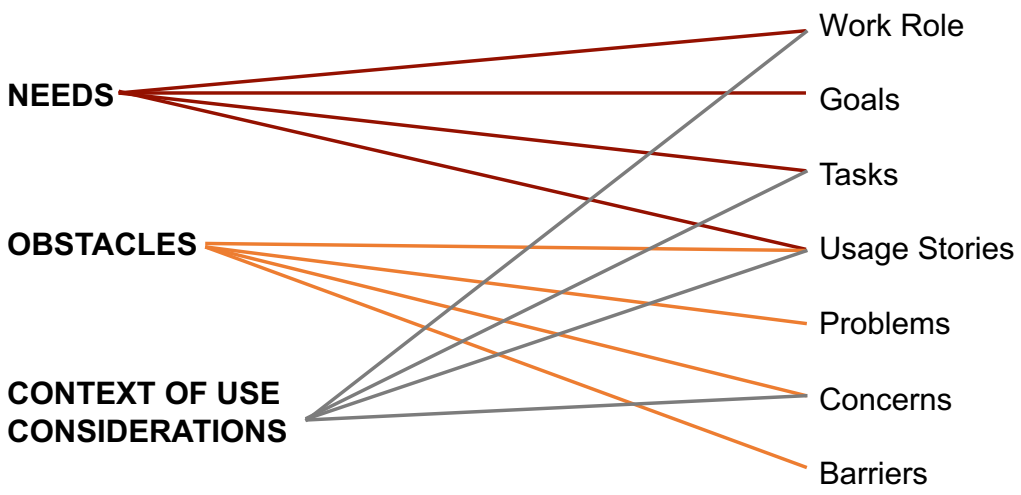

Figure 15. Design criteria inform persona components.

4.1.3.2 An Algorithm for Persona Ideation. With past persona research in mind, an algorithm was used to assist in grouping participants based on their distinct design criteria in order to inform personas. This algorithm was originally created to identify and group interaction dynamic patterns in meetings (ex. handshakes, talking, interrupting) across time, and is called the situated data mining (SDM) algorithm (Miller, 2017). In taking care to avoid creating an “average user” or a piece-meal assembly of different design criteria together from different participants that doesn’t truly represent anyone, the purpose of the algorithm application in this context was to search for the maximum quantity of design space criteria the maximum number of participants have in common, which arguably creates robustness to the persona design process. To prepare the design criteria for the algorithm, each participant’s unique (distinct) design criteria was considered. All “repeats” of criteria within a participant’s criteria set were excluded. As the algorithm executes, it searches for intersections where participants have the same design space criterion in their criteria set, and seeks to establish if there are additional criterion in common, and additional participants who have that criterion in common. It maximizes the quantity of criteria that given participants have in common. As the algorithm iteratively refines its criteria sets, it searches for additional participants who have those criteria in common with the previously

identified participants. Convergence occurs and iterative searching stops when only 1 design criterion is found in common for a compared pair of participants. This algorithm's execution was repeated to confirm execution results were the same upon repetitive executions. The raw results are available in Appendix D.1. The output from this algorithm's execution displaying the quantity of participants in an identified set, along with the quantity of design space criteria they had in common, is presented in Figure 16.

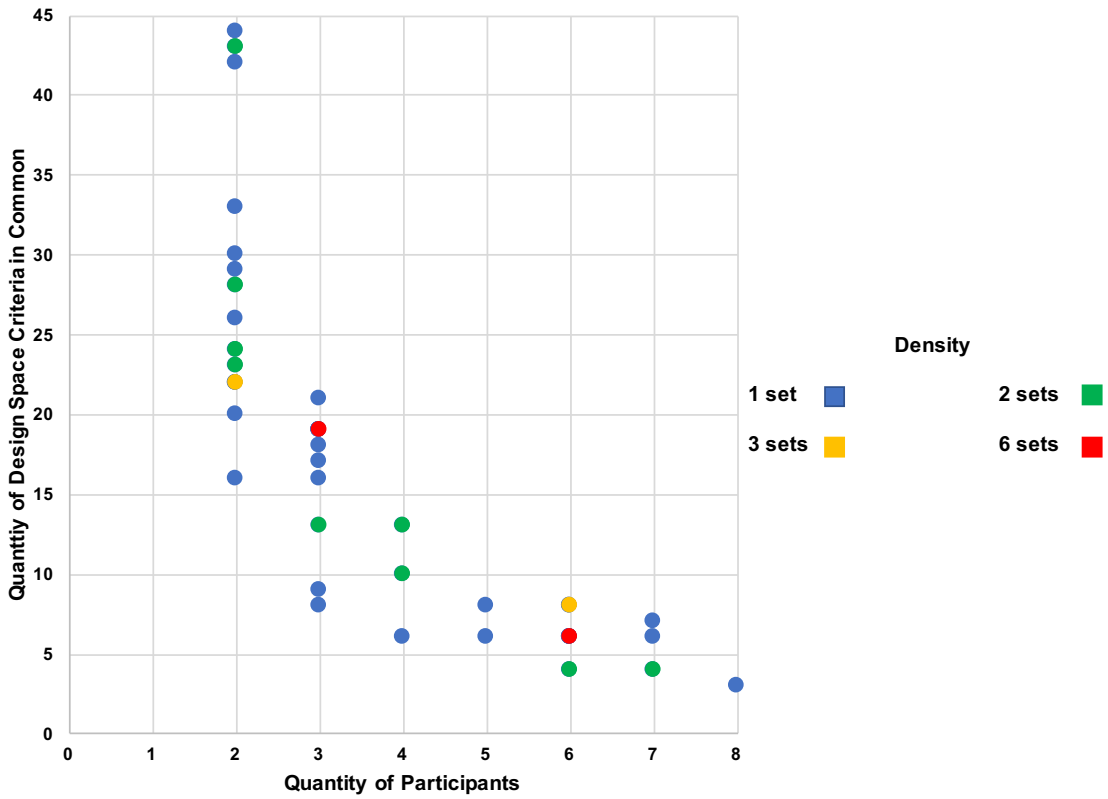

Figure 16. SDM Algorithm output visualized.

As evident from the graph, several pairs (sets of 2) of participants had large quantities of design space criteria in common, the highest being 44 criteria. As the quantity of participants in a considered group increased, there was in turn generally less common design space criteria found. Additionally, there were various *densities* for each data point of the graph. For example, only 1 set of 2 participants had 44 criteria in common. However, 6 sets of 6 participants had 6 criteria in

common. Likewise, 6 sets of 3 participants had 19 criteria in common. Interestingly, there were no cases of densities equal to 4 or 5 sets. The decision rules for selecting a specific participant set and their respective design space criteria set to create a persona were formulated:

1) Maximize the number of participants who have a maximum quantity of criteria in common. It's important to maximize the number of participants to ensure the design criteria set is held by a sizeable representative population, with a caveat:

    a. Design criteria set of selected participant set *must* contain needs, obstacles, *and* context of use considerations to foster creation of personas with dimensionality (refer to Figure 15). This research assumes that the needs, obstacles, and context considerations are of *equal importance* in an effort to inform designers.

    b. Given the components of personas provided in Figure 15, it is necessary to have several of each needs, obstacles and context considerations to provide content-rich personas. For this analysis, a constraint of at least three criteria per category (three needs, three obstacles, and three context of user considerations) was applied to meet the content-rich demand. Future research could explore optimal quantities of criteria for personas.

2) Review design space criteria components of selected participant sets.

    a) Participant sets that have more than 50% of the same design space criteria are not distinct enough to be separate personas, as more than half of the criteria would be repetitive between personas.

    b) Participant sets with 2 or more participants in common are not distinct enough to be separate personas, as they are pulling design criteria from the same participants.

3) Once a participant set is selected, personal details of persona must be generated from ***one*** participant's interview responses. This practice safeguards against creating an "average" persona, erroneous from averaging ages, pulling information from several participant interviews, etc. It is not good practice to build a "Frankenstein's monster" persona. The primary participant is selected via random number generator.

In order to maximize the participants who met these stipulations, the participant clusters initially selected for examination were those sets with four participants and ten or thirteen criteria in common (those sets with 5, 6, 7, or 8 participants did not have at least nine criteria in their sets). As the densities for (4,10) and (4,13) participants were both 2, there were four potential data sets. Recall that each data set must contain three needs, three obstacles, and three context of use considerations:

PARTICIPANT NUMBERS	DESIGN SPACE CRITERIA
[5, 19, 20, 2]	['Establish routine', 'Adjusting to civilian life', 'Feeling supported by family', 'Poor living situation', 'Freedom overload', 'Independence issues', 'Acquire job', 'Connect veteran to other veterans', 'View job postings for veterans', 'View job postings', 'Receive assistance', 'Connect veteran', 'Adjusting to new place'] Needs: 7; Obstacles: 3, Context: 3
[10, 17, 34, 7]	['Acquire VA benefits', 'Veteran stereotype', 'Age gap', 'Feeling independent', 'Financial burden', 'Understand VA benefits', 'Civilian cluelessness', 'Connect veteran to other veterans', 'Disability', 'Receive GI Bill benefits', 'Disrespectful civilians', 'Connect veteran', 'Having more world experience'] Needs: 5; Obstacles: 6; Context: 2

[30, 34, 39, 26]	['Civilian life lacks structure', 'Military experiences impact personality', 'Creating deeper friendship through military service', 'Civilian cluelessness', 'Connect veteran to other veterans', 'Receive information on VA', 'Understand VA benefits', 'Transition difficult', 'Connect veteran', 'Isolation easy'] Needs: 4; Obstacles: 3, Context: 3
[30, 34, 39, 17]	['Feeling independent', 'Creating deeper friendship through military service', 'Civilian cluelessness', 'Connect veteran to other veterans', 'Receive advice from other veterans', 'VA unpleasant', 'Understand VA benefits', 'Transition difficult', 'Connect veteran', 'Isolation easy'] Needs: 4; Obstacles: 1, Context: 5

Set [10,17,34,7] did not contain at least three context of use considerations, and was excluded. Set [30,34,39,17] did not contain at least three obstacles, and was excluded. Design space criteria for [30,34,39,26] and [30,34,39,17] were nearly identical (see rule 2), thus these two data sets are not distinct enough to create separate personas. Set [30,34,39,17] was already excluded for not meeting the obstacles quantity threshold, thus [30,34,39,26] was selected as a set for persona generation. Additionally, set [5,19,20,2] was selected as a set for persona generation. The resulting personas are available in section 4.2.11.

4.1.4 Fit Statistics

In order to discuss fit statistics for the various dependent variables from RQ2 and RQ3, an examination of the data sets for analysis per research question is necessary. The second research question (RQ2) posed: What are the

implications of the lived experiences of military veterans on the scope of the design space? As such, the entire corpus of data that emerged from second-cycle coding was examined to populate values for the dependent variables. These quantities were compared by treatment (II-ID, GI-GD, ID-II, GD-GI) as denoted by the orange boxes in Figure 17.

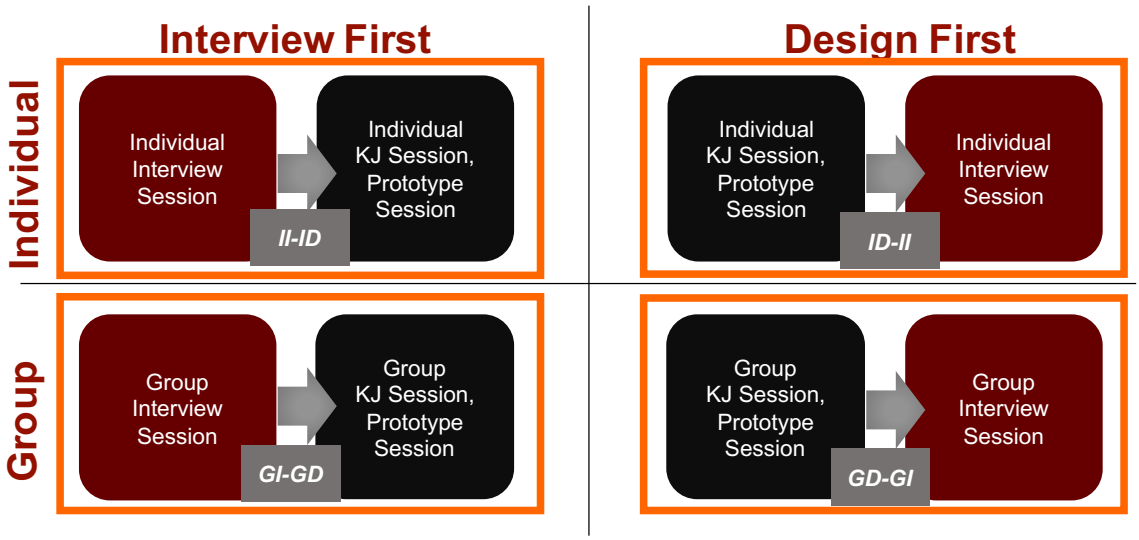

Figure 17. All design criteria elicited from all sessions was analyzed for RQ2.

The components of Research Question 3 required analysis after segmentation of the data based on session in which it was elicited. More specifically, RQ3a asked: What is the impact of session *setting* (individual or group) on *phenomenological* design? As phenomenological design involves only those procedures wherein the interview to elicit the lived experiences occurs ***before*** shifting focus to technology design exercises, only the II-ID and GI-GD sessions are examined for this research question. As the purpose of the research question is to search for differences between the individual and group settings, the II-ID and GI-GD session outputs are compared (noted by the orange box in Figure 18).

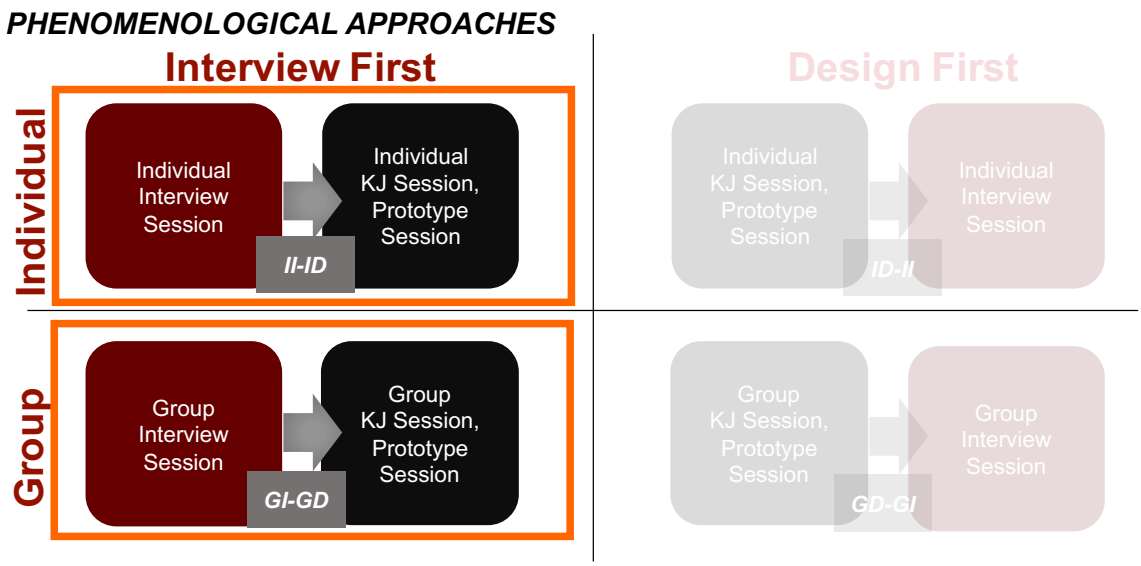

Figure 18. The purpose of RQ3a: investigate differences between individual and group approaches to phenomenological design.

However, in conducting fit statistics analyses, the entire corpus of data is still inspected in order to safeguard against type 1 error. More specifically, the entire corpus of data contained *n*=40 participants. To examine the II-ID and GI-GD sessions for differences, *n* is reduced to 20 participants. An alpha = 0.05 would indicate error due to chance for 1 of 20 participants, which is highly possible. Therefore, fit statistics (and subsequent inferential statistics) for RQ2 also addressed RQ3a. Interpretation of results for RQ3a focused on differences between II-ID and GI-GD groups only.

RQ3b asked if a priming effect was associated with phenomenological design. Interpretation of results addresses the usefulness of conducting an interview prior to a design session, but not necessarily taking the time to record, code, or analyze interview results. Therefore, strictly design session outputs from II-ID, GI-GD, ID-II and GD-GI were examined. Results from design sessions from II-ID and GI-GD sessions serve as results from priming participants, while ID-II and GD-GI participants were unprimed, as they completed the design session prior to their interview.

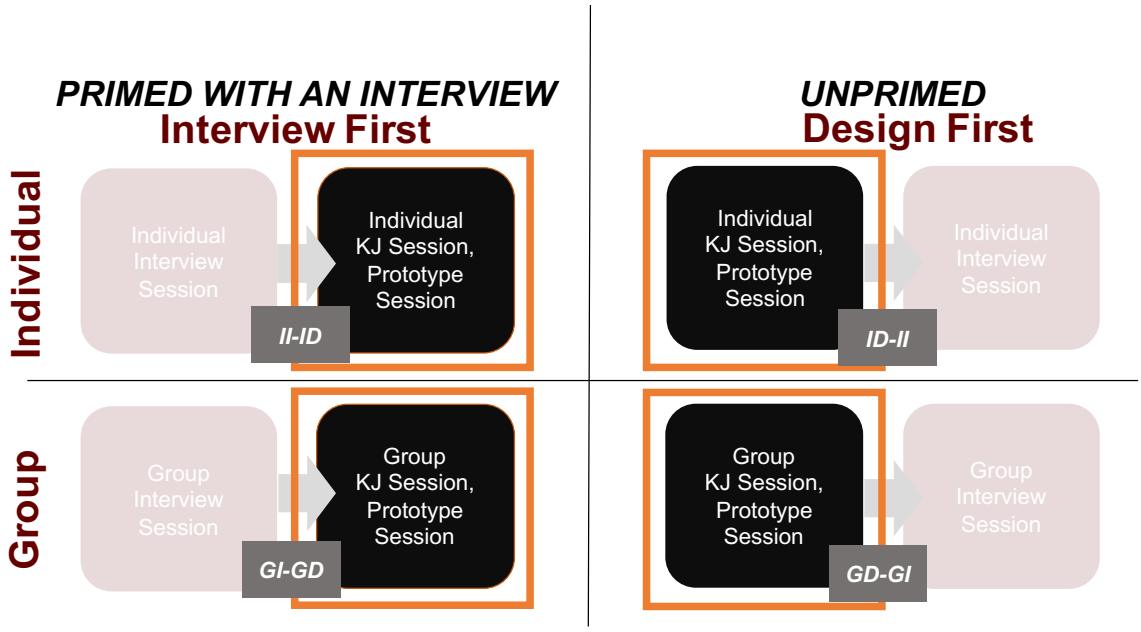

Figure 19. Analysis to support RQ3b compared the design sessions outputs of primed and unprimed participants. This comparison was performed between individual setting participants and again for group setting participants.

As *n* remained at 40 participants, revised fit statistics were calculated for RQ3b. It was assumed that dependent variables may not follow previously identified trends from RQ2 and RQ3a since the interview session data (the bulk of all design space criteria) were now excluded. Therefore, it is necessary to provide additional fit statistics to utilize for only RQ3b inferential statistics calculations.

RQ3c asked: what differences exist between a traditional participatory design approach and a phenomenological approach to design? More specifically, does conducting, coding, and including the interview in design space results provide additional insight for designers? In order to address this question, dependent variable measures from II-ID and GI-GD treatments represent the corpus of the "phenomenological approach to design", while the dependent variable measures from *design sessions only* from ID-II and GD-GI treatments represent outputs from a traditional approach to participatory design.

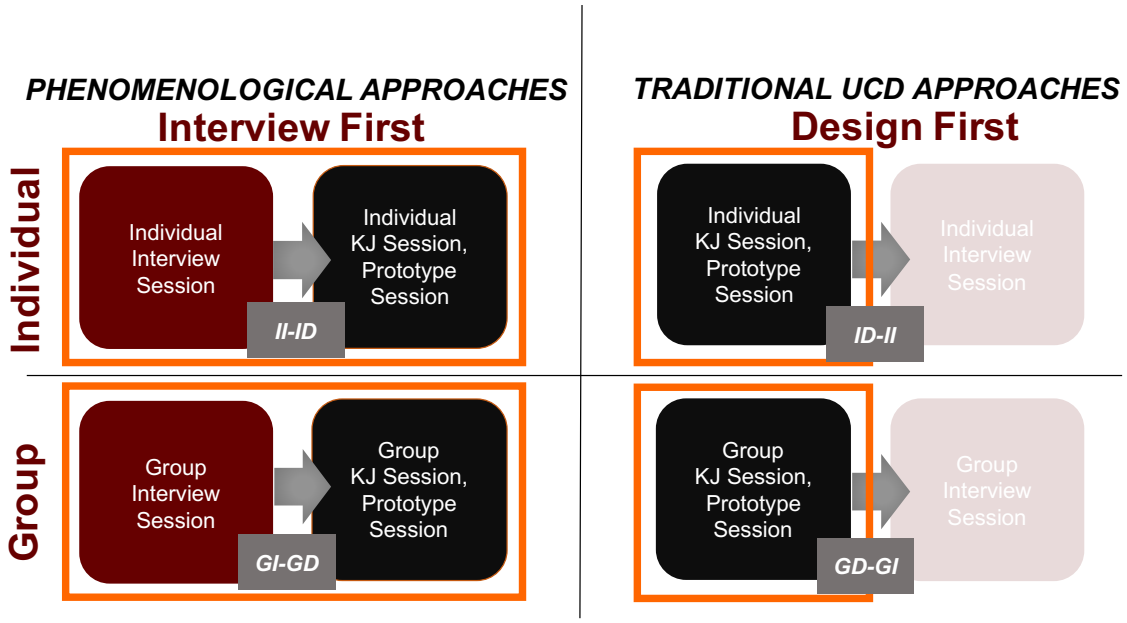

Figure 20. The purpose of RQ3c: investigate the impact of criteria that emerges from interview, the utility of phenomenological approach to participatory design.

As *n* remains at 40 participants, the caveat to this analysis was the exclusion of interview session data from ID-II and GD-GI treatments. As this data was excluded, a recalculation of fit statistics for this research question was necessary.

In summary, RQ2 and RQ3a share fit statistics of dependent variables and follow-up statistical tests. RQ3b required unique fit statistics calculations and analysis. RQ3c required unique fit statistics calculations and analysis.

4.1.4.1 RQ2 and RQ3a Fit Statistics. Research Question 2 posed: What are the implications of these lived experiences on the design space? Research Question 3a posed: What is the impact of session setting (individual or group) on phenomenological design? All dependent variables were tested for Normality. Shapiro-Wilk has the best power for a given significance when compared to an Anderson-Darling test (Razali and Wah, 2011), but an Anderson-Darling test is more sensitive (Stephens, 1974), therefore both tests were utilized to examine the data for normality. Normality was supported by an Anderson-Darling test (Stephens, 1974) and a Shapiro-Wilk test for all dependent variables, with the

exception of Barriers. Consequently, it was supported that all dependent variables except for the aforementioned follow a Normal distribution (see Table 26).

Table 26

RQ2 + RQ3a: Dependent variable tests for Normality

alpha = 0.05 **Dependent Variables**	**Anderson-Darling** Ho: the data follows a Normal Distribution Ha: the data does not follow a Normal Distribution **Decision Criteria:** p > alpha, fail to reject Ho	Decision:	**Shapiro-Wilk** Ho: the data follows a Normal Distribution Ha: the data does not follow a Normal Distribution **Decision Criteria:** p < alpha, reject Ho	Decision:
All Needs	A^2=0.351 , n=40 , p=0.469	Fail to reject Ho	W=0.974 , p=0.481	Fail to reject Ho
Functional Needs	A^2=0.309, n=40, p=0.559	Fail to reject Ho	W=0.972, p=0.414	Fail to reject Ho
Nonfunctional Needs	A^2=0.704, n=40, p=0.066	Fail to reject Ho	W=0.955, p=0.113	Fail to reject Ho
Obstacles	A^2=0.582, n=40, p=0.130	Fail to reject Ho	W=0.948, p=0.065	Fail to reject Ho
Challenges	A^2=0.484, n=40, p=0.228	Fail to reject Ho	W=0.956, p=0.125	Fail to reject Ho
Barriers	A^2=0.758, n=40, p=0.049	Reject Ho	W=0.939, p=0.032	Reject Ho
Context of Use Considerations	A^2=0.536, n=40, p=0.170	Fail to reject Ho	W=0.952, p=0.089	Fail to reject Ho
Design Space Total	A^2=0.559, n=40, p=0.149	Fail to reject Ho	W=0.959, p=0.160	Fail to reject Ho
Distinct Functional Needs	A^2=0.614, n=40, p=0.110	Fail to reject Ho	W=0.958, p=0.141	Fail to reject Ho
Distinct Nonfunctional Needs	A^2=0.528, n=40, p=0.177	Fail to reject Ho	W=0.958, p=0.141	Fail to reject Ho
Distinct Challenges	A^2=0.371, n=40, p=0.423	Fail to reject Ho	W=0.960, p=0.167	Fail to reject Ho
Distinct Barriers	A^2=0.460, n=40, p=0.261	Fail to reject Ho	W=0.959, p=0.150	Fail to reject Ho
Distinct Context of Use Considerations	A^2=0.294, n=40, p=0.598	Fail to reject Ho	W=0.971, p=0.398	Fail to reject Ho
Distinct Design Space criteria	A^2=0.267, n=40, p=0.688	Fail to reject Ho	W=0.979, p=0.640	Fail to reject Ho

4.1.4.2 RQ3b Fit Statistics. RQ3b involved inspection of the dependent variables with respect to their quantities from the design sessions only. As such, design space criteria elicited during all participants' interviews was excluded from analysis. The distribution of each design space criteria variable was examined for Normality, and the following interpretations were made:

Table 27
RQ3b: Dependent variable tests for Normality

alpha = 0.05 **Dependent Variables**	**Anderson-Darling** Ho: the data follows a Normal Distribution Ha: the data does not follow a Normal Distribution **Decision Criteria:** p > alpha, fail to reject Ho	Decision:	**Shapiro-Wilk** Ho: the data follows a Normal Distribution Ha: the data does not follow a Normal Distribution **Decision Criteria:** p < alpha, reject Ho	Decision:
All Needs	A^2=0.579 , n=40 , p=0.124	Fail to reject Ho	W=0.962 , p=0.207	Fail to reject Ho
Functional Needs	A^2=0.721, n=40, p=0.060	Fail to reject Ho	W=0.956, p=0.121	Fail to reject Ho
Nonfunctional Needs	A^2=0.600, n=40, p=0.119	Fail to reject Ho	W=0.963, p=0.218	Fail to reject Ho
Obstacles	A^2=2.451, n=40, p=0.000	Reject Ho	W=0.813, p=0.000	Reject Ho
Challenges	A^2=2.250, n=40, p=0.000	Reject Ho	W=0.838, p=0.000	Reject Ho
Barriers	A^2=2.634, n=40, p=0.000	Reject Ho	W=0.796, p=0.000	Reject Ho
Context of Use Considerations	A^2=2.095, n=40, p=0.000	Reject Ho	W=0.846, p=0.000	Reject Ho
Design Space Total	A^2=1.724, n=40, p=0.000	Reject Ho	W=0.885, p=0.001	Reject Ho
Distinct Functional Needs	A^2=0.641, n=40, p=0.094	Fail to reject Ho	W=0.957, p=0.128	Fail to reject Ho
Distinct Nonfunctional Needs	A^2=0.507, n=40, p=0.200	Fail to reject Ho	W=0.971, p=0.392	Fail to reject Ho
Distinct Challenges	A^2=2.016, n=40, p=0.000	Reject Ho	W=0.846, p=0.000	Reject Ho
Distinct Barriers	A^2=2.266, n=40, p=0.000	Reject Ho	W=0.809, p=0.000	Reject Ho
Distinct Context of Use Considerations	A^2=2.401, n=40, p=0.000	Reject Ho	W=0.852, p=0.000	Reject Ho
Distinct Design Space criteria	A^2=0.771, n=40, p=0.045	Reject Ho	W=0.896, p=0.002	Reject Ho

Therefore, all needs, functional needs, nonfunctional needs, distinct functional needs, and distinct nonfunctional needs were deemed to follow the normal distribution and were analyzed with parametric statistics, while the remaining variables were analyzed with nonparametric statistics.

4.1.4.3 RQ3c Fit Statistics. The purpose of RQ3c was to investigate the differences, if any, between a traditional participatory design approach and a phenomenological approach to design. As such, the design space criteria from both the interview and design sessions in II-ID and GI-GD were analyzed and compared against the design space criteria from the design sessions only in the ID-II and GD-GI treatments. The distribution of each design space criteria variable was examined for Normality, and the following interpretations were made in Table 27. Upon examination of results, all needs, functional needs, distinct functional needs, and distinct nonfunctional needs were satisfactorily normally distributed, while the remaining variables were found to be non-normal.

Table 28

RQ3c: Dependent variable tests for Normality

alpha = 0.05 **Dependent Variables**	**Anderson-Darling** Ho: the data follows a Normal Distribution Ha: the data does not follow a Normal Distribution **Decision Criteria:** p > alpha, fail to reject Ho	Decision:	**Shapiro-Wilk** Ho: the data follows a Normal Distribution Ha: the data does not follow a Normal Distribution **Decision Criteria:** p < alpha, reject Ho	Decision:
All Needs	A^2=0.626 , n=40 , p=0.103	Fail to reject Ho	W=0.957 , p=0.132	Fail to reject Ho
Functional Needs	A^2=0.752, n=40, p=0.051	Fail to reject Ho	W=0.948, p=0.066	Fail to reject Ho
Nonfunctional Needs	A^2=0.834, n=40, p=0.032	Reject Ho	W=0.934, p=0.022	Reject Ho
Obstacles	A^2=1.871, n=40, p=0.000	Reject Ho	W=0.870, p=0.000	Reject Ho
Challenges	A^2=1.743, n=40, p=0.000	Reject Ho	W=0.873, p=0.000	Reject Ho
Barriers	A^2=1.960, n=40, p=0.000	Reject Ho	W=0.862, p=0.000	Reject Ho
Context of Use Considerations	A^2=1.926, n=40, p=0.000	Reject Ho	W=0.878, p=0.000	Reject Ho
Design Space Total	A^2=1.562, n=40, p=0.001	Reject Ho	W=0.889, p=0.001	Reject Ho
Distinct Functional Needs	A^2=0.518, n=40, p=0.188	Fail to reject Ho	W=0.969, p=0.346	Fail to reject Ho
Distinct Nonfunctional Needs	A^2=0.474, n=40, p=0.242	Fail to reject Ho	W=0.946, p=0.056	Fail to reject Ho
Distinct Challenges	A^2=1.929, n=40, p=0.000	Reject Ho	W=0.889, p=0.001	Reject Ho
Distinct Barriers	A^2=1.913, n=40, p=0.000	Reject Ho	W=0.895, p=0.001	Reject Ho
Distinct Context of Use Considerations	A^2=2.567, n=40, p=0.000	Reject Ho	W=0.875, p=0.000	Reject Ho
Distinct Design Space criteria	A^2=1.658, n=40, p=0.000	Reject Ho	W=0.901, p=0.002	Reject Ho

4.2 Research Question 2 Results

RQ2 posed: What are the implications of these lived experiences on the design space? In order to address this question, the entire corpus of resulting design space criteria (including repetitions within and between participants) from second-cycle coding was examined.

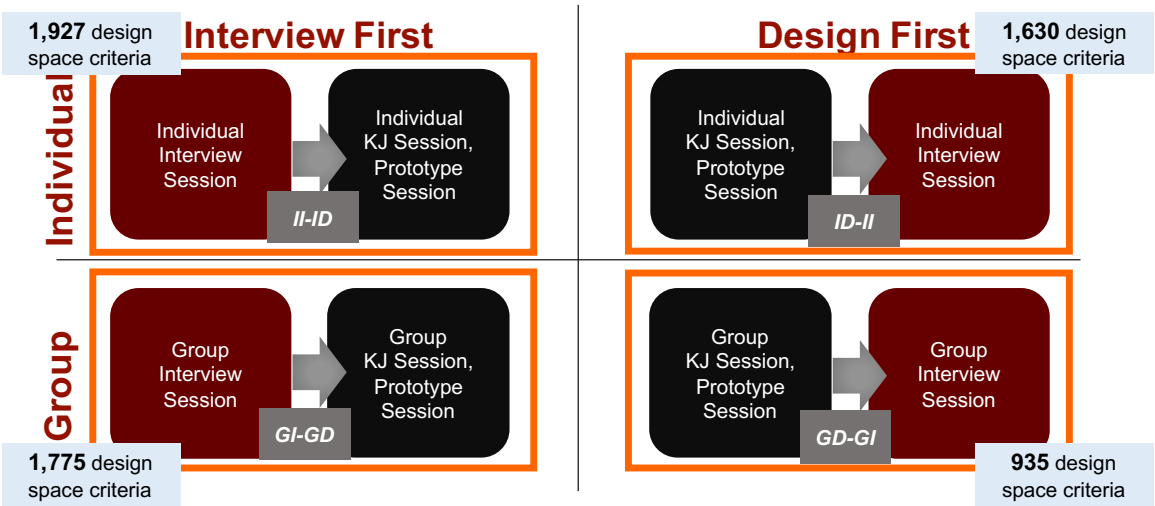

Figure 21. Design space criteria that emerged from boxed sessions were used for RQ2 analysis.

A total of 6,267 data points (instances of design space criteria being identified) emerged from the analysis of 3,063 meaning units. Therefore, several meaning units generated multiple design space criteria which led to the expansion of the data set size after second-cycle coding was complete. As a percent, 71% of the total data points were elicited during interview sessions, and only 29% of the total data points were elicited during the design sessions. Of the 6,267 design space criteria (which includes repetitions of criteria within and between participants), 29% were context of use considerations criteria, 33% were classified as needs criteria, and 38% were obstacles.

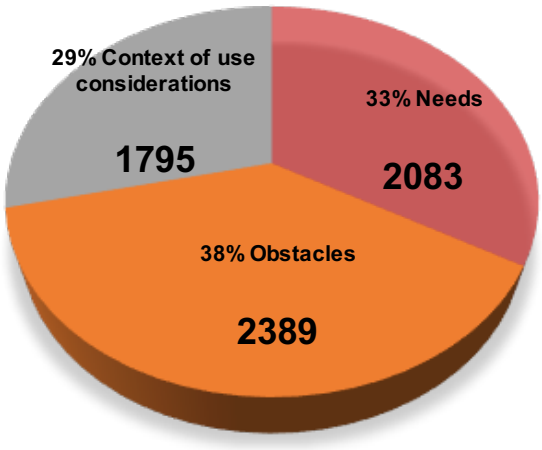

Figure 22. Classification overview of 6,267 design space data points.

Decomposing the composite variables all needs and obstacles into their components: functional needs, nonfunctional needs, barriers, and challenges, resulted in the following counts of design space criteria classifiers.

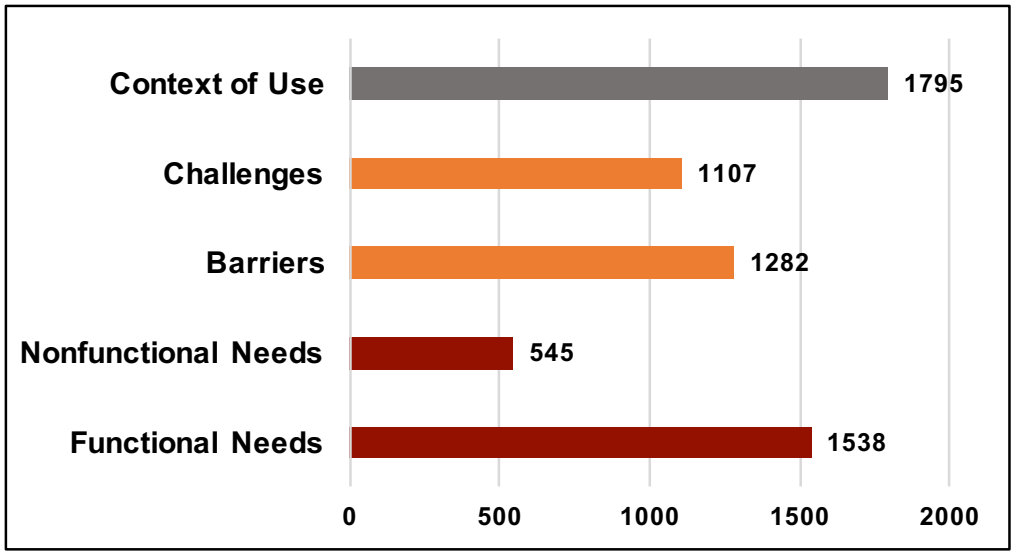

Figure 23. Nonfunctional needs: the least of the design criteria classifiers, suggesting it may be difficult for participants to describe *how* a functional need should be met.

The set of *distinct* design space criteria was also examined. This data set removed repetitions of criteria to focus on the body of unique design space criteria. This is important at a high level to view the full scope of topics and criteria as a list

(Appendix C.2). At the participant level, it is important to view each participant's distinct design criteria set in order to determine how much unique criteria they actually contributed. For example, if a participant provided the criterion functional need "acquire job", and continued to discuss how much he needed a job, the criterion "acquire job" would continue to be identified in that participant's criteria corpus. The final quantity count of this participant's data corpus could be quite high and could be misleading, as the several instances of "acquire job" are each considered unique in that they each contribute to the final quantity count. In order to address this, each participant's design criteria set was examined, and the repetitions of criteria were removed, such that the distinct set of criteria from each participant could be examined. Thus, the difference between the criteria set and the distinct criteria set of a participant is this: the criteria set provides insight into the quantity of criteria discussed while the distinct criteria set provides insight into scope of criteria discussed. In the following sections, the distinct criteria sets of participants is discussed for functional needs, nonfunctional needs, barriers, challenges, and context in addition to their overall quantities with repetitive criteria included. Distinct needs and distinct obstacles are not analyzed, as their aggregates (functional needs, nonfunctional needs; barriers, challenges) are, and provide specificity of design criteria type for the analysis. If desired, distinct quantities of total needs and obstacles may be computed by summing distinct quantities of their components (functional needs + nonfunctional needs or challenges + barriers, respectively).

From this research effort, considering contributions from all 40 participants, 1,521 distinct design space criteria were identified. Of these criteria, 38.9% were context of use considerations, 25.5% were needs, and 35.6% were obstacles.

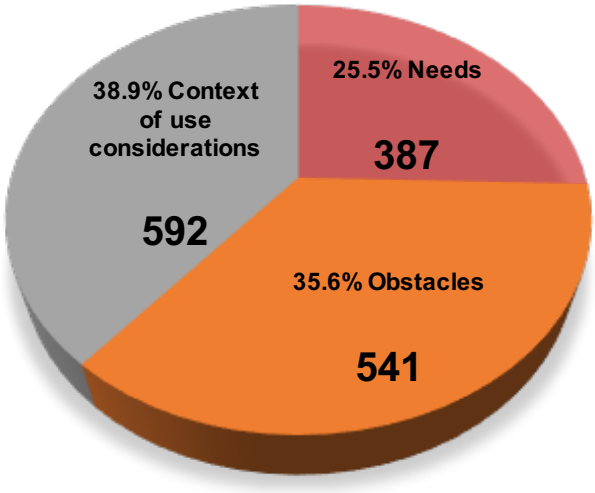

Figure 24. The classification of the 1,521 distinct design space criteria.

Decomposing the composite variables needs and obstacles into their components: functional needs, nonfunctional needs, barriers, and challenges, resulted in the following counts of distinct design space criteria classifiers.

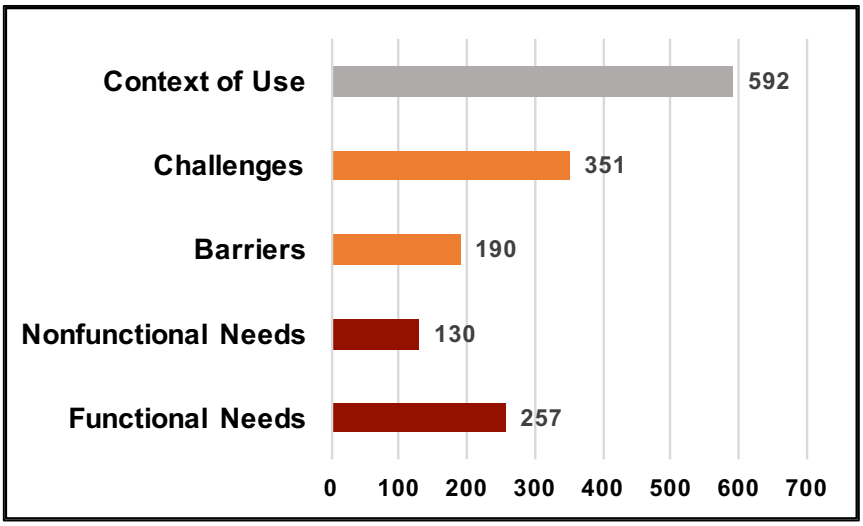

Figure 25. There were 592 distinctly different context of use considerations; Designers should always be aware of context of use.

Further examination of each dependent variable by treatment is provided in the following sections.

4.2.1 Total Design Space Criteria

The total quantities of all design space criteria per participant were calculated and compared among the four treatments. On average, participants provided 193 criteria (*SD* = 49) in the II-ID treatment, and 178 criteria (*SD* = 46) on average in the GI-GD treatment. For the ID-II treatment, 163 criteria (*SD* = 44) were elicited on average. Participants from the GD-GI treatment provided 94 total design space criteria on average (*SD* = 26).

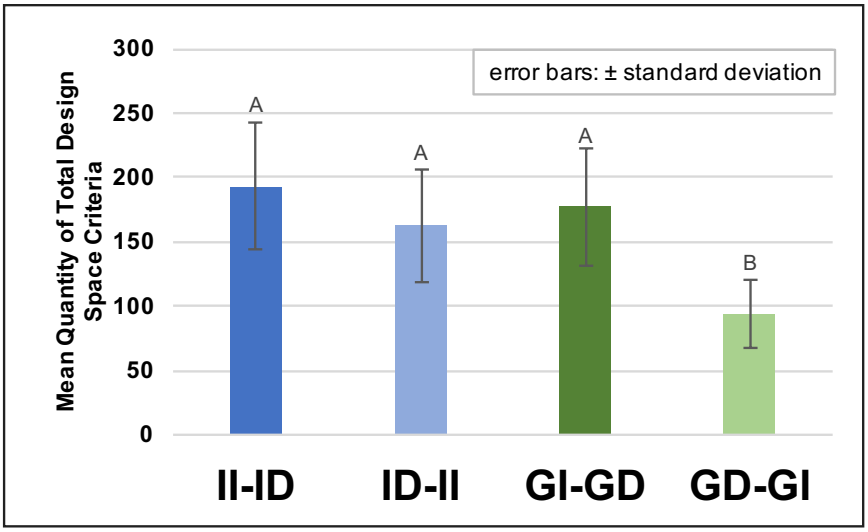

Figure 26. GD-GI participants provided significantly fewer total design space criteria on average.

The results of an ANOVA (Appendix C.3.8.1) indicated an effect due to setting (p = 0.003) and order (p = 0.000). An interaction effect was also found (p = 0.048). Post hoc Fisher LSD analysis indicated differences between the GD-GI treatment and each of the remaining treatments.

Additionally, the quantities of *distinct* design space criteria from each participant were calculated and compared for each of the 4 treatments. This analysis was performed in order to guard against bias regarding contribution by removing repetitive criteria from each participant's criteria set. For the II-ID treatment, 133 distinct design space criteria were collected on average (*SD* = 22), and 129 distinct design space criteria were collected on average (*SD* = 32) from participants in GI-GD treatment. For the ID-II treatment, 122 distinct design space

criteria were collected on average (*SD* = 30), while 71 distinct design space criteria were collected on average (*SD* = 17) from participants in GD-GI treatment.

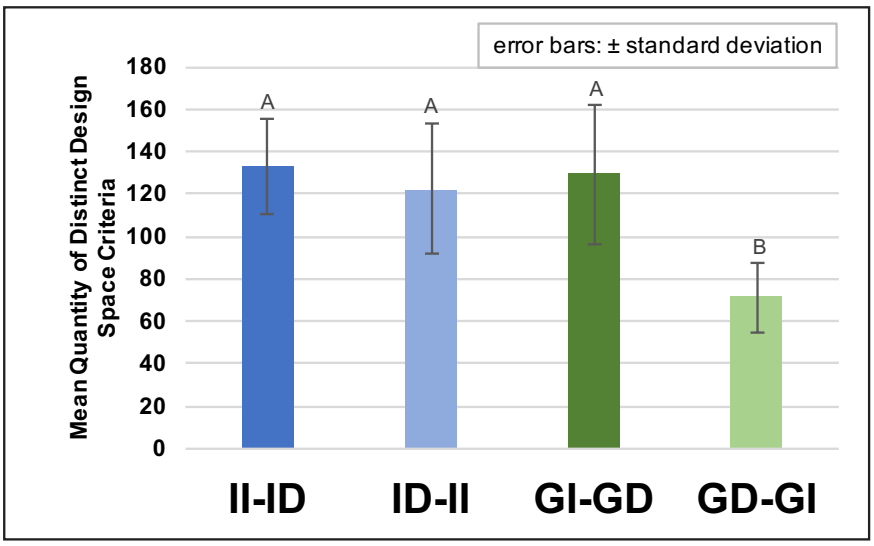

Figure 27. GD-GI participants provided significantly fewer distinct design space criteria on average.

The results of an ANOVA (Appendix C.3.14.1) indicated an effect due to setting (p = 0.002), an effect due to order (p = 0.000), and an interaction effect (p = 0.007). Post hoc Fisher LSD analysis indicated a difference between the GD-GI treatment and all remaining treatments. No other differences were detected. Based on analysis of total quantity and distinct quantity, results were similar in that GD-GI participants contributed less criteria.

4.2.2 All Needs

The total quantities of needs (composite of functional and non-functional needs from both the interview and design sessions) were calculated and compared among the four treatments. An average of 59 needs per participant were elicited from participants in II-ID treatment (*SD* = 20), and in the GI-GD treatment, 56 needs were elicited on average (*SD* = 11). For treatments in which the design session took place first, 54 needs were elicited on average from participants in the ID-II treatment (*SD* = 16) and 39 needs on average were elicited from participants

in the GD-GI treatment (*SD* = 16). An overview of these results is presented in Figure 28.

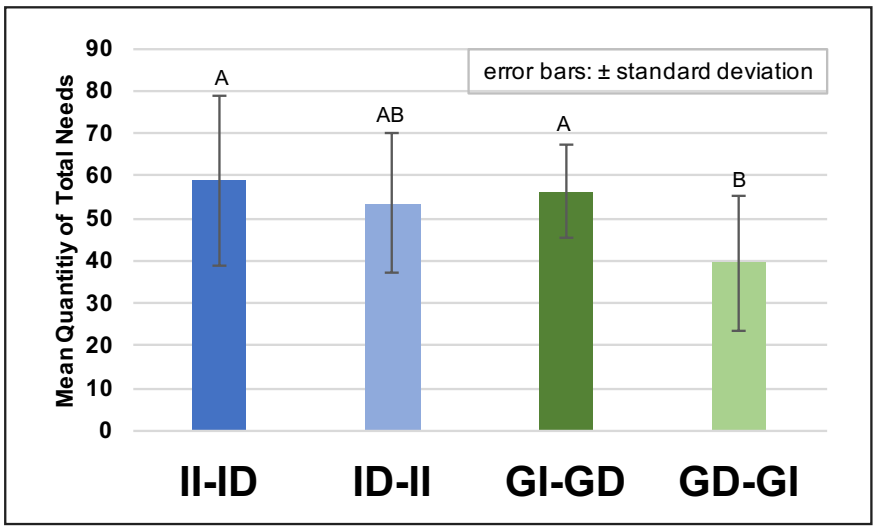

Figure 28. GD-GI participants provided significantly fewer total needs on average.

The results of an ANOVA (Appendix C.3.1.1) indicated a difference with respect to order used (p = 0.035), and post hoc Fisher LSD analysis (Appendix C.3.1.2) indicated differences between GD-GI and the II-ID treatment as well as between GD-GI and GI-GD treatment. No difference was detected between the II-ID and GI-GD treatments, the II-ID and ID-II treatments, the GI-GD and ID-II treatments, or the ID-II and GD-GI treatments. The difference between ID-II and GD-GI approached significance.

4.2.3 Functional Needs

The total quantities of functional needs were calculated and compared among the four treatments. On average, participants provided 44 functional needs (*SD* = 15) in the II-ID treatment, and 41 functional needs (*SD* = 7) on average in the GI-GD treatment. For the ID-II treatment, 41 functional needs (*SD* = 14) were elicited on average. Participants from the GD-GI treatment provided 29 functional needs on average (*SD* = 11).

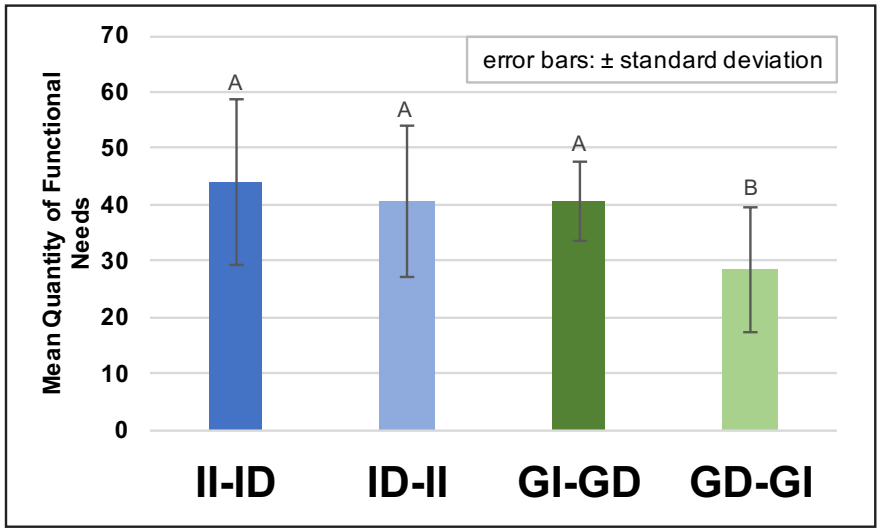

Figure 29. GD-GI participants provided significantly fewer functional needs on average.

The results of an ANOVA (Appendix C.3.2.1) indicated an effect with respect to setting used (p = 0.049). The difference with respect to order approached significance (p = 0.051), and post hoc Fisher LSD analysis (Appendix C.3.2.2) indicated differences between GD-GI treatment and all of the remaining treatments. No other differences were detected. A bubble chart displaying frequency of common functional needs (where higher frequency is indicated by larger bubble size) is provided on the next page. Bubble charts support sense-making of large quantities of data (ex. Eick, 2000). Used in this research effort, bubble charts display quantities of design space criteria as a function of bubble size to illustrate which criteria were mentioned more frequently than others. Many needs were low frequency and were excluded from the graphic for clarity. For example, some notable functional needs include: Connect veteran (112 instances), Connect local veterans (61 instances), Acquire job (57 instances), and Translate military skills (41 instances). These high-instance functional needs may reflect their relative importance to participants (and perhaps to designers), or, could reflect their salience. Future research could explore prioritization schemes for identified design criteria.

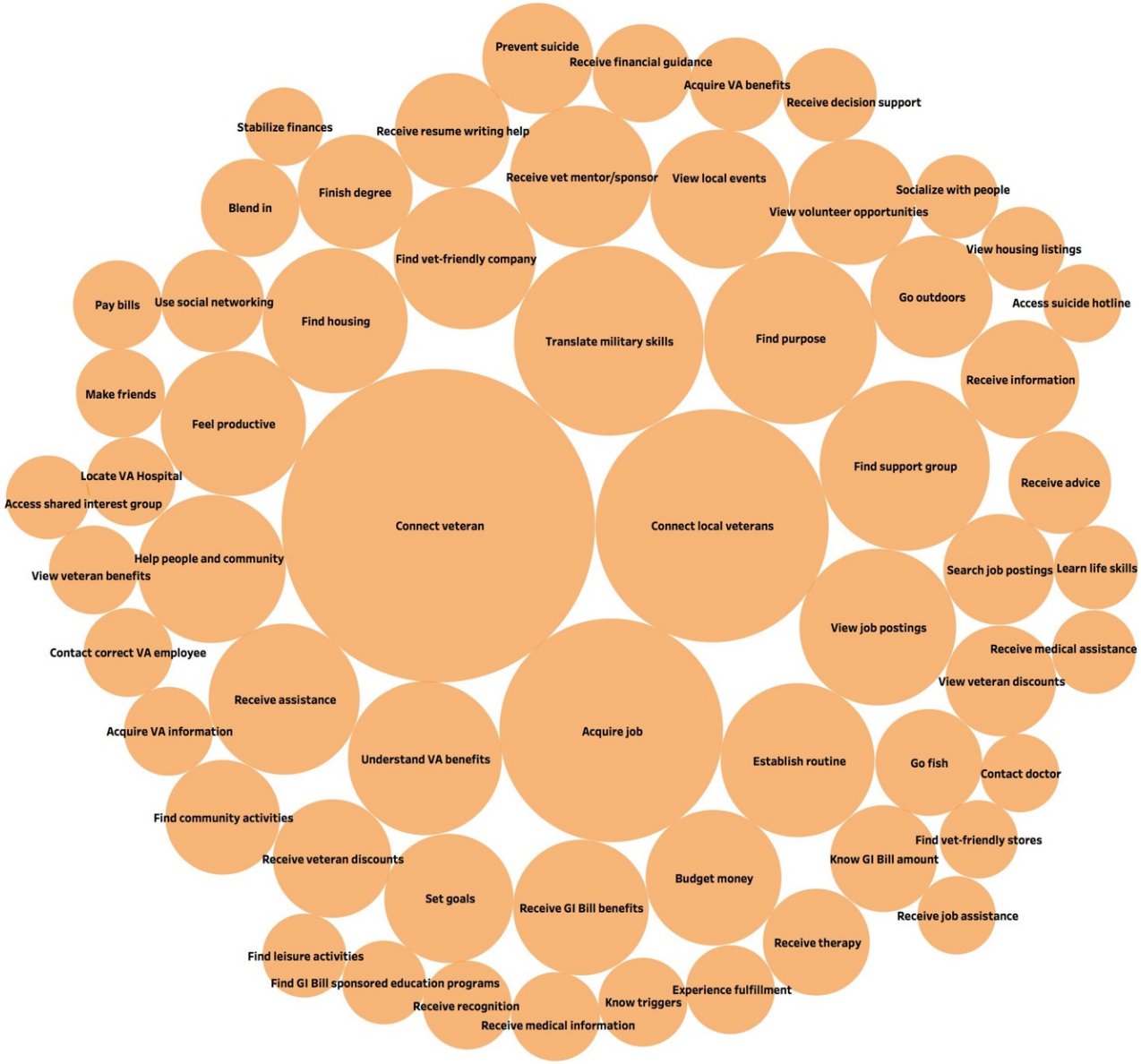

Figure 30. Functional needs frequency indicated by bubble size. Frequency may or may not relate to importance. However, saliency could assist designers with prioritization.

Additionally, the quantities of *distinct* functional needs from each participant were calculated and compared for each of the 4 treatments. In order to calculate distinct functional needs for a participant, repetitions of functional needs were removed from each participant's data set. For example, Participant 2 indicated the need to *Acquire job* multiple times throughout his interview and design session. However, for Participant 2's distinct functional needs data set, *Acquire job* is listed once. This is a notably different data set from the functional needs quantity discussed at the beginning of this section, as each instance of *Acquire job* was included in that data set. Distinct functional needs analysis considers each of the participant's functional needs once, while removing repetitions. This is helpful to measure the span of topics a participant discussed.

For the II-ID treatment, 29 distinct functional needs were collected on average (*SD* = 9), while 28 distinct functional needs were collected on average (*SD* = 5) from participants in GI-GD treatment. For the ID-II treatment, 30 distinct functional needs were collected on average (*SD* = 8), while 20 distinct functional needs were collected on average (*SD* = 7) from participants in GD-GI treatment.

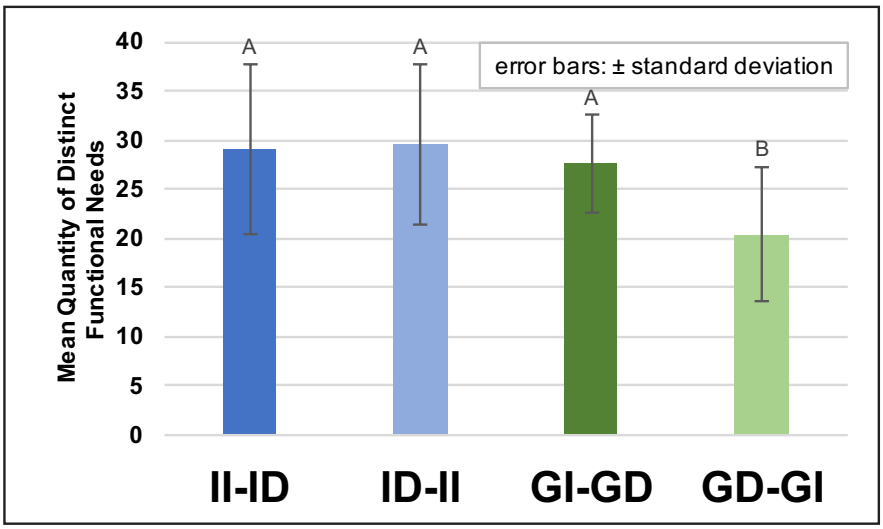

Figure 31. GD-GI participants provided significantly fewer distinct functional needs on average.

The results of an ANOVA (Appendix C.3.9.1) indicated an effect due to setting (p = 0.027), and post hoc Fisher LSD analysis (Appendix C.3.9.2) indicated differences between the GD-GI treatment and each of the remaining treatments. No other differences were detected. The list of functional needs is provided in Appendix C.2.1.

4.2.4 Nonfunctional Needs

The total quantities of nonfunctional needs were calculated and compared among the four treatments. On average, participants provided 15 nonfunctional needs (*SD* = 6) in the II-ID treatment, and 16 nonfunctional needs (*SD* = 8) on average in the GI-GD treatment. For the ID-II treatment, 13 nonfunctional needs (*SD* = 5) were elicited on average. Participants from the GD-GI treatment provided 12 nonfunctional needs on average (*SD* = 6).

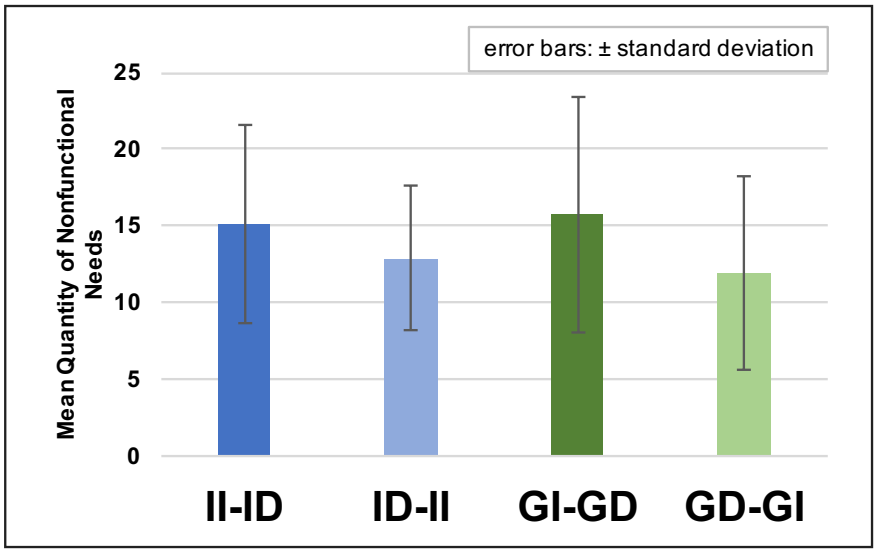

Figure 32. GI-GD participants provided the most nonfunctional needs on average, but not significantly more than participants from other treatments.

The results of an ANOVA (Appendix C.3.3.1) indicated no statistically significant differences between treatments with respect to quantity of nonfunctional needs. A bubble chart displaying frequency of common nonfunctional needs (where higher frequency is indicated by larger bubble size) is provided on the following page.

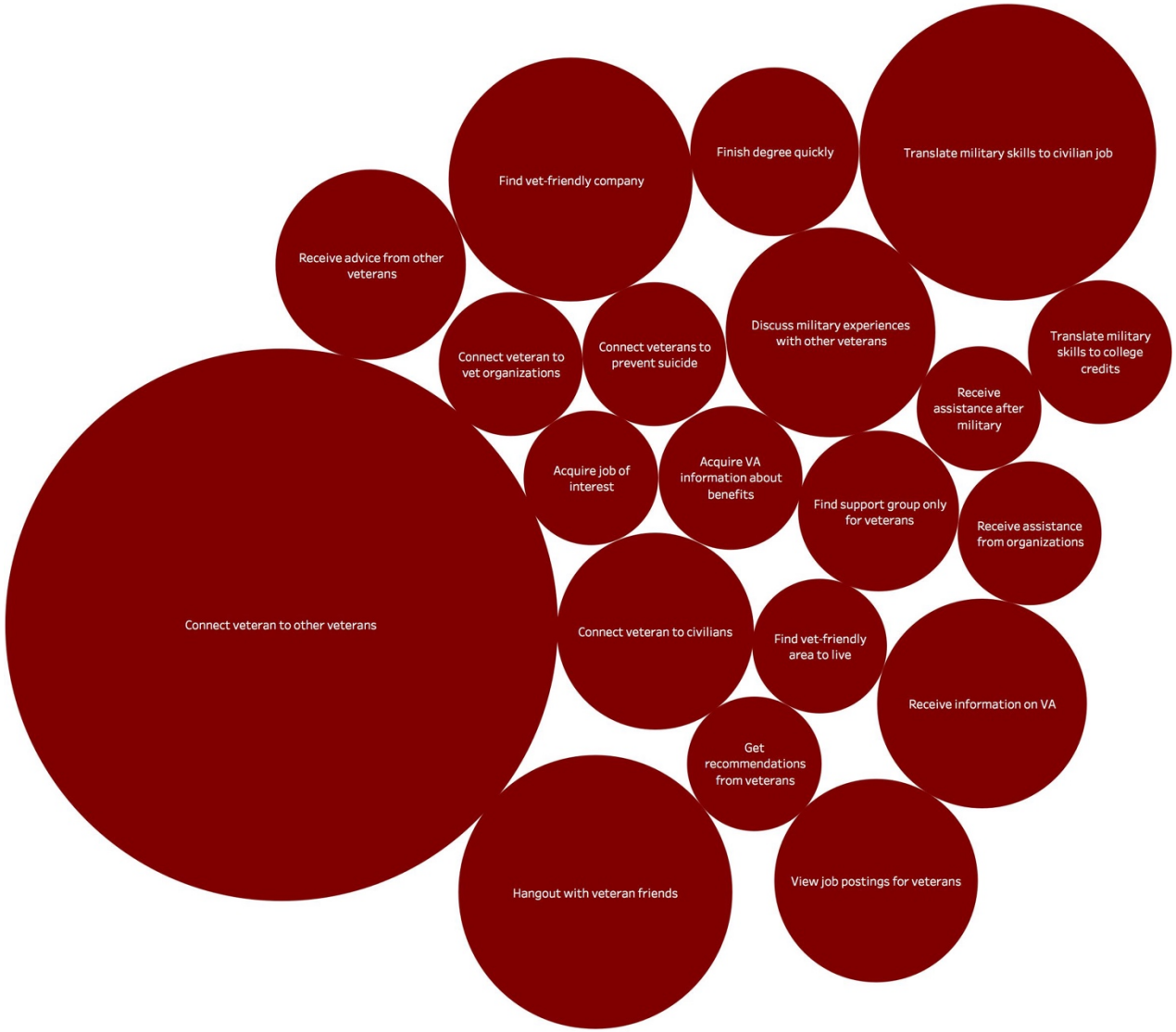

Figure 33. The highest-frequency nonfunctional needs indicate veterans would like to communicate and build relationships with other veterans.

Additionally, the quantities of *distinct* nonfunctional needs from each participant were calculated and compared for each of the 4 treatments. For the II-ID treatment, 11 distinct nonfunctional needs were collected on average (*SD* = 5), while 10 distinct nonfunctional needs were collected on average (*SD* = 4) from participants in GI-GD treatment. For the ID-II treatment, 10 distinct nonfunctional needs were collected on average (*SD* = 4), while 7 distinct nonfunctional needs were collected on average (*SD* = 3) from participants in GD-GI treatment.

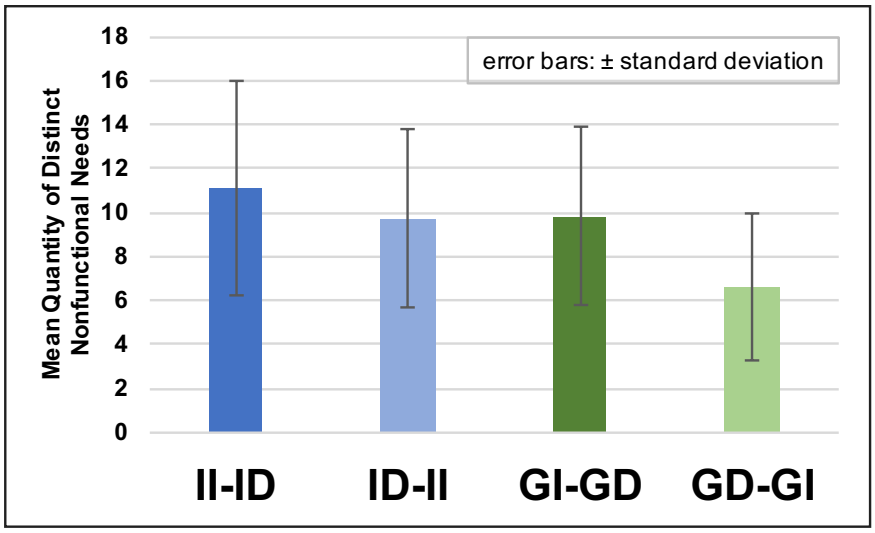

Figure 34. II-ID participants provided the most distinct nonfunctional needs on average, but not significantly more than participants from other treatments.

The results of an ANOVA (Appendix C.3.10.1) indicated no statistically significant differences between treatments. The list of all elicited non-functional needs is provided in Appendix C.2.2.

4.2.5 All Obstacles

The total quantities of obstacles (composite of barriers and challenges) were calculated and compared among the four treatments. An average of 76 obstacles were identified by participants in II-ID treatment (*SD* = 24), and in the GI-GD treatment, 72 obstacles were identified, on average (*SD* = 37). For treatments in which the design session took place first, 63 obstacles were identified on average from participants in the ID-II treatment (*SD* = 20) and 29 obstacles on

average were identified from participants in the GD-GI treatment (*SD* = 11). An overview of these results is presented in Figure 35.

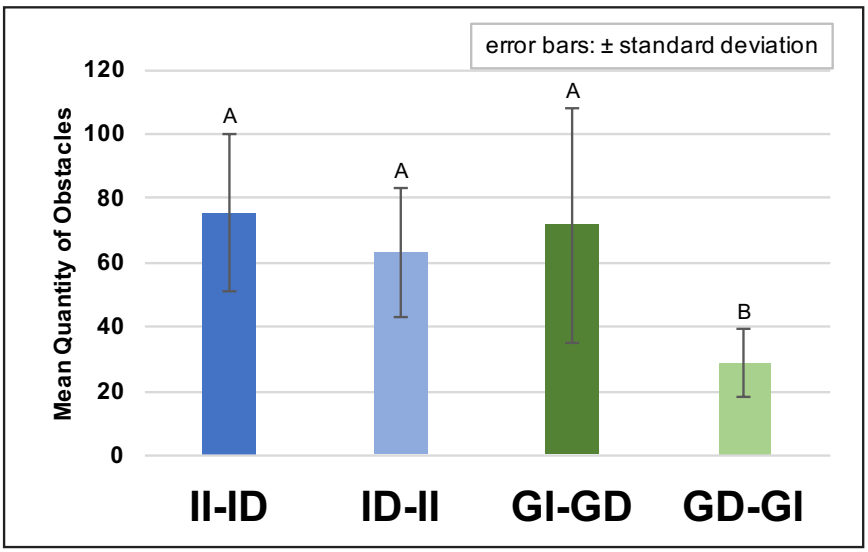

Figure 35. GD-GI participants provided significantly fewer obstacles on average.

The results of an ANOVA (Appendix C.3.4.1) indicated a difference with respect to order used ($p = 0.001$), and with respect to setting used ($p = 0.019$). The interaction effect approached significance ($p = 0.059$) and post hoc Fisher LSD analysis (Appendix C.3.4.2) indicated differences between GD-GI and each of the remaining treatments. No other differences were detected.

4.2.6 Barriers

The total quantities of barriers were calculated and compared among the four treatments. On average, participants provided 40 barriers (*SD* = 14) in the II-ID treatment, and 41 barriers (*SD* = 22) on average in the GI-GD treatment. For the ID-II treatment, 33 barriers (*SD* = 13) were elicited on average. Participants from the GD-GI treatment provided 15 barriers on average (*SD* = 5).

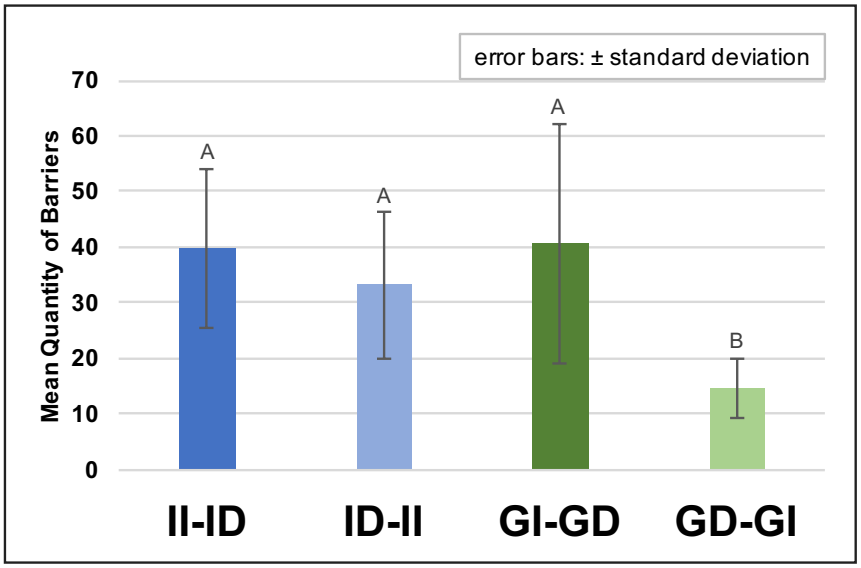

Figure 36. GD-GI participants provided significantly fewer barriers on average.

The results of a Kruskal-Wallis test (Appendix C.3.5.1) indicated a statistically significant difference (p = 0.001) among treatments. Pairwise comparisons of treatments via post hoc Mann-Whitney U tests indicated differences between the GD-GI treatment and each of the remaining treatments. A bubble chart displaying frequency of common identified barriers (where higher frequency is indicated by larger bubble size) is provided on the following page.

Figure 37. Civilian cluelessness (108 instances), PTSD (57 instances), Veteran stereotype (47 instances), Age gap (46 instances), and Financial burden (41 instances), were the most commonly identified barriers.

Additionally, the quantities of *distinct* barriers from each participant were calculated and compared for each of the four treatments. For the II-ID treatment, 25 distinct barriers were collected on average (*SD* = 6), and 25 distinct barriers were collected on average (*SD* = 11) from participants in GI-GD treatment. For the ID-II treatment, 22 distinct barriers were collected on average (*SD* = 6), while 11 distinct barriers were collected on average (*SD* = 3) from participants in GD-GI treatment.

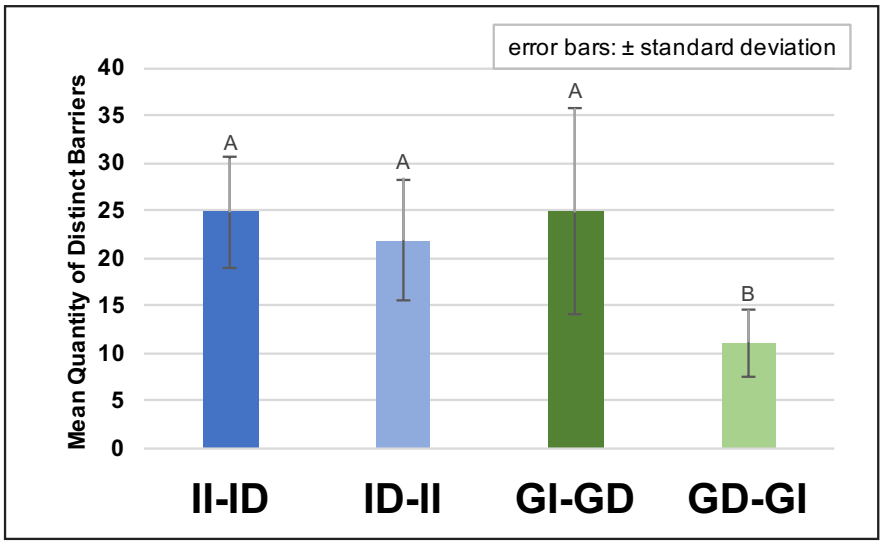

Figure 38. GD-GI participants provided significantly fewer distinct barriers on average.

The results of an ANOVA (Appendix C.3.11.1) indicated an effect due to setting (p = 0.025), an effect due to order (p = 0.001), and an interaction effect (p = 0.022). Post hoc Fisher LSD analysis indicated a difference between the GD-GI treatment and all remaining treatments. No other differences were detected. The list of all distinct barriers elicited is provided in Appendix C.2.3.

4.2.7 Challenges

The total quantities of challenges were calculated and compared among the 4 treatments. On average, participants provided 36 challenges (*SD* = 13) in the II-ID treatment, and 31 challenges (*SD* = 15) on average in the GI-GD treatment. For

the ID-II treatment, 30 challenges (*SD* = 9) were elicited on average. Participants from the GD-GI treatment provided 14 challenges on average (*SD* = 7).

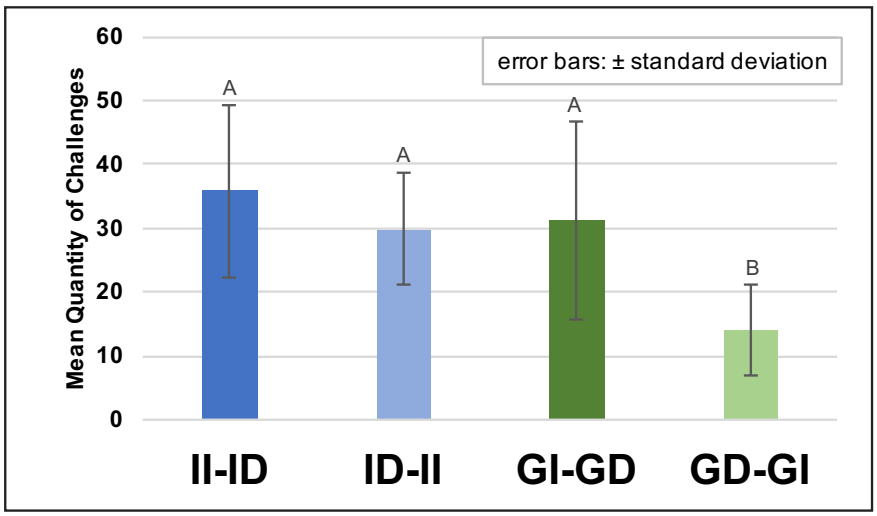

Figure 39. GD-GI participants provided significantly fewer challenges on average.

The results of an ANOVA (Appendix C.3.6.1) indicated an effect due to setting (p = 0.008) and order (p = 0.003). Post hoc Fisher LSD analysis indicated differences between the GD-GI treatment and each of the remaining treatments. A bubble chart displaying frequency of common identified challenges (where higher frequency is indicated by larger bubble size) is provided on the following page.

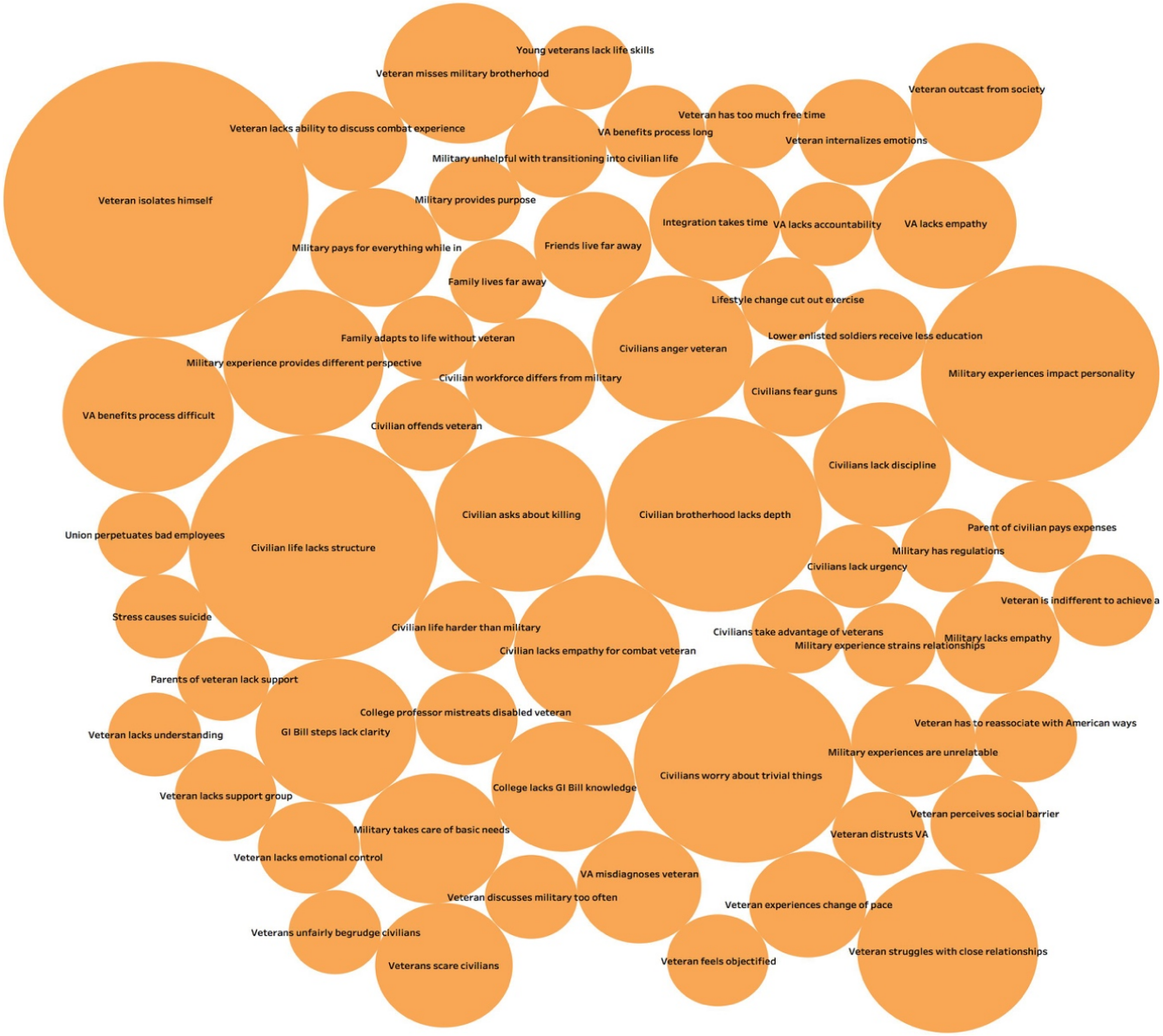

Figure 40. Veteran isolates himself (54 instances), Civilian life lacks structure (36 instances), Military experiences impact personality (33 instances), Civilians worry about trivial things (41 instances), and Civilian brotherhood lacks depth (27 instances) were the most commonly identified challenges.

Additionally, the quantities of *distinct* challenges from each participant were calculated and compared for each of the four treatments. For the II-ID treatment, 25 distinct challenges were collected on average (*SD* = 8), and 25 distinct challenges were collected on average (*SD* = 12) from participants in GI-GD treatment. For the ID-II treatment, 23 distinct challenges were collected on average (*SD* = 6), while 12 distinct challenges were collected on average (*SD* = 5) from participants in GD-GI treatment.

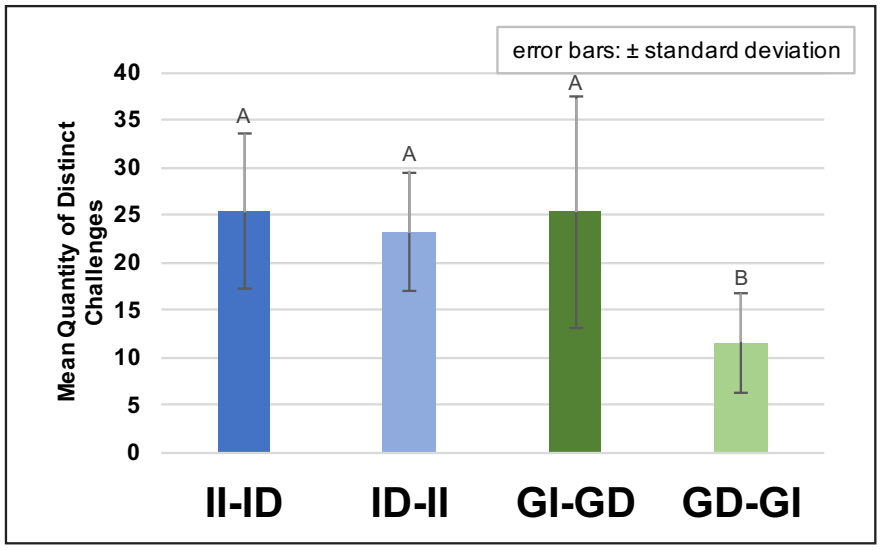

Figure 41. GD-GI participants provided significantly fewer distinct challenges on average.

The results of an ANOVA (Appendix C.3.12.1) indicated an effect due to setting (p = 0.033), an effect due to order (p = 0.004), and an interaction effect (p = 0.036). Post hoc Fisher LSD analysis indicated a difference between the GD-GI treatment and all remaining treatments. No other differences were detected. The list of all distinct challenges elicited is provided in Appendix C.2.4.

4.2.8 Context of Use Considerations

The total quantities of context of use considerations were calculated and compared among the four treatments. On average, participants provided 58 context of use considerations (*SD* = 21) in the II-ID treatment, and 50 context of use considerations (*SD* = 10) on average in the GI-GD treatment. For the ID-II treatment, 46 context of use considerations (*SD* = 16) were elicited on average.

Participants from the GD-GI treatment provided 26 context of use considerations on average (*SD* = 7).

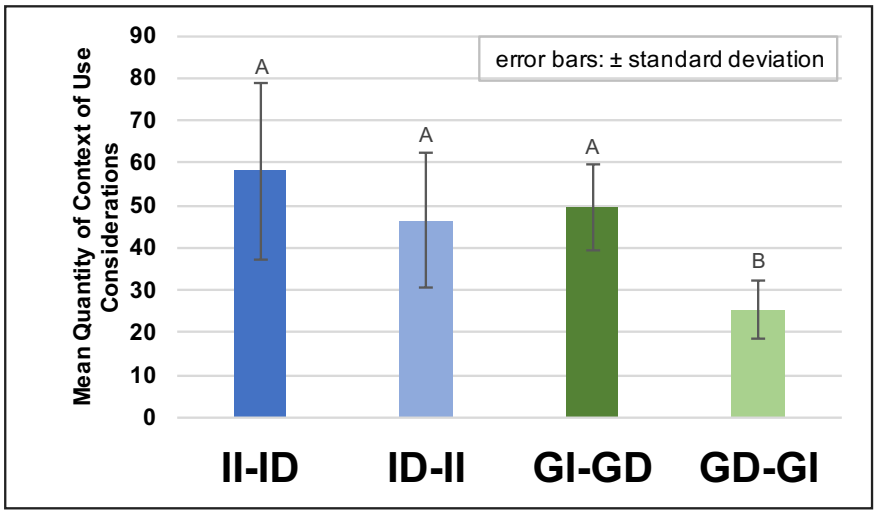

Figure 42. GD-GI participants provided significantly fewer context considerations on average.

The results of an ANOVA (Appendix C.3.7.1) indicated an effect due to setting (p = 0.002) and order (p = 0.000). Post hoc Fisher LSD analysis indicated differences between the GD-GI treatment and each of the remaining treatments. A bubble chart displaying frequency of common identified context of use considerations (where higher frequency is indicated by larger bubble size) is provided on the next page.

Figure 43. Feeling supported by family (53 instances), Struggling to build relationships (34 instances), Feeling independent (32 instances), Missing military structure (28 instances), and Living with parents (26 instances) were the most commonly identified context of use considerations.

Additionally, the quantities of *distinct* context of use considerations from each participant were calculated and compared for each of the four treatments. For the II-ID treatment, 42 distinct context of use considerations were collected on average (*SD* = 11), and 42 distinct context of use considerations were collected on average (*SD* = 9) from participants in GI-GD treatment. For the ID-II treatment, 38 distinct context of use considerations were collected on average (*SD* = 12), while 22 distinct context of use considerations were collected on average (*SD* = 5) from participants in GD-GI treatment.

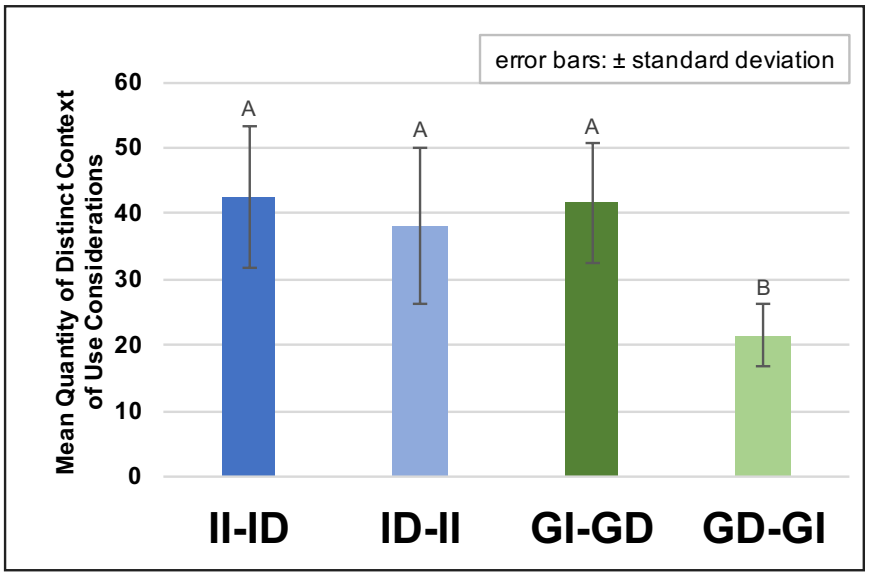

Figure 44. GD-GI participants provided significantly fewer distinct context considerations on average.

The results of an ANOVA (Appendix C.3.13.1) indicated an effect due to setting (p = 0.006), an effect due to order (p = 0.000), and an interaction effect (p = 0.014). Post hoc Fisher LSD analysis indicated a difference between the GD-GI treatment and all remaining treatments. No other differences were detected. The list of all context of use considerations elicited is provided in Appendix C.2.5.

4.2.9 Breadth

While analysis of the variables which measured the distinct quantities of their respective design space criterion offer some insight on design space coverage, an additional metric was utilized. Breadth inspected the data set of each approach with respect to the codebook. Furthermore, breadth is expressed in terms of a fraction to indicate how many codebook themes were used within the data set of the treatment. If all codebook themes were utilized in the coding of the data set of an examined treatment, the breadth score of that treatment is 1.

Table 29

Coverage of codebook themes was highest for II-ID treatment results.

Theme	II-ID	GI-GD	ID-II	GD-GI
1.1				
1.2				
1.3				
1.4				
1.5				
1.6				
1.7				
1.8				
1.9				
1.10				
1.11				
1.12				
1.13				
2.1				
2.2				
2.3				
3.1				
3.2				
3.3				
3.4				
3.5				
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5.6				
5.7				
5.8				
5.9				
5.10				
5.11				
5.12				
5.13				
5.14				
5.15				
5.16				
5.17				
6.1				
6.2				
6.3				
6.4				
6.5				
6.6				
6.7				
6.8				
6.9				
6.10				
6.11				

Quantity of Design Space Criteria

1-20

21-40

41-60

61-80

81-100

>100

From inspection of Table 29, there were a total of 57 codebook themes. At a glance, some relationships between first-cycle coding results and second-cycle coding results are evident. For example, four codebook themes contained instances where participants in one or more treatments provided over 100 design criteria from that theme: 5.1 Difficulty relating to or interacting with civilians (including age difference at school/work, feeling misunderstood), 5.15 Support through interaction with other veterans, 6.1 Discrepancy between regimented life and veteran/civilian life, and 6.2 Difficulty transitioning to independent adulthood. To calculate breadth for a treatment, any instance of zero design space criteria was counted. The formula for breadth, calculated for each treatment, was defined as:

$$\boldsymbol{Breadth} = \frac{\boldsymbol{Total\ \#\ of\ Themes} - \sum \boldsymbol{Zero\ criteria\ theme\ instances}}{\boldsymbol{Total\ \#\ of\ Themes}}$$

The breadth score for II-ID = (57 – 1)/57 = 0.982, and for GI-GD = 0.930. For treatments in which the design session took place first, the breadth score of II-ID = 0.965, and GI-GD = 0.895.

While this breadth score offers no explanations for stark differences in saturations of a theme, it does provide a quantifiable measure of codebook coverage for a treatment, which permits interpretations about the which topics and categories were discussed frequently by participants in those treatments. The II-ID and GI-GD treatment participants provided 98% and 93% coverage, respectively, of the codebook topics. The ID-II resulting coverage (97%) was greater than the GD-GI coverage (90%). Participants in all four treatments provided good codebook coverage of the topics and insights into the myriad of major issues and lived experiences of the veteran population queried in this research effort.

4.2.10 Post hoc examination of PTSD-specific outcomes

Although PTSD was not directly addressed by any of the RQs, post hoc exploratory analysis was conducted to examine some differences between

participants based on PTSD diagnosis. Due to the 4 different treatment conditions assignment of both PTSD-positive and negative participants to those groups, it is inappropriate to perform in-depth comparisons of two selected participant groups: those with PTSD ("PTSD" group) and those without a PTSD diagnosis ("NO PTSD" group). However, some high-level summary information is available as far as design space criteria differences between the two diagnosis groups.

Exploratory data analysis was first championed by John Tukey (1977). He believed too much emphasis was placed on hypothesis testing, and not enough emphasis was placed on investigation of the data in order to determine new hypotheses to test. One purpose of exploratory data analysis is to examine the data for interesting trends and results, rather than to examine data specifically to address a pre-existing hypothesis, which could prevent interesting discoveries already contained in the data set.

Keeping in mind that *N*=40 participants was unevenly partitioned with respect to PTSD diagnosis, as *n*=21 indicated they had never been diagnosed with PTSD, while *n*=19 indicated they had received a PTSD diagnosis from a primary care physician (PCP) or psychologist, their overall design space criteria contributions were examined. PTSD-diagnosed participants (*n*=19) contributed 991 total needs, 1301 total obstacles, and 846 total context of use considerations, which sums to 3138 total design space criteria. Participants without a PTSD diagnosis (*n*=21) contributed 1092 total needs, 1087 total obstacles, and 950 total context of use considerations, summing to 3129 total design space criteria.

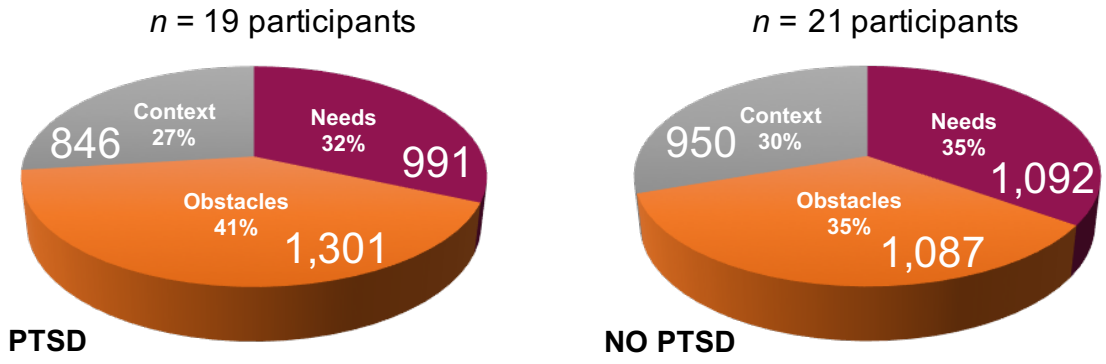

Figure 45. The largest category provided of design space criteria for both PTSD and no-PTSD participants was obstacles.

Given the symptomology of PTSD, it is interesting that the “PTSD” group of participants, which contained 2 fewer participants than the “NO PTSD” group of participants, provided ***more*** design space criteria than the “NO PTSD” group of participants. It is not surprising that a higher fraction of their design space criteria were obstacles than was seen in the “NO PTSD” participant outcomes. In addition to this insight, some exploratory analysis of the design space criteria with respect to diagnosis was performed. This was done in collaboration with the Data Visualization Studio in Virginia Tech University Libraries by merging first-cycle coding and second-cycle coding results.

Using Gephi, a visualization software, each design space criteria data point was examined by codebook theme of origin as well as by participant diagnosis. Each gray node indicates a codebook theme. Each blue (NO PTSD) and red (PTSD) dot indicates a design space criterion that emerged from second-cycle coding of the meaning units that had been identified that codebook theme. This overview permits examination of frequency of design space criteria by codebook theme, as well as if it was contributed by a participant with PTSD or not. An overview of this examination is presented below.

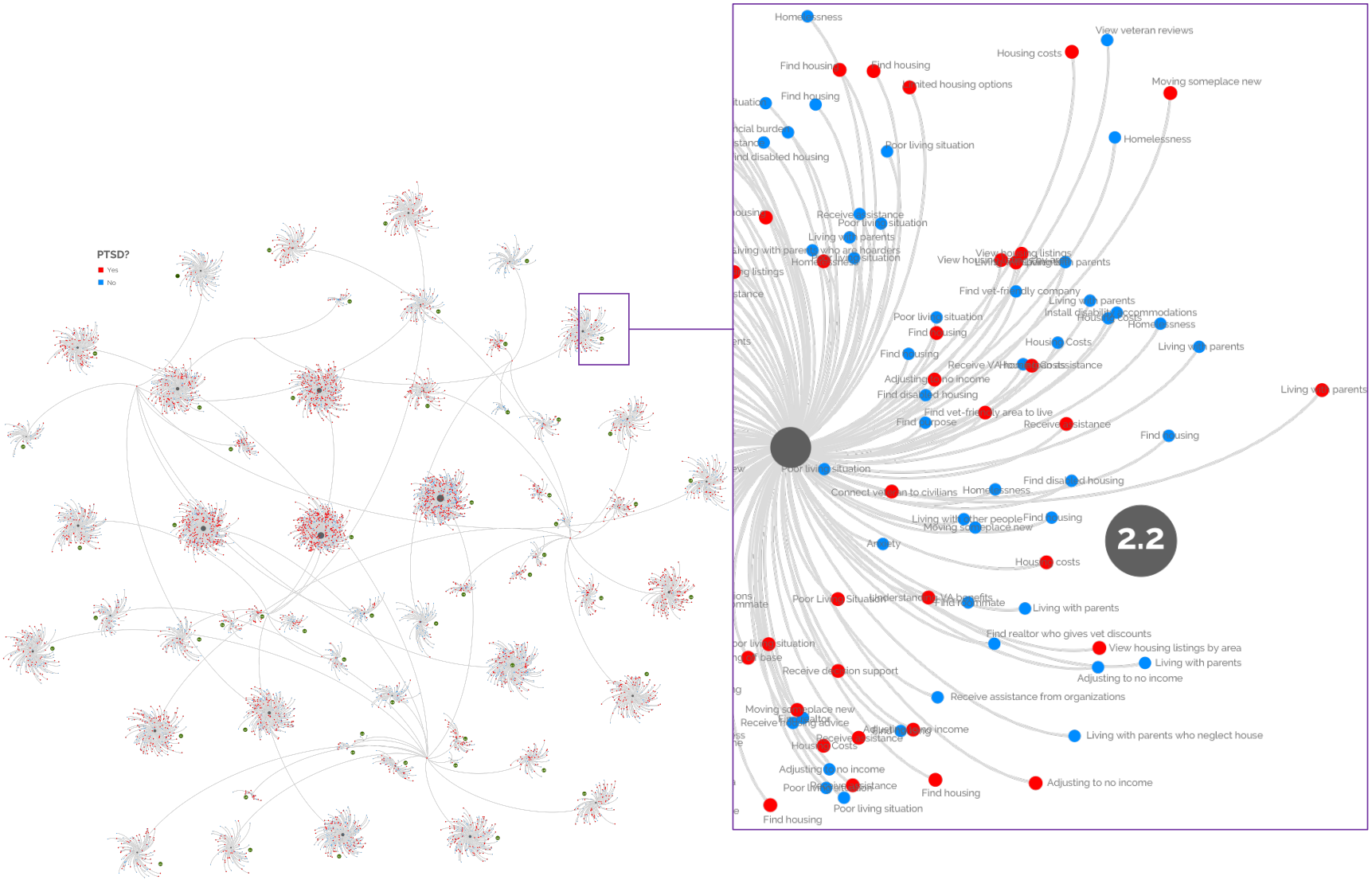

Figure 46. Each dark gray dot represents a codebook theme. The blue (criterion provided by a NO PTSD participant) and red dots (criterion provided by a PTSD participant) indicate design space criteria linked to the proximal codebook theme. An excerpt of example theme 2.2 *Housing Issues* is provided with criteria associated with the theme.

For exploration, codebook macro-themes 2.0 Financial and 3.0 Physical Health were selected and examined.

The financial macro-theme (Figure 47) contained 3 themes: 2.1 Strain or difficulty, 2.2 Housing issues, and 2.3 VA Disability-related monetary issues. Notice that nearly ***equal proportions*** of PTSD and NO PTSD participants disclosed financial issues-related design space criteria.

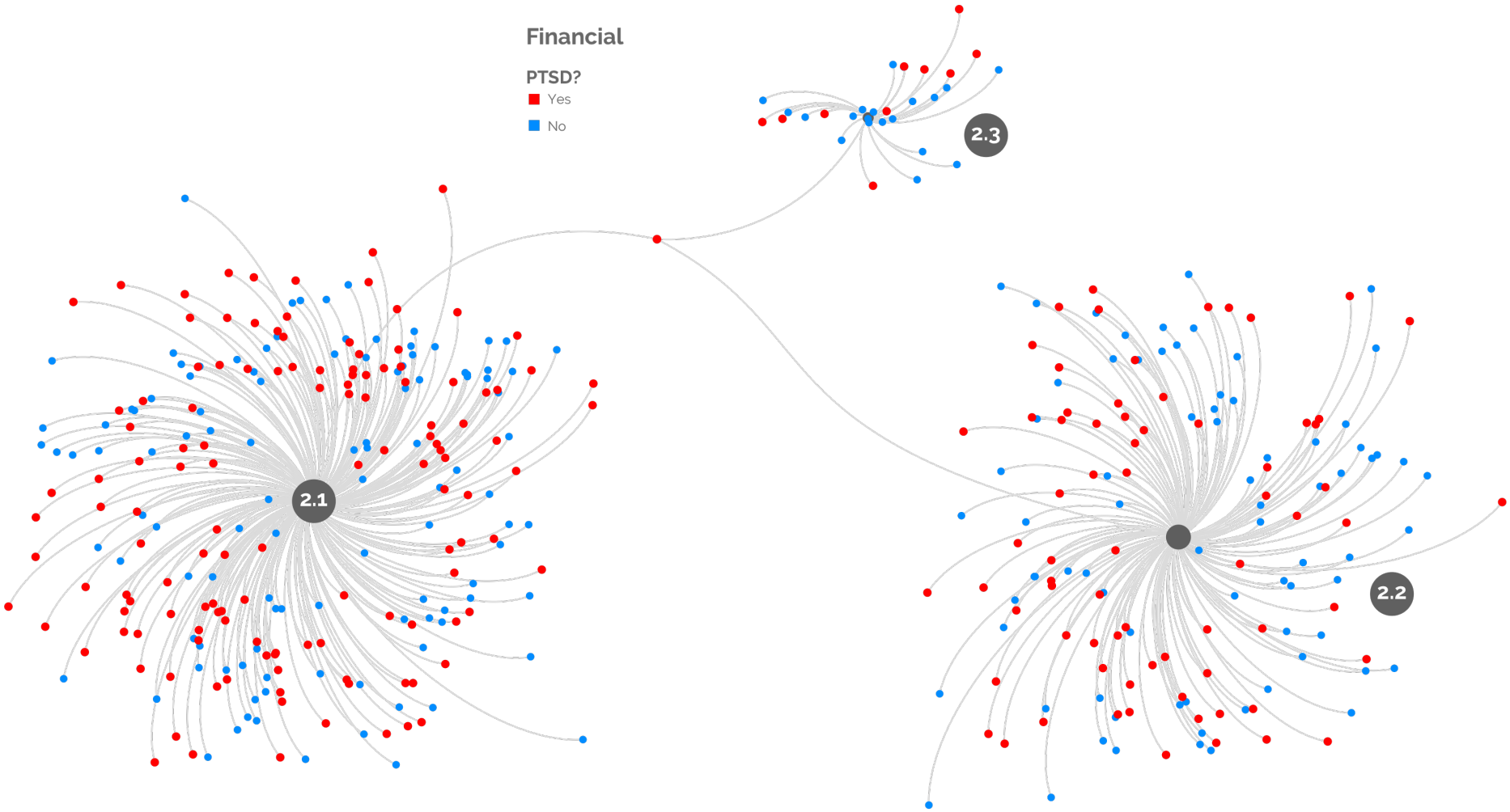

Figure 47. Diagnosis may not have much impact on financial issues veterans experience.

Physical Health contained 5 themes: 3.1 Injury occurred + evident during service, 3.2 Delayed onset injury (manifests after discharge), 3.3 Dietary/weight management/exercise, 3.4 Sleep issues, 3.5 Drug/alcohol abuse by self or other vet. It is interesting to note 3.1 and 3.2 were comprised of a majority PTSD participants, while 3.4 was comprised completely of PTSD participants. In examining the design space criteria at each node (which is the representation of a codebook theme's hub), some interesting relationships emerge.

For example, the second cycle coding of 3.4-categorized meaning units discovered issues with sleep apnea, sedatives, sleep schedules, nightmares, motivation, physical pain, and nasal issues. Figure 48 displays *Drug/alcohol abuse by self or other vet* (Theme 3.5) and the criteria linked to that theme. Some of them are seemingly obvious, such as addiction (a barrier), alcohol issues (barrier), receive addiction counselling (functional need), homelessness (barrier) etc. However, some criteria tied to drug/alcohol abuse were interesting and unexpected: find companions (functional need), feeling bored (context), civilian life lacks structure (challenge), keeping bad habits developed in military (context), establish routine (functional need).

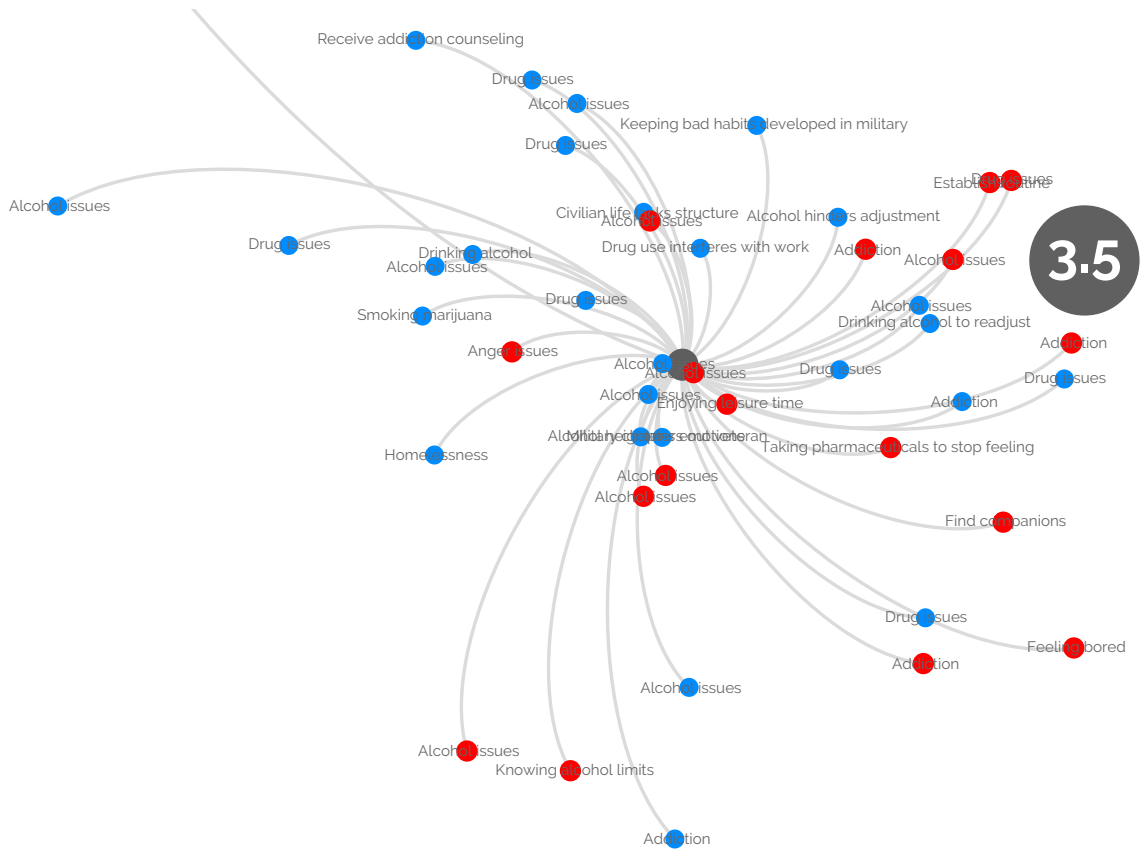

Figure 48. Some interesting relationships were discovered, for example, "Establish routine" emerged as a need from Theme 3.5 Alcohol and Drug Abuse.

Examination of design criteria by codebook theme lays the groundwork to establishing relationships among design criteria that may not otherwise be obvious. This is an area for further exploration in future research. Although exhaustive examination of the design space criteria by codebook theme of origin and by diagnosis is outside the scope of this work, future research could explore relationships within the data corpus to discover additional insights and more comprehensive understanding of the reintegration phenomenon, especially with respect to PTSD, if desired.

4.2.11 Personas

After [5, 19, 20, 2] and [30, 34, 39, 26] data sets were selected, the personal details of the select participants were retrieved from their screening questionnaire (Appendix A.3) and demographic questionnaire (Appendix A.8.2):

PARTICIPANTS	DESIGN SPACE CRITERIA
[5, 19, 20, 2] P# Age PTSD Maritl Col 5 34 no M done 19 34 yes M done 20 32 no M done 2 33 no M done	['Establish routine', 'Adjusting to civilian life', 'Feeling supported by family', 'Poor living situation', 'Freedom overload', 'Independence issues', 'Acquire job', 'Connect veteran to other veterans', 'View job postings for veterans', 'View job postings', 'Receive assistance', 'Connect veteran', 'Adjusting to new place']
[30, 34, 39, 26] P# Age PTSD Maritl Col 30 33 no M some 34 26 yes S some 39 23 no S some 26 31 yes M some	['Civilian life lacks structure', 'Military experiences impact personality', 'Creating deeper friendship through military service', 'Civilian cluelessness', 'Connect veteran to other veterans', 'Receive information on VA', 'Understand VA benefits', 'Transition difficult', 'Connect veteran', 'Isolation easy']

All participants from [5,19,20,2] and [30,34,39,26] were white, and there was a mixture of ages and diagnosis status within the participant sets. Education was consistent within a participant set. Set [5,19,20,2] contained college graduates while set [30,34,39,26] contained participants who indicated “some college” as a response on their questionnaire. Additionally, all participants from [5,19,20,2] were married, while half of the participants from set [30,34,39,26] were single. The average age of participants from set [5,19,20,2] was 33.3 (SD = 0.96) and the average age of participants in set [30,34,39,26] was 28.25 (SD = 4.57).

Using a random number generator, Participant 20 and Participant 34 were selected as primary representative participants for persona ideation, and their persona frameworks could be created. The data management spreadsheet of design space criteria of Participant 20 and Participant 34 was examined to

determine the line number in their interview and design sessions from which the criteria emerged. These details provided context for the personas to make them information-rich while still incorporating those emergent criteria that the participants within a set had in common. The master spreadsheet was filtered to display only the participant of interest and the criterion of interest. The session (interview (I) or design(D)) as well as the line number of the transcript were noted in green for reference. These inspections provided the sources from the original transcripts of personal details with which the personas could be refined. The interview and design session transcripts of the selected participants were re-read in their entirety as an initial step. On the second iteration of reading, specific line numbers that contained each design criterion of interest were highlighted and used to inform persona creation. Whenever possible, verbatim excerpts were used to enhance the authenticity of the personas. The frameworks of the two personas, as well as the final personas, are shown on the following page.

PERSONA #1

NAME Participant 20

AGE 32

OCCUPATION stay-at-home dad

NEEDS ['Establish routine' (I 468), 'Acquire job' (D 116 + 195), 'Connect veteran' (I 67 + 591), 'Connect veteran to other veterans' (D 114 + 198), 'View job postings for veterans' (D 195), 'View job postings' (D 195), 'Receive assistance' (I 168, 237, 275; D 116)]

OBSTACLES ['Poor living situation' (I 260 + 642), 'Freedom overload' (I 632), 'Independence issues' (I 632)]

CONTEXT OF USE CONSIDERATIONS ['Adjusting to civilian life' (I 308), 'Feeling supported by family' (I 341 + 371) , 'Adjusting to new place' (I 287)]

PERSONA #2

NAME Participant 34

AGE 26

OCCUPATION student

NEEDS ['Connect veteran' (I 317; D 190 + 234), 'Connect veteran to other veterans' (I 317; D 38, 49, 229, 190, 234), 'Receive information on VA' (I 416, D 187), 'Understand VA benefits' (I 416; D 187)]

OBSTACLES ['Civilian life lacks structure' (I 1048), 'Military experiences impact personality' (I 55 + 668) 'Civilian cluelessness' (I 55, 60, 68, 82, 242, 611, 625, 685, 1204)]

CONTEXT OF USE CONSIDERATIONS ['Creating deeper friendship through military service' (I 668), 'Transition difficult' (I 414), 'Isolation easy'(I 803)]

NATHAN JONES

AGE 32
OCCUPATION Stay-at-home dad, looking for employment opportunities

Nathan is a West Point and Army Ranger's school graduate and is married with two children. He is currently very frustrated with his living situation as he left the military 3 months ago, and his personal belongings from the base in Germany where he was stationed have still not arrived at his new home in the US. He spent several years from the beginning of his marriage on deployments. Now he is medically retired and trying to be a more present and active father.

I'll be honest the only hard thing about marriage is I've deployed every year for the past five years. So – since I've retired is the longest time since we've been married that we've spent physically together. And then like, the hardest thing when you come back from deployment is like, "Now I gotta be inserted into a family mechanism that's already working and I have no idea how it works."

Nathan finds fatherhood very challenging, and demanding of a skill set he has not yet developed. He would like to find veterans in his area to enjoy leisure time with, but finds it difficult sometimes to relax and be himself around veterans who were lower enlisted, because of lingering power differential and usually, education disparity. While in the military, Nathan was in charge of over 160 soldiers, and the world of child rearing and arranging play dates feels rather small. While West Point has offered him a teaching position, Nathan's wife's career is blossoming at their current location, and Nathan feels he should give her the opportunity to follow her passions. As focus has shifted to his children, Nathan feels the culture shock associated with moving off base into the civilian world.

When you live on a military base, it's like "Where do the kids go to school?" The post school. "Where are we going to get daycare?" The post daycare. "Where are we going to go grocery shopping?" The grocery store on post. "Where are we going to buy our clothes?" Well the store on post. Like, you just live on post and it's easy to just stay in that community and never leave post. And then there's also outdoor recreation on post that does free trips. All the yards are manicured and they sweep the streets. So, we're really spoiled and that's part of the reason, when you've had access that's been so easy your entire professional career and you get out and you're like: "Where's the nearest playground?", and they tell you "Over by the library." Ughh.. I have to DRIVE there?!

Nathan craves the sense of community he had in the military, and he misses the sense of power and respect he felt from others while being an officer. He's decided to find a job in the area when the kids start school, but is unsure of how to match his military skills to a civilian job. He craves a routine but is enjoying being a little lax in his newfound independence.

When people thank me for my service, it IS kind of a bittersweet thing because I knew.... I've known guys that died. I know guys who've gotten out and committed suicide. And it brings up a LOT of emotions that you can't control. And you carry on your conversation and try not to display it. But when the conversation is over with, you still have emotions or thoughts in your head of back when, when it all happened and it can make you angry, sad, or you know, just a number of different things.

JOSEPH TAYLOR

AGE 26 **OCCUPATION** college student

Joseph is a mechanical engineering student at a university, trying to reintegrate into the civilian society. He often feels alone and unable to relate to his much younger classmates, due to age difference as well as difference of life experiences. Civilian relationships seem shallow to him, and he sees civilians as naïve when it comes to matters of love and sacrifice. He wishes he could find a way to connect to other veterans in the area to establish friendships, or to find vet-savvy civilians who understand how to be respectful without being awkward. He often misses his friends from the Marine Corps who are now scattered all over the country, and is wary of making new friends with civilians based on bad experiences with them in the past.

When I'm at a party and people start asking a lot of questions about "have you killed anyone?", they just don't understand that these can be very personal questions. And if I've been drinking, it can bring out a lot of bad emotions.

The VA is like a labyrinth to him, and he feels like a lot of his time is wasted trying to make appointments and view insurance options, and phone calls with VA employees have left him feeling frustrated and angry, while no progress on his tasks has been made. He doesn't understand his benefits, and his health issues he believes developed after burn pit exposure have not been addressed. He wants to learn how to find recent research papers done on topics of specific interest to veterans, like burn pits.

He lives alone in his apartment, and while he finds that appealing and freeing, he also realizes that he is isolated from others most of the time. He wants to find volunteer opportunities as he enjoys the feeling he gets from helping people, but he is reluctant to approach volunteer organizations because he doesn't want to field more intrusive questions from civilians. His school work is going well, but he struggles with the collegiate approach of learning information, when his military experience taught him so much about *applying* information to real tasks. He often struggles with PTSD and survivor's guilt, and his girlfriend recently ended their relationship because he would get angry for no apparent reason and neither he nor she knew why or how to de-escalate his anger.

Joseph feels that both the VA and his college make assumptions about what should be "obvious" to him, but Joseph joined the military directly out of high school after growing up with impoverished, uneducated parents, and is only now truly beginning to function as an independent adult. Resources relating to available scholarships, GI Bill information, disability claims, budgeting and paying for apartment utilities, etc., would be helpful in the transition process.

Evaluation of these personas was not addressed in the scope of this research effort. Further research could explore the utility of these personas versus personas created using other methodologies. However, the methodology of identifying population trends while also connecting a persona to an individual, real, representative user, shows promise for future research.

4.3 Research Question 3 Results

The purpose of Research Question 3 (RQ3) was to examine the differences among select elicitation methods on design with respect to the breadth and depth of design space criteria that was elicited, specifically:

- (RQ3a): What is the impact of session ***setting*** (individual or group) on ***phenomenological design***?
- (RQ3b): Is there a ***priming effect*** associated with a phenomenological approach to design?
- (RQ3c): What differences exist between a ***traditional*** participatory design approach and a ***phenomenological*** approach to design?

The results from inspecting each component of RQ3 is discussed in the following sections.

4.3.1 RQ3a Results

The purpose of RQ3a was to discern the difference (if any) between an individual and a group approach to phenomenological design. This required inspection of dependent variables from the II-ID and GI-GD treatments.

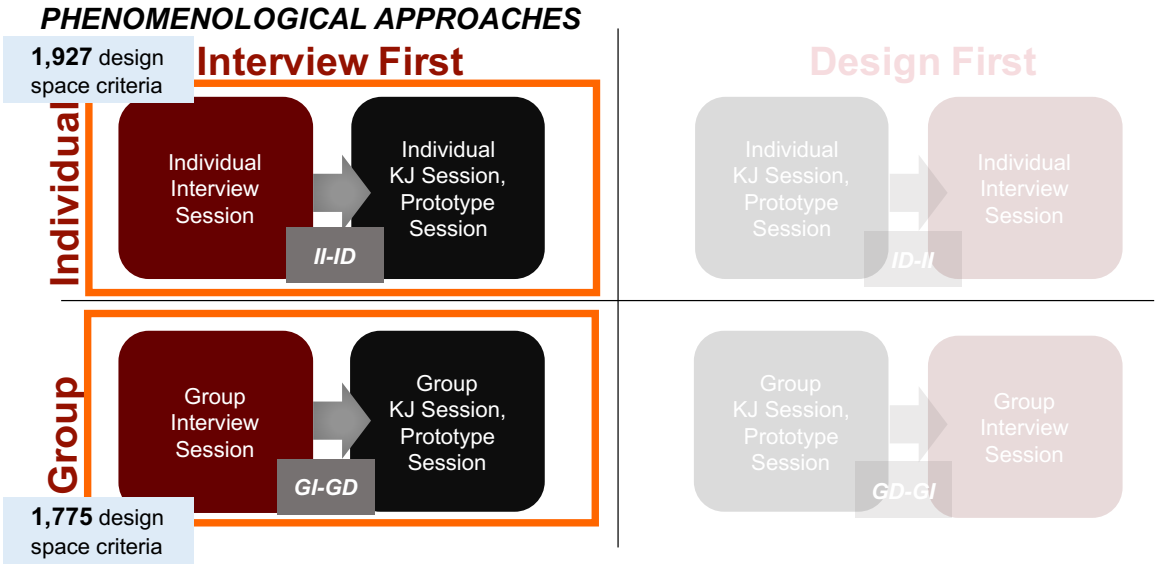

Figure 49. Design space criteria that emerged from boxed sessions were examined for RQ3a analysis.

This analysis was desirable since there was uncertainty regarding which setting (individual or group) in a phenomenological approach to participatory design is optimal.

4.3.1.1 Quantity-Based Dependent Variables. There was no difference detected between the individual and group setting of the of the phenomenological approach to participatory design with respect to quantity-based (repetitions included) dependent variables. Analysis conducted to address RQ2 often detected differences when comparing the 4 treatments, however, post hoc analysis to check for pairwise differences did not find a difference between II-ID and GI-GD treatments for each quantity-based dependent variable examined.

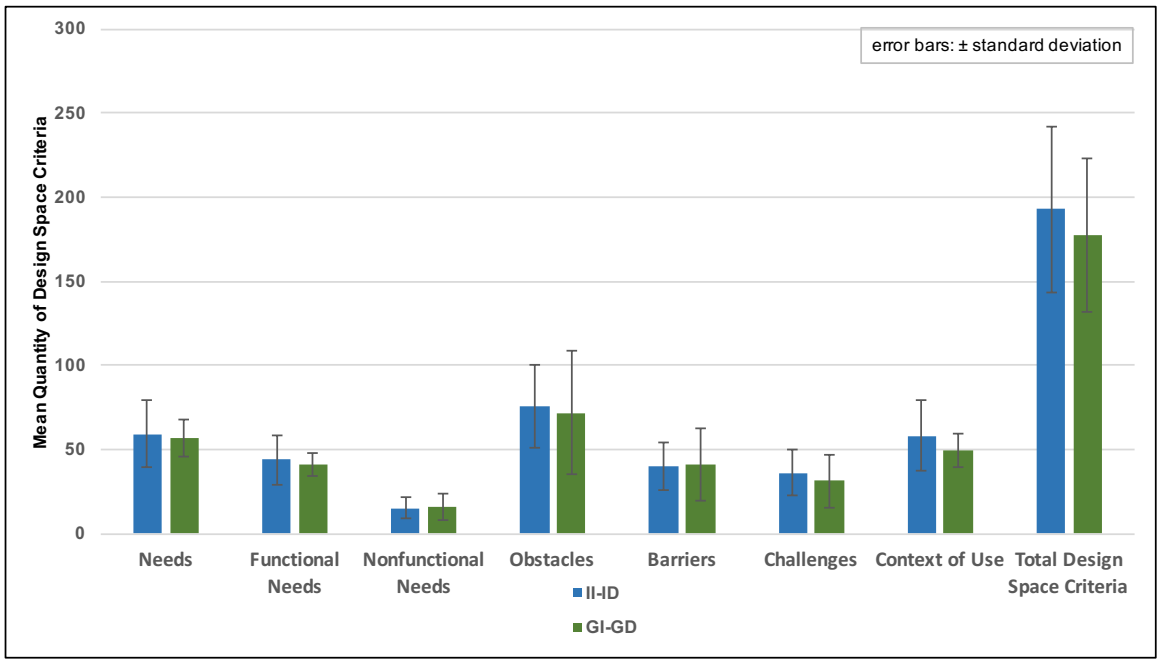

Figure 50. There were no significant differences found between the group and individual setting of phenomenological design with respect to design space criteria quantities.

Analysis of the total design space criteria (section 4.2.1) all needs (section 4.2.2), functional needs (section 4.2.3), nonfunctional needs (section 4.2.4), obstacles (section 4.2.5), barriers (section 4.2.6), challenges (section 4.2.7), and context of

use considerations (section 4.2.8) failed to detect any differences between the outcomes of utilizing an individual versus a group approach to phenomenological participatory design. There were slightly more total design space criteria elicited from participants in the II-ID treatment on average than from participants in the GI-GD treatment.

4.3.1.2 Distinct Dependent Variables. There was no difference detected between the individual and group setting of the of the phenomenological approach to participatory design with respect to distinct (repetitions excluded) dependent variables. Analysis conducted to address RQ2 often detected differences when comparing the 4 treatments, however, post hoc analysis to check for pairwise differences did not find any differences between II-ID and GI-GD treatments for each distinct dependent variable examined.

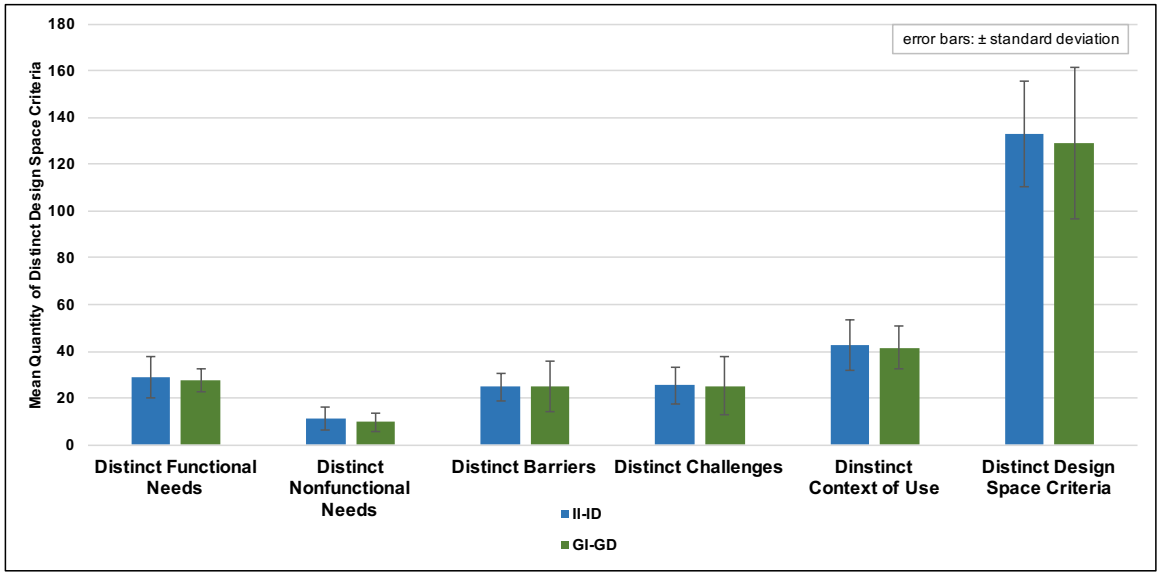

Figure 51. There were no significant differences found between the group and individual setting of phenomenological design with respect to distinct design space criteria quantities.

Analysis of distinct total design space criteria (section 4.2.1), distinct functional needs (section 4.2.3), distinct nonfunctional needs (section 4.2.4), distinct barriers

(section 4.2.5), distinct challenges (section 4.2.6), and distinct context of use considerations (section 4.2.7) failed to detect any differences between the outcomes of utilizing an individual versus a group approach to phenomenological participatory design. There were slightly more distinct total design space criteria elicited from participants in the II-ID treatment than from participants in the GI-GD treatment.

4.3.1.3 Breadth. The breadth score for II-ID = 0.982, and for GI-GD = 0.930 (Refer back to section 4.2.9 for breadth score definition). This measure indicates a 98.2% coverage of the codebook by participants in the II-ID treatment, and 93% coverage of the codebook themes by participants in the GI-GD treatment.

4.3.1.4 Summary. More research is needed to sufficiently address RQ3a. As the II-ID treatment performed slightly better than the GI-GD treatment with respect to the total and distinct design criteria elicited, as well as breadth with respect to the codebook, no statistically significant differences between the 2 treatments were detected. A limiting factor for this research question was sample size in this context, as well as lack of literature comparing these two approaches to participatory design. Additionally, only pairs of 2 veterans were utilized in the group setting, which could impact results (as opposed to conducting the group sessions with 3 or more veterans concurrently). Further exploration in this research area is recommended.

4.3.2 RQ3b Results

Research Question 3b asked: Is there a *priming* effect associated with a phenomenological approach to design? In a more practical sense, investigation of this research question addressed the notion of conducting an interview before the design session (II-ID and GI-GD treatments), but only ***analyzing*** the design session output. This could potentially save designers some time and other

resources during the analysis phase of their research, if the interview was deemed necessary to conduct but not necessary to analyze. Serving as the control groups, ID-II and GD-GI treatments are used in the analysis, as participants from those treatments had not yet been exposed to the interview when they completed their design session.

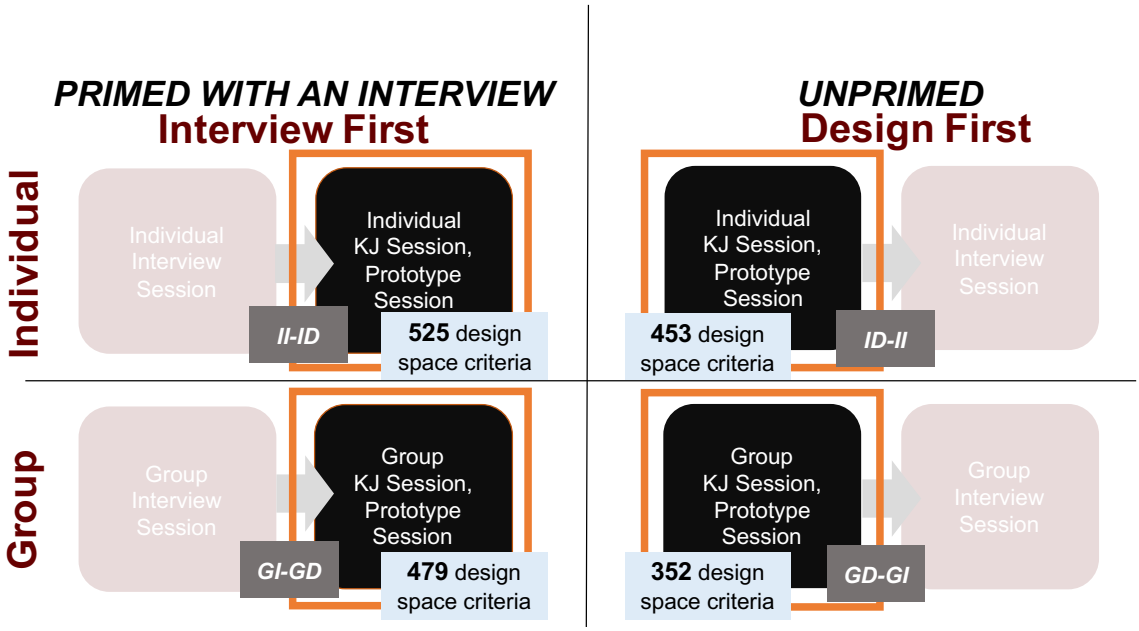

Figure 52. Design space criteria that emerged from boxed sessions were used for RQ3b analysis.

The total quantity of data points used for RQ3b analysis resulting from this modification was 1,809 (compared to the original 6,267). This indicates that of the total 6,267 data points, 4,458 data points were elicited during the interview sessions (71%). As the only data considered to address this research question was obtained during design sessions, adapted annotations were utilized to compare the four approaches for this specific research question:

I-Pr Approach: "Individual Primed", utilized the criteria found from the ***design session only*** from the II-ID treatment.

G-Pr Approach: "Group Primed", utilized the criteria found from the ***design session only*** from the GI-GD treatment.

I-UPr Approach: "Individual Unprimed", utilized the criteria found from the ***design session only*** from the ID-II treatment.

G-UPr Approach: "Group Unprimed", utilized the criteria found from the ***design session only*** from the GD-GI treatment.

The results from comparing primed and unprimed participant output from the individual and group participatory design settings are presented in the following sections.

4.3.2.1 Total Design Space Criteria. The total quantities of all design space criteria (needs, obstacles, context of use considerations) were calculated and compared among the four approaches. An average of 52 total design space criteria were elicited during the I-Pr sessions (*SD* = 27) and 48 total design space criteria on average were elicited in the G-Pr sessions (*SD* = 17). Participants from I-UPr provided 45 total design space criteria on average (*SD* = 23), and participants from G-UPr sessions provided 35 total design space criteria on average (*SD* = 21).

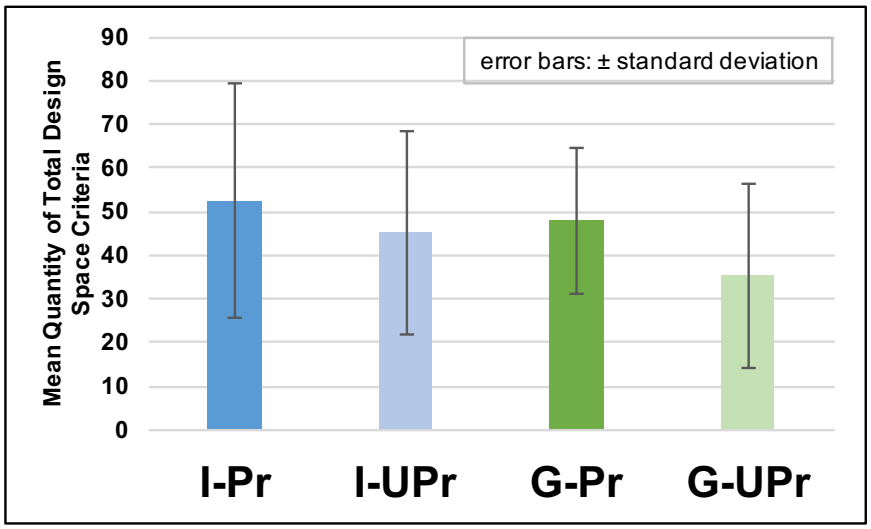

Figure 53. No difference found between primed and unprimed participants with respect to design space criteria provided.

A Kruskal-Wallis test (Appendix C.5.8.1) did not detect a significant difference among approaches.

Additionally, the quantity of *distinct* design space criteria was calculated and compared for each of the four approaches. There were 40 distinct design space criteria collected on average from I-Pr participants (*SD* = 18), and 37 distinct design space criteria collected on average from G-Pr participants (*SD* = 16). For the unprimed participants, 38 distinct design space criteria were collected on average for the I-UPr (*SD* = 19) and 27 distinct design space criteria was collected on average for G-UPr (*SD* = 16) participants.

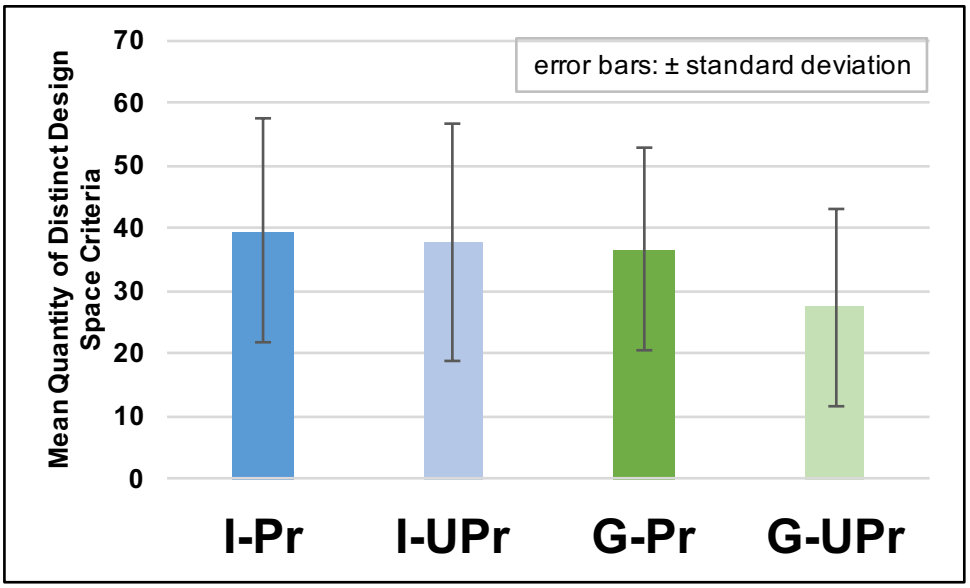

Figure 54. No difference found between primed and unprimed participants with respect to distinct design space criteria provided.

A Kruskal-Wallis test (Appendix C.5.14.1) failed to detect a difference amongst approaches.

4.3.2.2 All Needs. The total quantities of needs (composite of functional needs and non-functional needs) were calculated and compared among the four approaches. For the approaches in which participants were primed, 35 needs were collected on average (*SD* = 16) for the individual primed (I-Pr) approach, while 36 needs were collected on average (*SD* = 7) from participants in the group primed (G-Pr) approach. Needs results for the unprimed participants from I-UPr and G-

UPr treatments were 30 needs (*SD* = 15) and 28 needs (*SD* = 14) on average, respectively.

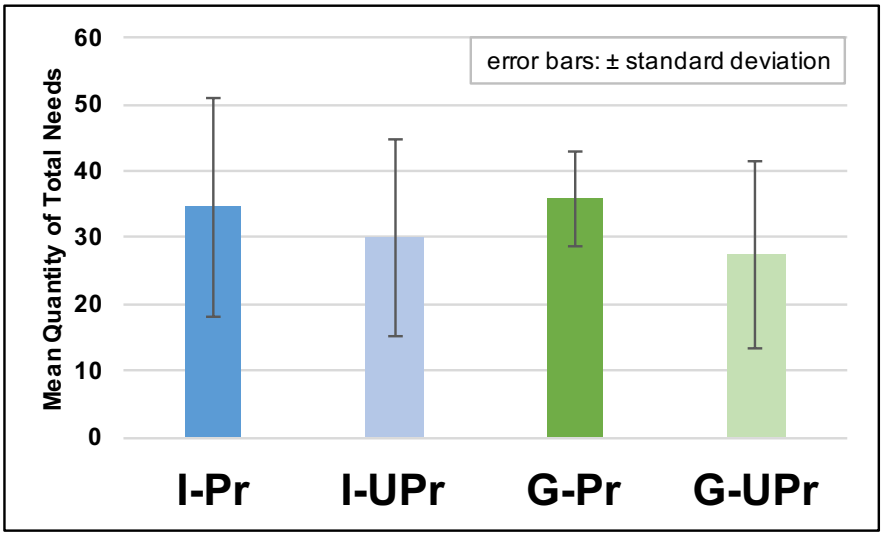

Figure 55. No difference found between primed and unprimed participants with respect to total needs provided.

An ANOVA (Appendix C.5.1.1) failed to detect differences with respect to approach used.

4.3.2.3 Functional Needs. The total quantities of functional needs were calculated and compared among the four approaches. On average, 25 functional needs were calculated for the I-Pr (*SD* = 12) and G-Pr (*SD* = 6) approaches, while 22 functional needs were collected on average from I-UPr participants (SD = 12). G-UPr participants provided 19 functional needs on average (*SD* = 9).

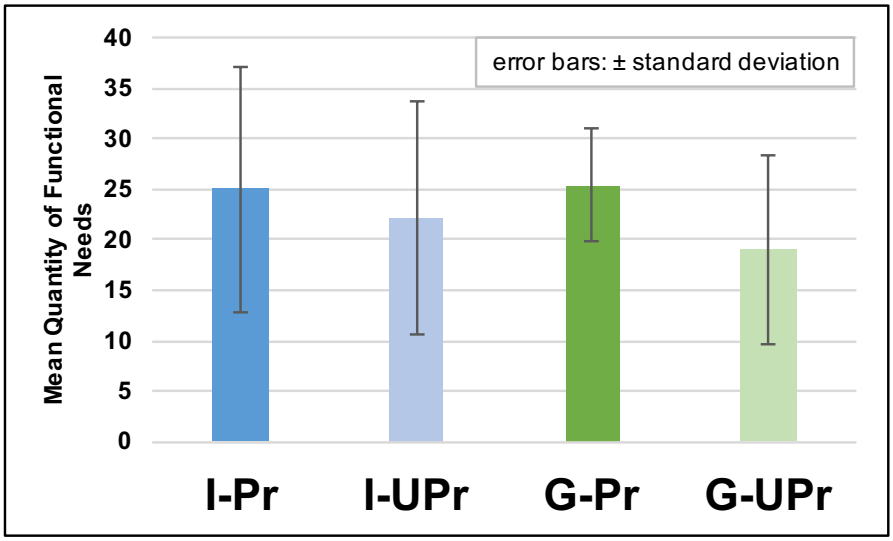

Figure 56. No difference found between primed and unprimed participants with respect to functional needs provided.

An ANOVA (Appendix C.5.2.1) failed to detect any differences with respect to approach used.

Additionally, the quantities of *distinct* functional needs from each participant were calculated and compared for each of the four approaches. In order to calculate distinct functional needs for a participant, repetitions of functional needs were removed from each participant's data set.

For the I-Pr and G-Pr participants, 18 distinct functional needs were collected on average (*SD* = 8 and 6, respectively), and I-UPr participants provided 18 distinct functional needs on average (*SD* = 8). G-UPr participants provided 14 distinct functional needs on average (*SD* = 6).

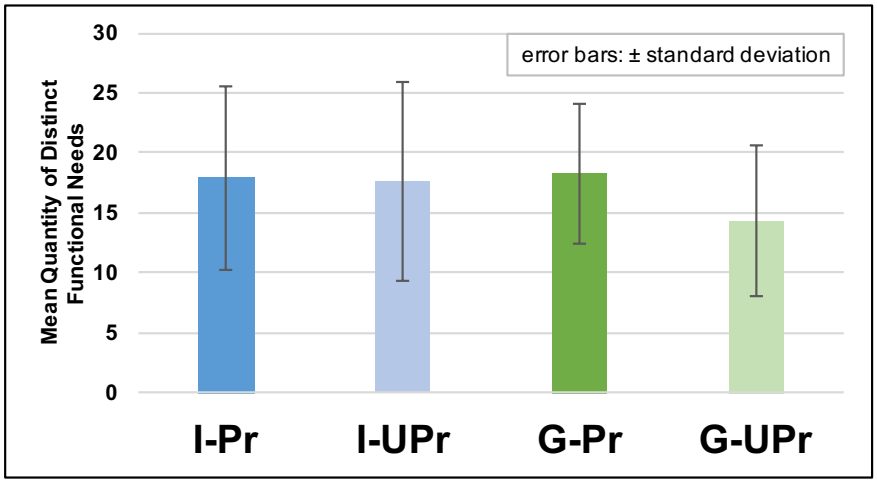

Figure 57. No difference found between primed and unprimed participants with respect to distinct functional needs provided.

The results of an ANOVA (Appendix C.5.9.1) indicated no difference amongst approaches with respect to distinct functional needs elicited.

The findings from analysis of functional needs and distinct functional needs agree those found from analysis of all needs, with respect to no differences detected amongst the four approaches.

4.3.2.4 Nonfunctional Needs. The total quantities of nonfunctional needs were calculated and compared among the four approaches. An average of 10 nonfunctional needs were elicited during the I-Pr sessions (*SD* = 5) and the G-Pr sessions (*SD* = 4). Participants from I-UPr provided 8 nonfunctional needs on average (*SD* = 4), and participants from G-UPr sessions provided 9 nonfunctional needs on average (*SD* = 5).

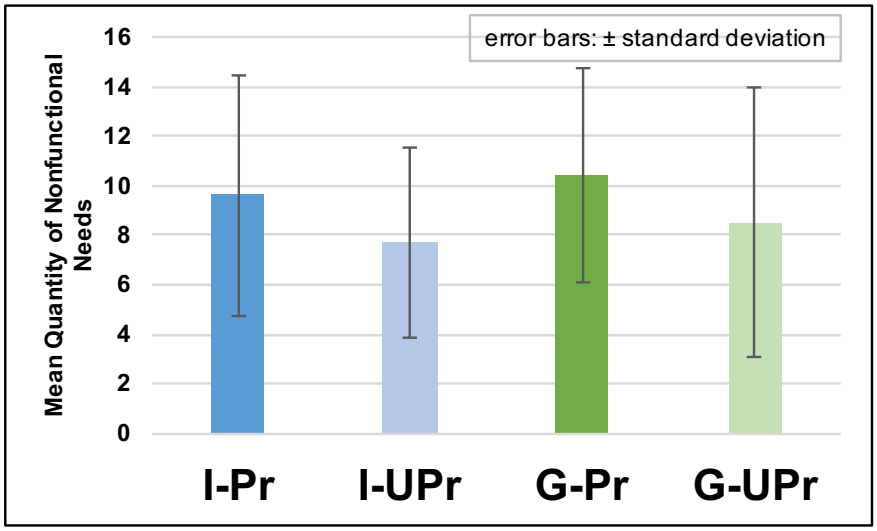

Figure 58. No difference found between primed and unprimed participants with respect to nonfunctional needs provided.

The results of an ANOVA (Appendix C.5.3.1) did not indicate a difference among approaches.

Additionally, the quantity of *distinct* nonfunctional needs were calculated and compared for each of the four approaches. Similarly to distinct functional needs, distinct nonfunctional needs removed repetitions of nonfunctional needs within a participant's data set.

There were 7 distinct nonfunctional needs collected on average from I-Pr participants (*SD* = 3), and 7 distinct nonfunctional needs collected on average from G-Pr participants (*SD* = 2). For the unprimed participants, 6 distinct non-functional needs were collected on average for both the I-UPr (*SD* = 3) and G-UPr (*SD* = 3) participants.

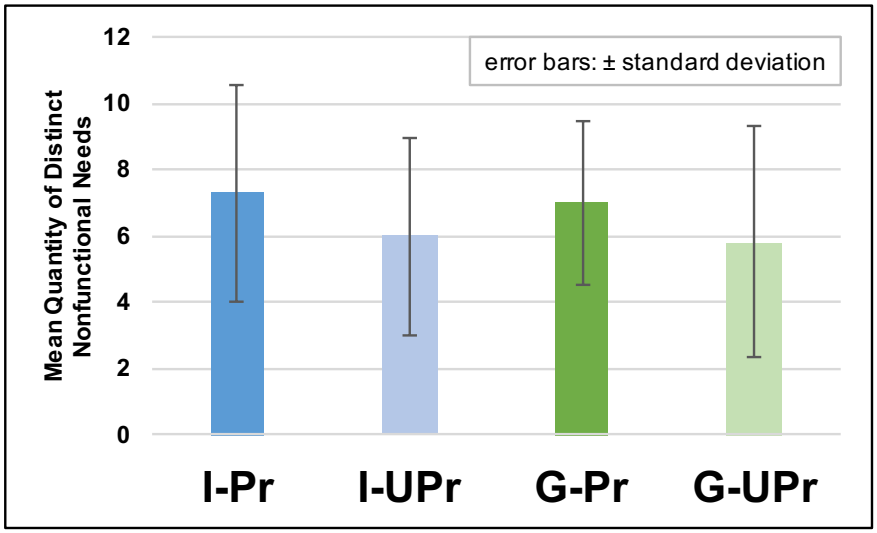

Figure 59. No difference found between primed and unprimed participants with respect to distinct nonfunctional needs provided.

The results of an ANOVA (Appendix C.5.10.1) failed to indicate a difference amongst approaches.

The findings from analysis of nonfunctional needs and distinct nonfunctional needs agree with those found from analysis of all needs, functional needs, and distinct functional needs; no differences were detected amongst the four approaches.

4.3.2.5 Obstacles. The total quantities of obstacles (composite of total barriers and total challenges) were calculated and compared among the four approaches. Participants from the I-Pr sessions contributed 10 obstacles on average (*SD* = 9), and participants from G-Pr session contributed only 3 obstacles on average (*SD* = 4). I-UPr participants contributed 9 obstacles on average (*SD* = 7), while G-UPr participants contributed 4 obstacles on average (*SD* = 6).

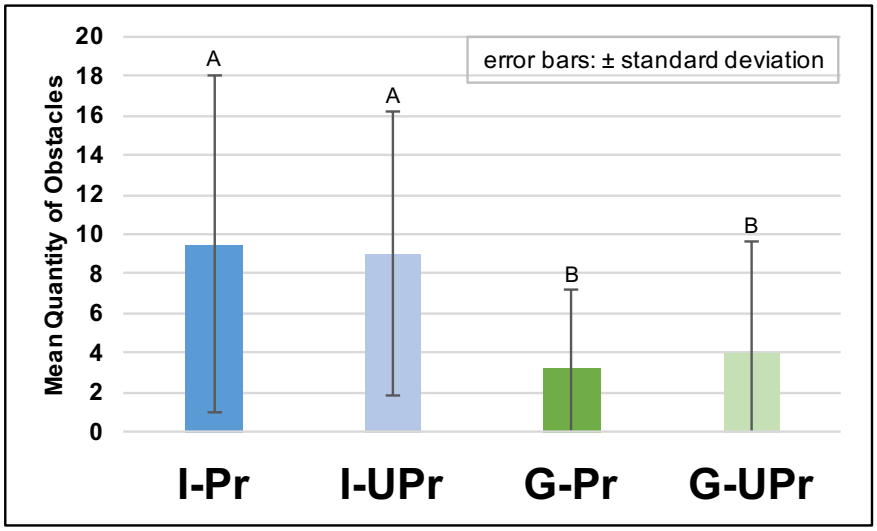

Figure 60. No difference found between primed and unprimed participants with respect to obstacles provided.

The results of a Kruskal-Wallis test (Appendix C.5.4.1) indicated a difference among approaches (p=0.031), and post hoc Mann-Whitney U tests using pairwise comparisons of approaches (Appendix C.5.4.2) indicated differences between each individual setting and each group setting. No differences between primed and unprimed conditions were found.

These findings indicate an effect due to setting on the quantity of obstacles elicited. This may be due to group setting participants being wary of discussing topics with negative connotations. G-UPr participants had not experienced the interview yet, and may not have thought to discuss challenges and barriers in brainstorming the needs for technology during the design session. Of course, I-UPr participants had not experienced the interview session yet either, but disclosed significantly more obstacles. In comparing I-Pr to G-Pr participants, recall these are the same participants from II-ID and GI-GD treatments discussed in section 4.2.4. There were no differences found in quantity of obstacles between II-ID and GI-GD participants, however, when examining results from the *design session only* for these participants, a difference exists. There could be a phenomena causing GI-GD participants to “leave their obstacles in the interview”, while II-ID participants reiterated obstacles from the interview in the design session. It is an interesting result, but not necessarily surprising considering 71%

of design space criteria in this research was elicited during the interview sessions. Focusing on the complete data set from all four original treatments (II-ID, GI-GD, ID-II, GD-GI), and upon examination of obstacles, 2,098 were elicited during the interview sessions, while only 291 were elicited during the design sessions. This discrepancy should be noted, although it does not necessarily explain the resulting differences between the individual and group setting elicitation results with respect to obstacles.

4.3.2.6 Barriers. The total quantities of barriers were calculated and compared among the four approaches. An average of 6 barriers were elicited during the I-Pr sessions (*SD* = 5) and 3 barriers on average were elicited in the G-Pr sessions (*SD* = 4). Participants from I-UPr provided 4 barriers on average (*SD* = 5), and participants from G-UPr sessions provided 2 barriers on average (*SD* = 3).

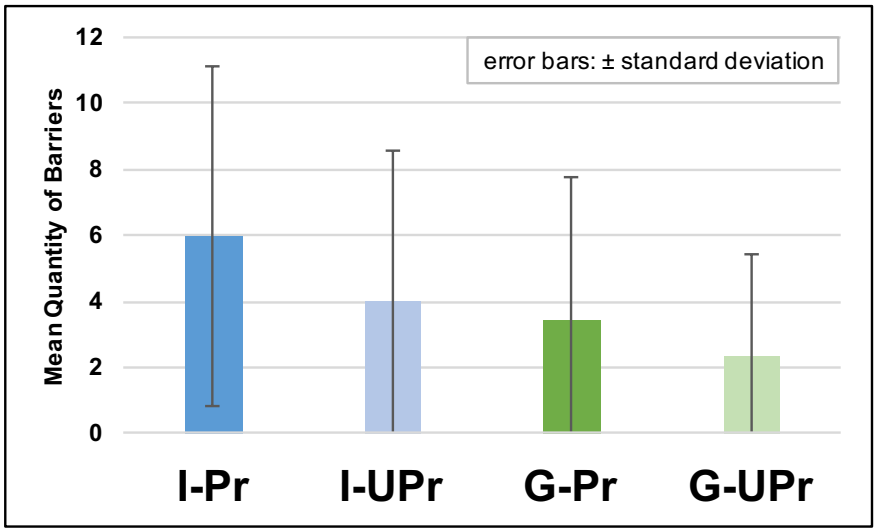

Figure 61. No difference found between primed and unprimed participants with respect to barriers provided.

As was found with obstacles, more barriers were detected in individual settings than in group settings on average. However, a Kruskal-Wallis test (Appendix C.5.5.1) did not detect a significant difference among approaches. The

variance was also remarkably high between participants within each approach, which raises additional questions about comparisons among approaches.

Additionally, the quantity of *distinct* barriers were calculated and compared for each of the four approaches. There were 4 distinct barriers collected on average from I-Pr participants (*SD* = 4), and 3 distinct barriers collected on average from G-Pr participants (*SD* = 4). For the unprimed participants, 4 distinct barriers were collected on average for the I-UPr (*SD* = 4) and 2 distinct barriers on average were collected from G-UPr (*SD* = 3) participants.

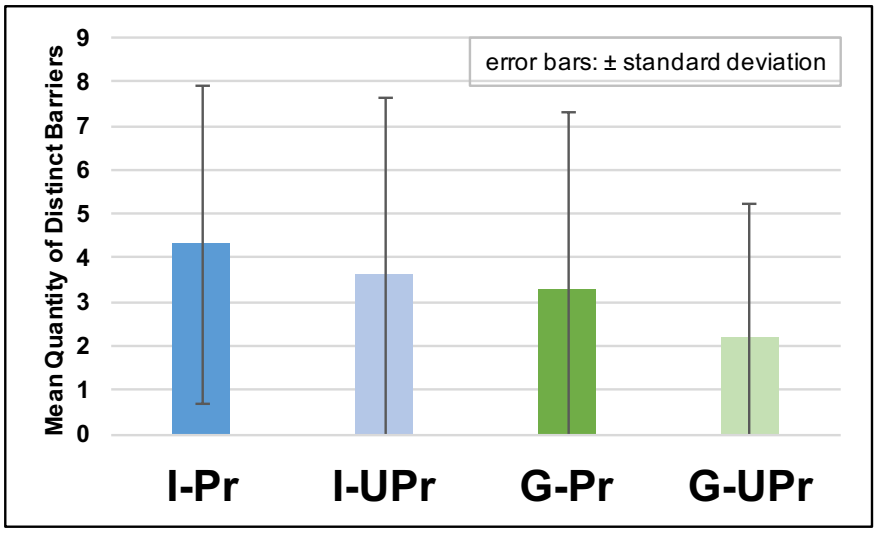

Figure 62. No difference found between primed and unprimed participants with respect to distinct barriers provided.

The results of a Kruskal-Wallis test (Appendix C.5.11.1) failed to indicate a difference amongst approaches. The large variance indicates some participants mentioned a barrier and did not repeat it, whereas other participants mentioned the same barrier repeatedly, rendering their distinct barrier count to be small. Additionally, some participants did not mention any barriers. From I-Pr and G-Pr approaches, 2 participants provided 0 distinct barriers (also 0 total barriers), from I-UPr, 1 participant provided 0 distinct barriers, and from G-UPr, 4 participants provided 0 distinct barriers. As an entire approach was only comprised of 10 participants, nearly half of the G-UPr participants provided 0 barriers in their design session. The lack of emphasis on barriers could be attributed to the design session

question: “Imagine you are designing an app to help veterans with community reintegration. What features or capabilities would this app need?” This question is clearly more need-focused than barrier-focused, and could have impacted the results. Similarly, the wireframing exercise was need-focused. The design session was semi-structured, so it was possible for participants to explore the obstacles (barriers & challenges) realm of the design space, but only if the participant thought of it.

The findings from analysis of barriers and distinct barriers agree with those found from analysis of all needs, functional needs, distinct functional needs, nonfunctional needs, and distinct nonfunctional needs; no differences were detected amongst the four approaches.

4.3.2.7 Challenges. The total quantities of challenges were calculated and compared among the four approaches. An average of 4 challenges were elicited during the I-Pr sessions (*SD* = 4) and 3 challenges on average were elicited in the G-Pr sessions (*SD* = 4). Participants from I-UPr provided 5 challenges on average (*SD* = 3), and participants from G-UPr sessions provided 2 challenges on average (*SD* = 3).

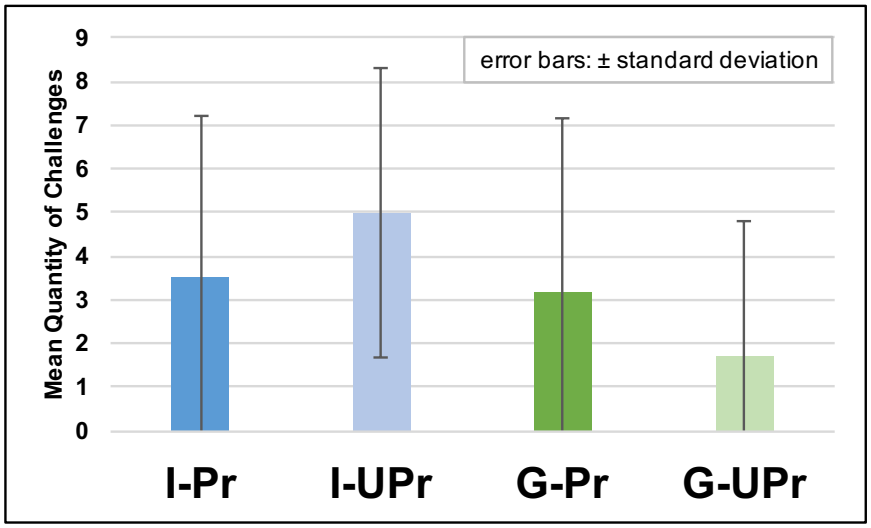

Figure 63. No difference found between primed and unprimed participants with respect to challenges provided.

As was found with obstacles and barriers, more challenges were detected in individual settings than in group settings on average. However, a Kruskal-Wallis test (Appendix C.5.6.1) did not detect a significant difference among approaches. The variance was also remarkably high between participants within each approach, which raises additional questions about comparisons among approaches.

Additionally, the quantity of *distinct* challenges were calculated and compared for each of the four approaches. There were 3 distinct challenges collected on average from I-Pr participants (*SD* = 3), and 3 distinct challenges collected on average from G-Pr participants (*SD* = 3). For the unprimed participants, 4 distinct challenges were collected on average for the I-UPr (*SD* = 3) and 2 distinct challenges were collected on average for G-UPr (*SD* = 3) participants.

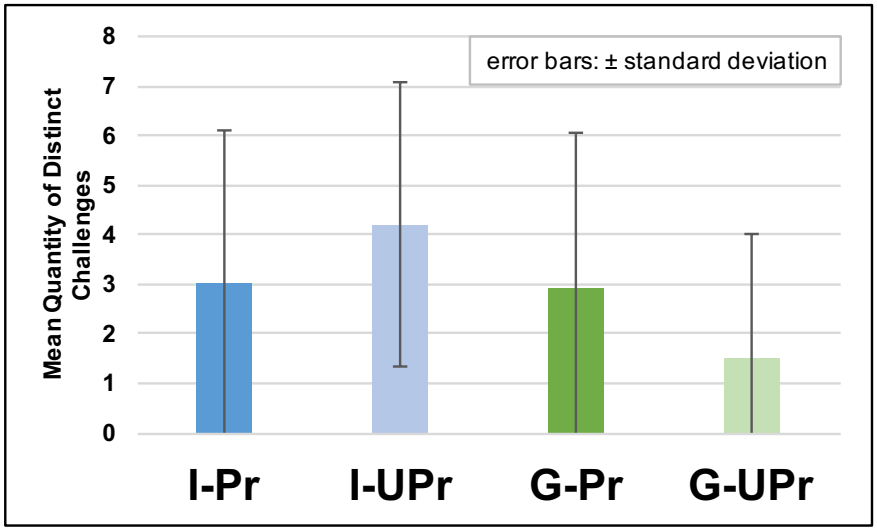

Figure 64. No difference found between primed and unprimed participants with respect to distinct challenges provided.

The results of a Kruskal-Wallis test (Appendix C.5.12.1) failed to detect a difference amongst approaches. The large variance indicates some participants mentioned a challenge and did not repeat it, whereas other participants mentioned the same challenge repeatedly, rendering their distinct challenge count to be small. Additionally, some participants did not mention any challenges. From I-Pr, 2

participants provided 0 distinct challenges (also 0 total challenges), from G-Pr, 4 participants provided 0 distinct challenges (and 0 total challenges), from I-UPr, 1 participant provided 0 distinct challenges, and from G-UPr, 7 participants provided 0 distinct challenges. As an entire approach evaluation was only comprised of 10 participants, over half of the G-UPr participants provided 0 challenges in their design session. The lack of emphasis on challenges could be attributed to the design session question: “Imagine you are designing an app to help veterans with community reintegration. What features or capabilities would this app need?” This question is clearly more need-focused than challenge-focused, and could have impacted the results. Similarly, the wireframing exercise was need-focused. The design session was semi-structured, so it was possible for participants to explore the obstacles (barriers & challenges) realm of the design space, but only if the participant thought of it and mentioned it aloud.

The findings from analysis of challenges and distinct challenges agree with those found from analysis of all needs, functional needs, distinct functional needs, nonfunctional needs, distinct nonfunctional needs, barriers, and distinct barriers; no differences were detected amongst the 4 approaches.

4.3.2.8 Context of Use Considerations. The total quantities of context of use considerations were calculated and compared among the four approaches. An average of 8 context considerations were elicited during the I-Pr sessions (*SD* = 7) and 6 context considerations on average were elicited in the G-Pr sessions (*SD* = 4). Participants from I-UPr provided 6 context considerations on average (*SD* = 5), and participants from G-UPr sessions provided 4 context considerations on average (*SD* = 4).

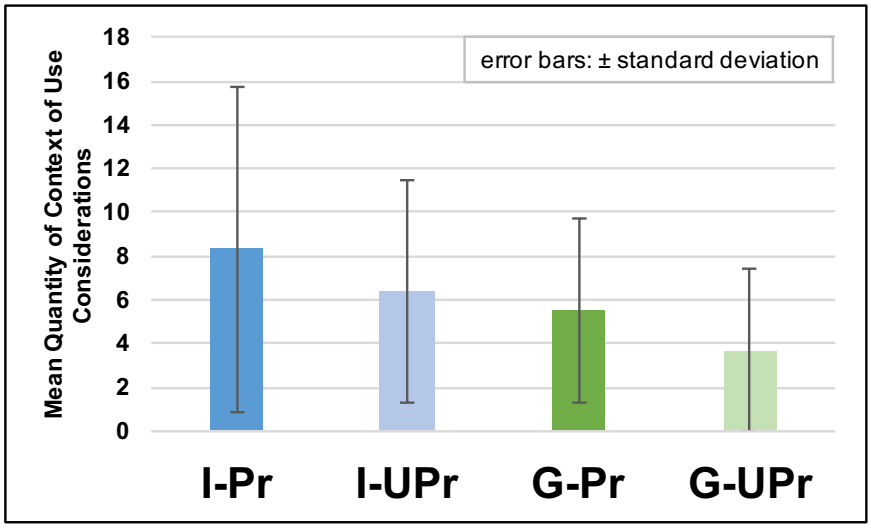

Figure 65. No difference found between primed and unprimed participants with respect to context considerations provided.

A Kruskal-Wallis test (Appendix C.5.7.1) did not detect a significant difference among approaches. The variance was also remarkably high between participants within each approach, which raises additional questions about comparisons among approaches.

Additionally, the quantity of *distinct* context of use considerations were calculated and compared for each of the four approaches. There were 7 distinct context considerations collected on average from I-Pr participants (*SD* = 6), and 5 distinct context considerations collected on average from G-Pr participants (*SD* = 4). For the unprimed participants, 6 distinct context considerations were collected on average for the I-UPr (*SD* = 5) and 4 distinct context considerations was collected on average for G-UPr (*SD* = 3) participants.

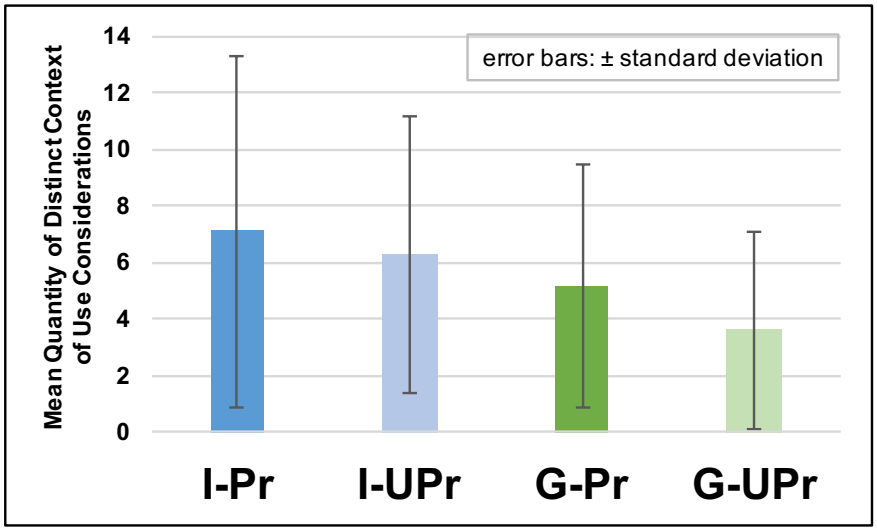

Figure 66. No difference found between primed and unprimed participants with respect to distinct context considerations provided.

A Kruskal-Wallis test (Appendix C.5.13.1) failed to detect a difference amongst approaches.

The findings from analysis of context of use considerations and distinct context of use considerations agree with those found from analysis of all needs, functional needs, distinct functional needs, nonfunctional needs, distinct nonfunctional needs, barriers, distinct barriers, challenges and distinct challenges; no differences were detected amongst the four approaches.

4.3.2.9 Breadth. Recall that there were a total of 57 codebook themes. To calculate breadth for an approach, any instance of zero design space criteria was noted and counted. The formula for breadth, calculated for each approach, was defined as:

$$\boldsymbol{Breadth} = \frac{\boldsymbol{Total\ \#\ of\ Themes} - \sum \boldsymbol{Zero\ criteria\ theme\ instances}}{\boldsymbol{Total\ \#\ of\ Themes}}$$

The breadth score for I-Pr = (57 – 19)/57 = 0.667, for G-Pr = 0.614. For the unprimed participants, the breadth score of I-UPr = 0.702, and G-UPr = 0.491.

Table 30

Examination of criteria from design sessions only indicated poor codebook theme coverage

	Approach			
Theme	I-Pr	G-Pr	I-UPr	G-UPr
1.1				
1.2				
1.3				
1.4				
1.5				
1.6				
1.7				
1.8				
1.9				
1.10				
1.11				
1.12				
1.13				
2.1				
2.2				
2.3				
3.1				
3.2				
3.3				
3.4				
3.5				
4.1				
4.2				
4.3				
4.4				
4.5				
4.6				
4.7				
4.8				
5.1				
5.2				
5.3				
5.4				
5.5				
5.6				
5.7				
5.8				
5.9				
5.10				
5.11				
5.12				
5.13				
5.14				
5.15				
5.16				
5.17				
6.1				
6.2				
6.3				
6.4				
6.5				
6.6				
6.7				
6.8				
6.9				
6.10				
6.11				

Quantity of Design Space Criteria

1-20	
21-40	
41-60	
61-80	
81-100	

The codebook coverage suffered when only criteria elicited during the design sessions were examined. One notable saturation across all 4 approaches was theme 5.15, “Support through interaction with other veterans”, which was discussed much more frequently by participants than all other codebook themes.

4.3.2.10 Summary. This analysis was performed to determine if the interview created a priming effect. The design session-generated design space criteria from all four original treatments were examined. There was no effect detected due to priming participants by having them complete an interview prior to their design session. In comparing the four approaches (I-Pr, G-Pr, I-UPr, and G-UPr), no significant differences in dependent variable measures were found, with the exception of the variable obstacles, a composite of challenges and barriers. However, the difference detected was not due to prime, but was due to setting (individual or group), and individual settings contributed more obstacles on average than those in the group settings. This could be due to the sensitive nature of the subject area, and veterans in group settings may have shied from discussing negative issues in front of other veterans, choosing to focus on needs and context.

The major conclusion that was circuitously addressed by investigation of this research question is that the analysis of the interview is crucial to scoping the design space. In omitting all interview data to investigate this research question, the total design space criteria set was reduced from 6,267 total criteria to 1,809 total criteria. Additionally, comparison of the breadth scores of II-ID (98%), GI-GD (93%), ID-II (98%), and GD-GI (93%), which considered design space criteria elicited from both the interview and design session, to breadth scores of their design session only counterparts of I-Pr (67%), G-Pr (61%), I-UPr (70%), and G-UPr (49%) shows a massive reduction in the coverage of the codebook by the topics the participants discussed. This discrepancy is addressed directly in RQ3c results, discussed in the following section.

4.3.3 RQ3c Results

Research Question 3c posed: What differences exist between a traditional participatory design approach and a phenomenological approach to design? In order to address this question, it was necessary to compare resulting design space criteria from conditions in which a phenomenological design approach was used (the II-ID and GI-GD treatments) to conditions in which a traditional participatory design approach was used (the design sessions from the ID-II and GD-GI treatments). ***All design space criteria elicited during the interview portions of the ID-II and GD-GI treatments were excluded from this analysis, as traditional participatory design does not utilize an interview***. Rather, traditional participatory design champions the involvement of the "representative user" to participate in (strictly) design exercises with the goal of establishing user requirements for a technology.

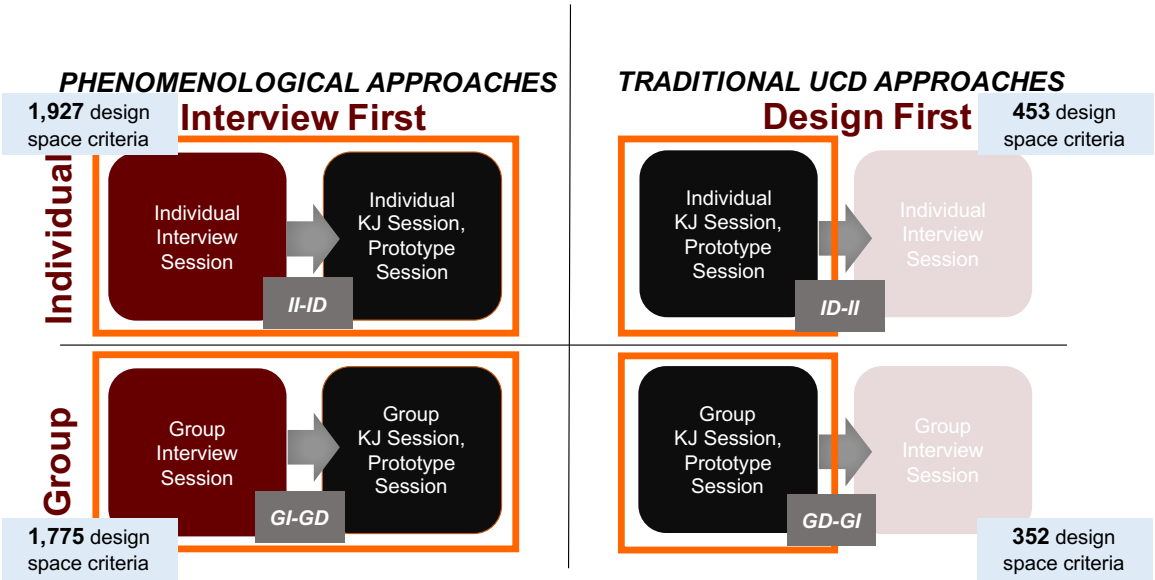

Figure 67. Design space criteria that emerged from boxed sessions were used for RQ3c analysis.

The total quantity of data points used for RQ3c analysis resulting from this modification was 4,507 (compared to the original 6,267). Furthermore, adapted annotations were utilized to compare the four approaches in this research question:

IP Approach: Individual Phenomenological Approach to Participatory Design, identical to II-ID treatment

GP Approach: Group Phenomenological Approach to Participatory Design, identical to GI-GD treatment

IT Approach: Individual Traditional Approach to Participatory Design, utilized the criteria found from the ***design session only*** from ID-II treatment

GT Approach: Group Traditional Approach to Participatory Design, utilized the criteria found from the ***design session only*** from GD-GI treatment

The results from comparing phenomenological and traditional participatory design approaches are presented in the following sections.

4.3.3.1 Total Design Space Criteria. The total quantities of context of use considerations were calculated and compared among the four approaches. For the phenomenological approaches to participatory design, 193 total design space criteria were collected on average from the individual setting (SD = 50) and 178 design space criteria were collected on average from the group setting (SD = 46). An average of only 45 design space criteria (SD = 23) and 35 design space criteria (SD = 21) were elicited from the individual traditional (IT) and group traditional (GT) participatory design approach, respectively.

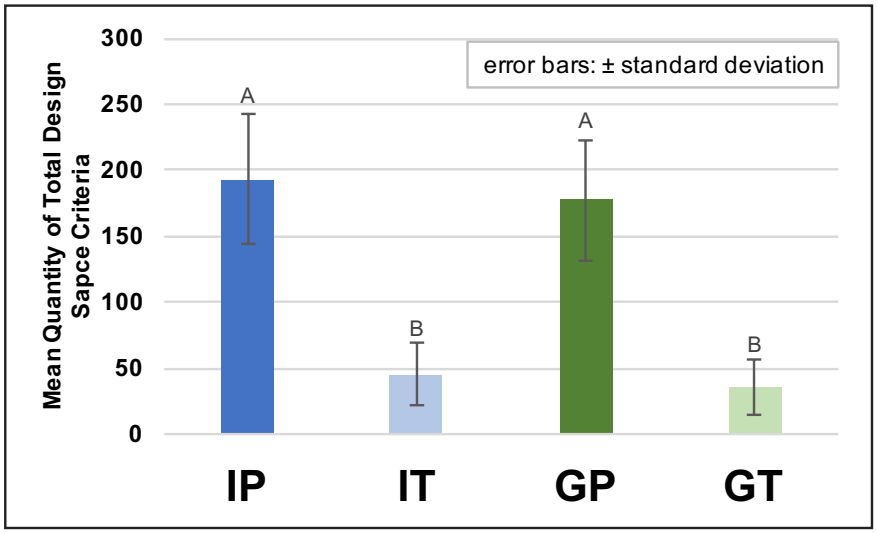

Figure 68. Both individual and group phenomenological approach participants provided significantly more total design space criteria than traditional participatory participants did.

The results of a Kruskal-Wallis test (Appendix C.6.8.1) indicated a difference among approaches ($p = 0.000$), and post hoc Mann-Whitney U tests using pairwise comparisons of approaches (Appendix C.6.8.2) indicated differences between each phenomenological design approach and each traditional participatory design approach. No difference was detected between the individual and group setting of the phenomenological design approach. No difference was detected between the individual and group setting of the traditional design approach.

Additionally, the quantity of *distinct* design space criteria were calculated and compared for each of the four approaches. For the phenomenological approaches to participatory design, 133 distinct design space criteria were collected on average the individual setting (*SD* = 22). In the group setting of the phenomenological approach, 129 distinct design space criteria were collected on average (*SD* = 32). The average number of distinct design space criteria for the traditional participatory design approach was 38 in the individual setting (*SD* = 19) and 27 for the group setting (*SD* = 16).

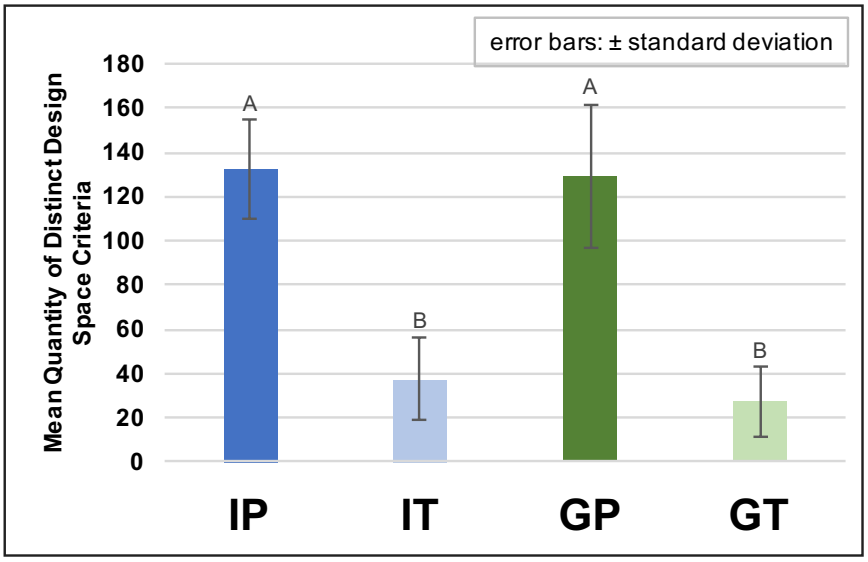

Figure 69. Both individual and group phenomenological approach participants provided significantly more distinct design space criteria than traditional participatory participants did.

The results of a Kruskal-Wallis test (Appendix C.6.14.1) indicated a difference amongst approaches (p = 0.000), and post hoc Mann-Whitney U tests which performed pairwise comparisons of approaches (Appendix C.6.13.2) indicated differences between each phenomenological design approach and each traditional participatory design approach. No difference was detected between the individual and group setting of the phenomenological design approach. No difference was detected between the individual and group setting of the traditional design approach.

4.3.3.2 All Needs. The total quantities of needs (composite of functional needs and non-functional needs) were calculated and compared among the four approaches. For the phenomenological approaches to participatory design, 59 needs were collected on average (*SD* = 20) for the individual phenomenological participatory design (IP) approach, while 56 needs were collected on average (*SD* = 11) from participants in the group phenomenological participatory design (GP) approach. Utilizing only the design session outputs from ID-II and GD-GI participants, 30 needs (*SD* = 15) and 28 needs (*SD* = 14) on average were elicited

from the individual traditional (IT) and group traditional (GT) participatory design approach, respectively.

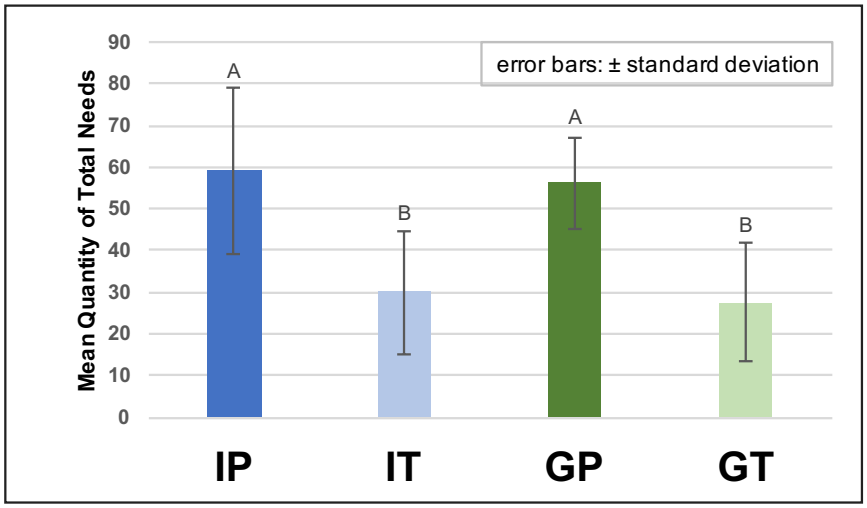

Figure 70. Both individual and group phenomenological approach participants provided significantly more total needs than traditional participatory participants did.

The results of an ANOVA (Appendix C.6.1.1) indicated a difference with respect to the Phenomenological or Traditional approach used (p=0.000), and post hoc Fisher LSD analysis (Appendix C.6.1.2) indicated differences between each phenomenological design approach and each traditional participatory design approach. No difference was detected between the individual and group settings of the phenomenological design approach. No difference was detected between the individual and group settings of the traditional design approach.

4.3.3.3 Functional Needs. The total quantities of functional needs were calculated and compared among the four approaches. For the phenomenological approaches to participatory design, 44 functional needs were collected on average (*SD* = 15) for the individual phenomenological participatory design (IP) approach, while 41 functional needs were collected on average (*SD* = 7) from participants in the group phenomenological participatory design (GP) approach. Utilizing only the design session outputs from ID-II and GD-GI participants, 22 functional needs (*SD* = 12)

from the individual traditional (IT) approach and 19 functional needs (*SD* = 9) from the group traditional (GT) participatory design approach.

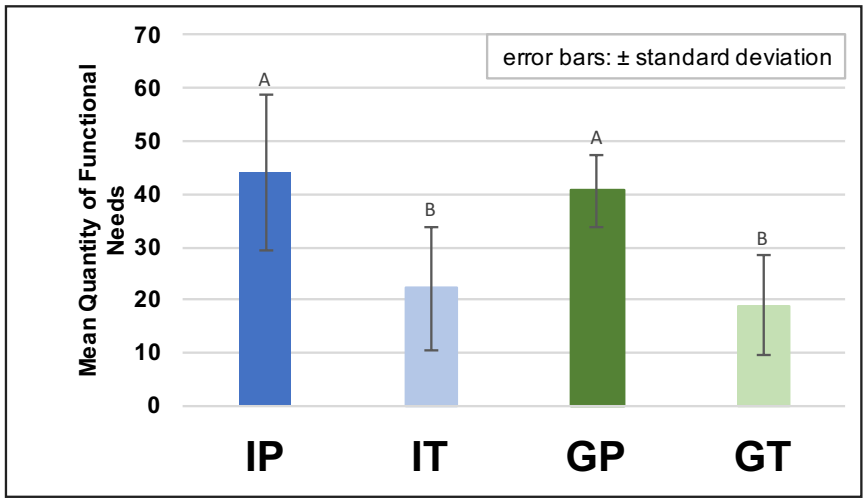

Figure 71. Both individual and group phenomenological approach participants provided significantly more functional needs than traditional participatory participants did.

The results of an ANOVA (Appendix C.6.2.1) indicated a difference with respect to approach used (p=0.000), and post hoc Fisher LSD analysis (Appendix C.6.2.2) indicated differences between each phenomenological design approach and each traditional participatory design approach. No difference was detected between the individual and group setting of the phenomenological design approach. No difference was detected between the individual and group setting of the traditional design approach.

Additionally, the quantities of *distinct* functional needs from each participant were calculated and compared for each of the four approaches. In order to calculate distinct functional needs for a participant, repetitions of functional needs were removed from each participant's data set.

For the phenomenological approaches to participatory design, 29 distinct functional needs were collected on average (*SD* = 9) for the individual phenomenological participatory design (IP) approach, while 28 distinct functional needs were collected on average (*SD* = 5) from participants in the group phenomenological participatory design (GP) approach. However, 18 distinct

functional needs (*SD* = 8) and 14 distinct functional needs (*SD* = 6) on average were elicited from the individual traditional (IT) and group traditional (GT) participatory design approach, respectively.

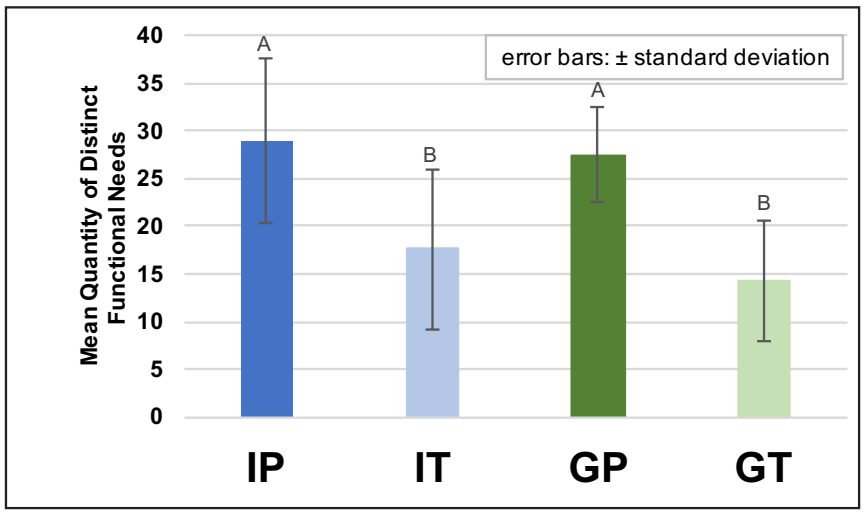

Figure 72. Both individual and group phenomenological approach participants provided significantly more distinct functional needs than traditional participatory participants did.

The results of a Kruskal-Wallis test (Appendix C.6.9.1) indicated a difference amongst approaches with respect to distinct functional needs elicited (p=0.000), and post hoc Mann-Whitney U tests which performed pairwise comparisons of approaches (Appendix C.6.9.2) indicated differences between each phenomenological design approach and each traditional participatory design approach. No difference was detected between the individual and group settings of the phenomenological design approach. No difference was detected between the individual and group settings of the traditional design approach.

The findings from analysis of functional needs and distinct functional needs mirror those found from analysis of all needs, with respect to the differences found between a traditional and phenomenological approach, irrespective of individual or group setting.

4.3.3.4 Nonfunctional Needs. The total quantities of nonfunctional needs were calculated and compared among the four approaches. For the phenomenological approaches to participatory design, 15 nonfunctional needs were collected on average (*SD* = 6) for the individual phenomenological participatory design (IP) approach, while 16 nonfunctional needs were collected on average (*SD* = 8) from participants in the group phenomenological participatory design (GP) approach. Utilizing only the design session outputs from ID-II and GD-GI participants, 8 nonfunctional needs (*SD* = 4) and 9 nonfunctional needs (*SD* = 5) on average were elicited from the individual traditional (IT) and group traditional (GT) participatory design approach, respectively.

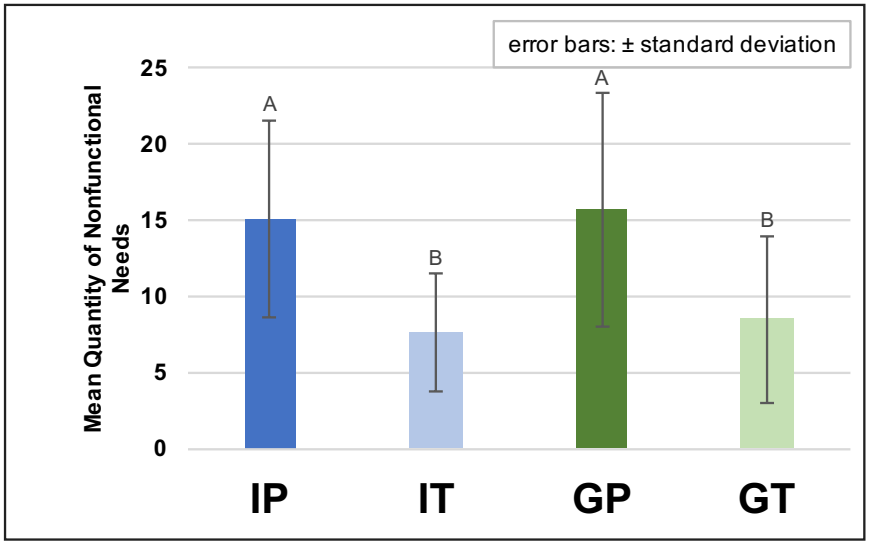

Figure 73. Both individual and group phenomenological approach participants provided significantly more nonfunctional needs than traditional participatory participants did.

The results of a Kruskal-Wallis test (Appendix C.6.3.1) indicated a difference among approaches (p=0.005), and post hoc Mann-Whitney U tests using pairwise comparisons of approaches (Appendix C.6.3.2) indicated differences between each phenomenological design approach and each traditional participatory design approach. No difference was detected between the individual and group setting of

the phenomenological design approach. No difference was detected between the individual and group setting of the traditional design approach.

Additionally, the quantity of *distinct* nonfunctional needs were calculated and compared for each of the four approaches. Similarly to distinct functional needs, distinct nonfunctional needs removed repetitions of nonfunctional needs within a participant's data set.

For the phenomenological approaches to participatory design, 11 distinct nonfunctional needs were collected on average (*SD* = 5) for the individual phenomenological participatory design (IP) approach, while 10 distinct nonfunctional needs were collected on average (*SD* = 4) from participants in the group phenomenological participatory design (GP) approach. Utilizing only the design session outputs from ID-II and GD-GI participants, 6 distinct nonfunctional needs (*SD* = 3) and 6 distinct nonfunctional needs (*SD* = 3) on average were elicited from the individual traditional (IT) and group traditional (GT) participatory design approach, respectively.

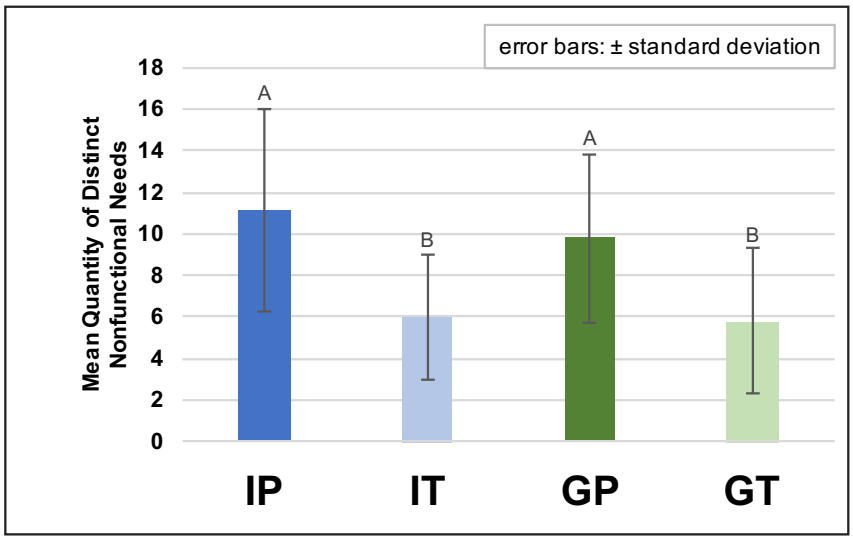

Figure 74. Both individual and group phenomenological approach participants provided significantly more distinct nonfunctional needs than traditional participatory participants did.

The results of a Kruskal-Wallis test (Appendix C.6.10.1) indicated a difference amongst approaches (p=0.008), and post hoc Mann-Whitney U tests which

performed pairwise comparisons of approaches (Appendix C.6.10.2) indicated differences between each phenomenological design approach and each traditional participatory design approach. No difference was detected between the individual and group setting of the phenomenological design approach. No difference was detected between the individual and group setting of the traditional design approach.

The findings from analysis of nonfunctional needs and distinct nonfunctional needs mirror those found from analysis of all needs, functional needs, and distinct functional needs; with respect to the differences found between a traditional and phenomenological approach, irrespective of individual or group setting.

4.3.3.5 Obstacles. The total quantities of obstacles (composite of total barriers and total challenges) were calculated and compared among the four approaches. For the phenomenological approaches to participatory design, 76 obstacles were collected on average (*SD* = 24) for the individual phenomenological participatory design (IP) approach, while 72 obstacles were collected on average (*SD* = 37) from participants in the group phenomenological participatory design (GP) approach. Utilizing only the design session outputs from ID-II and GD-GI participants, 9 obstacles (*SD* = 7) and 4 obstacles (*SD* = 6) on average were elicited from the individual traditional (IT) and group traditional (GT) participatory design approach, respectively.

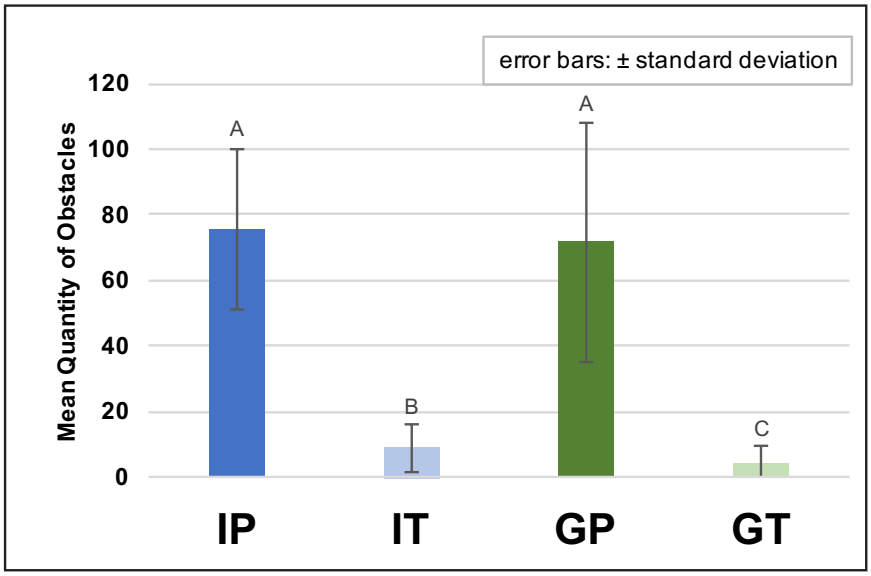

Figure 75. Both individual and group phenomenological approach participants provided significantly more obstacles than traditional participatory participants did.

The results of a Kruskal-Wallis test (Appendix C.6.4.1) indicated a difference among approaches (p=0.000), and post hoc Mann-Whitney U tests using pairwise comparisons of approaches (Appendix C.6.4.2) indicated differences between each phenomenological design approach and each traditional participatory design approach. Additionally, a difference was detected between the individual and group setting of the traditional design approach. No difference was detected between the individual and group setting of the phenomenological design approach.

The findings from analysis of obstacles agree with those found from analysis of previous variables in this section; with respect to the differences found between a traditional and phenomenological approach. Unlike analysis results of previous variables, a difference in obstacles was detected between the individual and group setting of the traditional approach.

4.3.3.6 Barriers. The total quantities of barriers were calculated and compared among the four approaches. For the phenomenological approaches to participatory design, 40 barriers were collected on average for both the individual (*SD* = 14) and group (*SD* = 22) settings of phenomenological participatory design

approach. An average of 4 barriers (*SD* = 5) and 2 barriers (*SD* = 3) were elicited from the individual traditional (IT) and group traditional (GT) participatory design approach, respectively.

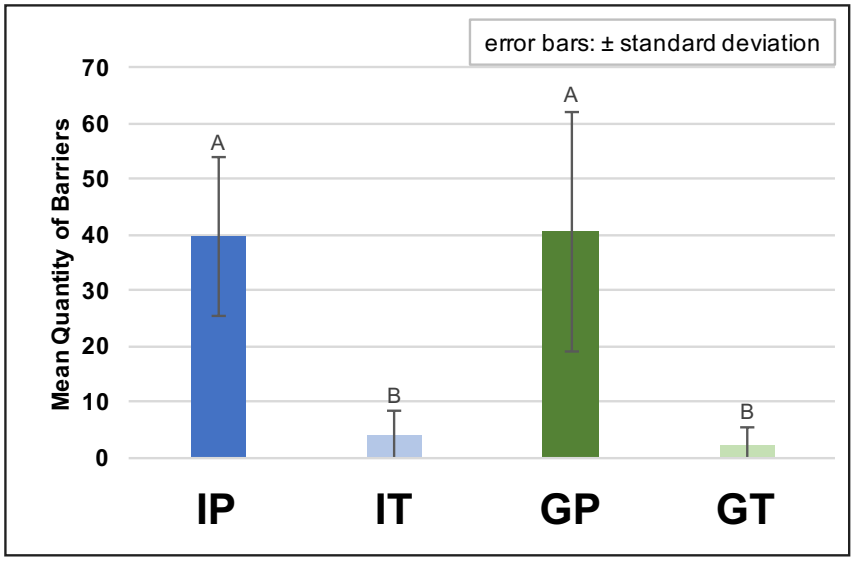

Figure 76. Both individual and group phenomenological approach participants provided significantly more barriers than traditional participatory participants did.

The results of a Kruskal-Wallis test (Appendix C.6.5.1) indicated a difference among approaches (*p*=0.000), and post hoc Mann-Whitney U tests using pairwise comparisons of approaches (Appendix C.6.5.2) indicated differences between each phenomenological design approach and each traditional participatory design approach. No difference was detected between the individual and group setting of the phenomenological design approach. No difference was detected between the individual and group setting of the traditional design approach.

Additionally, the quantity of *distinct* barriers was calculated and compared for each of the four approaches. For the phenomenological approaches to participatory design, 25 distinct barriers were collected on average for both the individual (*SD* = 6) and group (*SD* = 11) setting. The average number of distinct barriers for the traditional participatory design approach was 4 in the individual setting (*SD* = 4) and 2 for in the group setting (*SD* = 3).

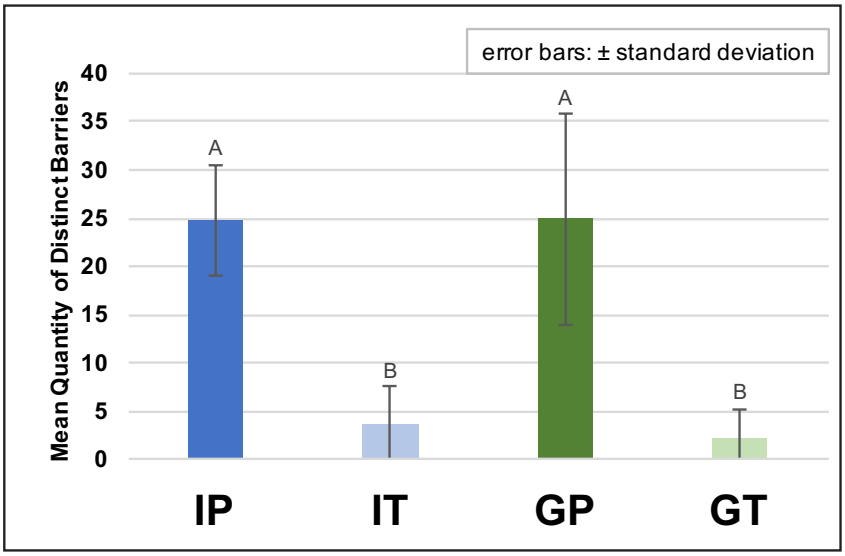

Figure 77. Both individual and group phenomenological approach participants provided significantly more distinct barriers than traditional participatory participants did.

The results of a Kruskal-Wallis test (Appendix C.6.11.1) indicated a difference amongst approaches (p=0.000), and post hoc Mann-Whitney U tests which performed pairwise comparisons of approaches (Appendix C.6.11.2) indicated differences between each phenomenological design approach and each traditional participatory design approach. No difference was detected between the individual and group setting of the phenomenological design approach. No difference was detected between the individual and group setting of the traditional design approach.

The findings from this analysis reflect the general consensus reached from analysis of previous variables in this section: there are differences in results found after utilizing a traditional or phenomenological approach to participatory design, irrespective of individual or group setting. A notable exception was found with the variable obstacles, as a difference was indicated between the individual and group setting of the traditional participatory design approach.

4.3.3.7 Challenges. The total quantities of identified challenges were calculated and compared among the four approaches. For the phenomenological approaches to participatory design, 36 challenges were collected on average in

the individual setting (*SD* = 13) and 31 challenges were collected on average in the group setting (*SD* = 15). An average of 5 challenges (*SD* = 3) and 2 challenges (*SD* = 3) were elicited from the individual traditional (IT) and group traditional (GT) participatory design approach, respectively.

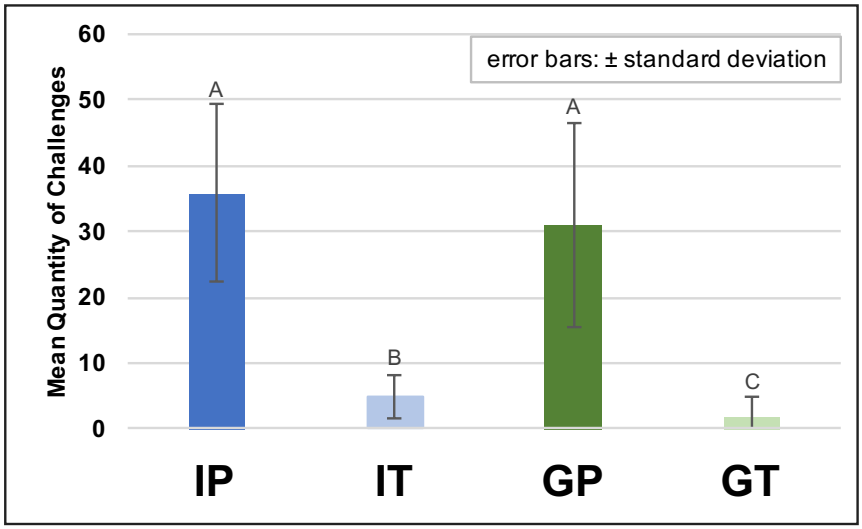

Figure 78. Both individual and group phenomenological approach participants provided significantly more challenges than traditional participatory participants did.

The results of a Kruskal-Wallis test (Appendix C.6.6.1) indicated a difference among approaches ($p = 0.000$), and post hoc Mann-Whitney U tests using pairwise comparisons of approaches (Appendix C.6.6.2) indicated differences between each phenomenological design approach and each traditional participatory design approach. Also, a difference was detected between the individual and group setting of the traditional design approach. No difference was detected between the individual and group setting of the phenomenological design approach. These findings reflect similar findings of analysis of the obstacles.

Additionally, the quantities of *distinct* challenges were calculated and compared for each of the four approaches. For the phenomenological approaches to participatory design, 25 distinct challenges were collected on average for both the individual (*SD* = 8) and group (*SD* = 12) setting. The average number of

distinct challenges for the traditional participatory design approach was 4 in the individual setting (*SD* = 3) and 2 in the group setting (*SD* = 3).

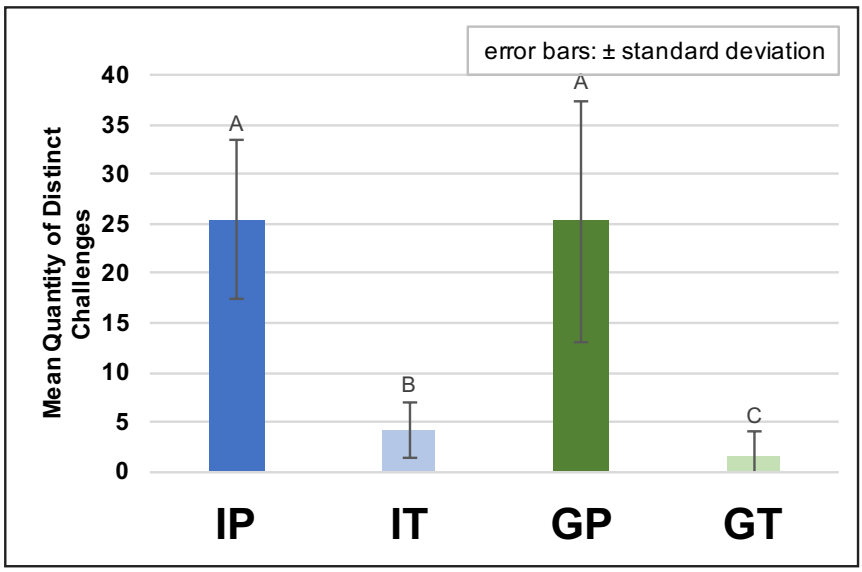

Figure 79. Both individual and group phenomenological approach participants provided significantly more distinct challenges than traditional participatory participants did.

The results of a Kruskal-Wallis test (Appendix C.6.12.1) indicated a difference amongst approaches (p = 0.000), and post hoc Mann-Whitney U tests which performed pairwise comparisons of approaches (Appendix C.6.12.2) indicated differences between each phenomenological design approach and each traditional participatory design approach. Also, a difference was detected between the individual and group setting of the traditional design approach. No difference was detected between the individual and group setting of the phenomenological design approach.

The findings from this analysis reflect the general consensus reached from analysis of previous variables in this section: there are differences in results found after utilizing a traditional or phenomenological approach to participatory design. Additionally (and similarly to obstacles results), a difference was indicated between the individual and group setting of the traditional participatory design approach.

4.3.3.8 Context of Use Considerations. The total quantities of context of use considerations were calculated and compared among the four approaches. For the phenomenological approaches to participatory design, 58 context of use considerations were collected on average from the individual setting (*SD* = 20) and 50 context of use considerations were collected on average from the group setting (*SD* = 10). An average of 6 context of use considerations (*SD* = 5) and 4 context of use considerations (*SD* = 4) were elicited from the individual traditional (IT) and group traditional (GT) participatory design approach, respectively.

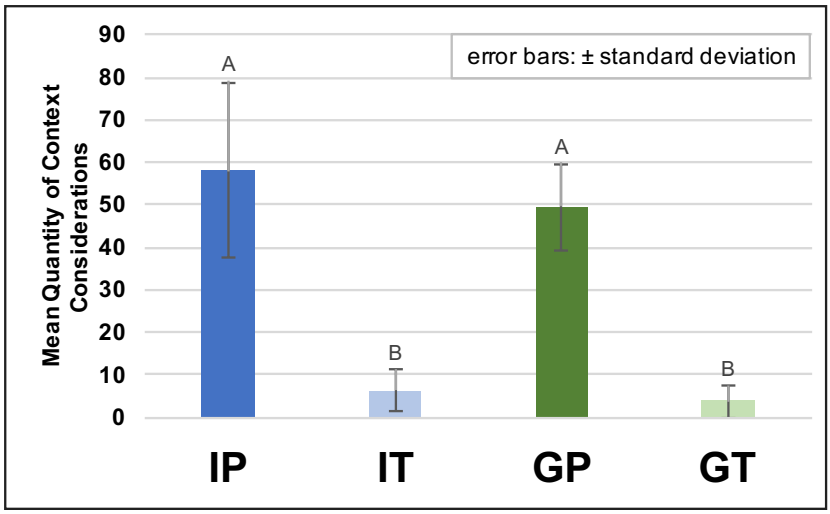

Figure 80. Both individual and group phenomenological approach participants provided significantly more context considerations than traditional participatory participants did.

The results of a Kruskal-Wallis test (Appendix C.6.7.1) indicated a difference among approaches ($p = 0.000$), and post hoc Mann-Whitney U tests using pairwise comparisons of approaches (Appendix C.6.7.2) indicated differences between each phenomenological design approach and each traditional participatory design approach. No difference was detected between the individual and group setting of the phenomenological design approach. No difference was detected between the individual and group setting of the traditional design approach.

Additionally, the quantity of *distinct* context of use considerations were calculated and compared for each of the four approaches. For the

phenomenological approaches to participatory design, 42 distinct context of use considerations were collected on average the individual setting (*SD* = 11). In the group setting of the phenomenological approach, 42 distinct context of use considerations were collected (*SD* = 9). The average number of distinct context of use considerations for the traditional participatory design approach was 6 in the individual setting (*SD* = 5) and 4 for in the group setting (*SD* = 3).

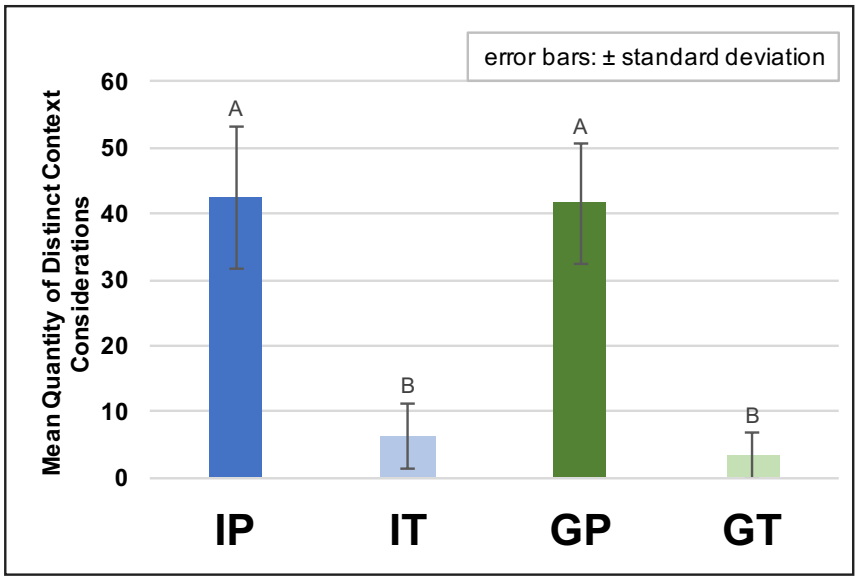

Figure 81. Both individual and group phenomenological approach participants provided significantly more distinct context considerations than traditional participatory participants did.

The results of a Kruskal-Wallis test (Appendix C.6.13.1) indicated a difference amongst approaches (p = 0.000), and post hoc Mann-Whitney U tests which performed pairwise comparisons of approaches (Appendix C.6.13.2) indicated differences between each phenomenological design approach and each traditional participatory design approach. No difference was detected between the individual and group setting of the phenomenological design approach. No difference was detected between the individual and group setting of the traditional design approach.

The findings from this analysis reflect the general consensus reached from analysis of previous variables in this section: there are differences in results found

after utilizing a traditional or phenomenological approach to participatory design, irrespective of individual or group setting. A notable exception was found with the variables obstacles, challenges, and distinct challenges as a difference was indicated between the individual and group setting of the traditional participatory design approach.

4.3.3.9 Breadth. While analysis of the variables which measured the distinct quantities of their respective design space criterion offer some insight on design space coverage, an additional metric was utilized. Breadth inspected the data set of each approach with respect to the codebook. Furthermore, breadth is expressed in terms of a fraction to indicate how many codebook themes were recognized in the data set of the approach. If all codebook themes were utilized in the coding of the data set of an examined approach, the breadth score of that approach is 1.

Table 31

Participants from phenomenological sessions provided superior codebook theme coverage to traditional sessions participants

Theme	IP	GP	IT	GT
1.1				
1.2				
1.3				
1.4				
1.5				
1.6				
1.7				
1.8				
1.9				
1.10				
1.11				
1.12				
1.13				
2.1				
2.2				
2.3				
3.1				
3.2				
3.3				
3.4				
3.5				
4.1				
4.2				
4.3				
4.4				
4.5				
4.6				
4.7				
4.8				
5.1				
5.2				
5.3				
5.4				
5.5				
5.6				
5.7				
5.8				
5.9				
5.10				
5.11				
5.12				
5.13				
5.14				
5.15				
5.16				
5.17				
6.1				
6.2				
6.3				
6.4				
6.5				
6.6				
6.7				
6.8				
6.9				
6.10				
6.11				

Quantity of Design Space Criteria

1-20	
21-40	
41-60	
61-80	
81-100	
>100	

From inspection of the table, there were a total of 57 codebook themes. To calculate breadth for an approach, any instance of zero design space criteria was noted and counted. The formula for breadth, calculated for each approach, was defined as:

$$\boldsymbol{Breadth} = \frac{\boldsymbol{Total\ \#\ of\ Themes} - \sum \boldsymbol{Zero\ criteria\ theme\ instances}}{\boldsymbol{Total\ \#\ of\ Themes}}$$

The breadth score for IP = (57 – 1)/57 = 0.982, for GP = 0.930. For the traditional approaches to participatory design, the breadth score of IT = 0.702, and GT = 0.491.

While this breadth score offers no explanations for stark differences in saturations of a theme across approaches (for example, in theme 5.1, IP=124 criteria, GP=129 criteria, IT=12 criteria, GT=3 criteria), it does provide a quantifiable measure of codebook coverage for an approach, which permits interpretations about the various topics and categories that were discussed by participants in those approaches. The IP and GP provided good coverage of the codebook, with a 98% and 93% coverage, respectively, of the codebook topics. However, the IT approach coverage (70%) and the GT approach (only 49%) didn't elicit enough scope of information to provide a designer the most insight into the myriad of major issues and lived experiences disclosed by the overall veteran population queried in this research effort.

4.4 Discussion

The analysis performed in Chapter 4 addressed differences in elicitation methods as measured by the breadth and depth of design criteria that was elicited from participants. Perhaps the most compelling result of this investigation: ***the interview about the user's lived experience is both useful and provides a more comprehensive quantity and breadth criteria to inform a designer's understanding of the design space.*** Designers must not assume an ideal representative user is also an ideal user interface designer. Simultaneously, designers must not assume they know everything about a user population to design technologies without their input. Perhaps the approach of traditional participatory design (demonstrated by the analysis of the design sessions of ID-II and GD-GI treatments, otherwise known as the IT and GT approaches), i.e., looking at a problem through a technology lens, is too constraining for representative users to provide a rich breadth and depth of contribution. This is a ***defining characteristic of phenomenological interviews: a deviation from technology-centered design thinking to experience-based storytelling and conveying lived experiences.*** In the interview, questions were formulated to query participants about their personal experiences, which was effective in eliciting information that informed the design space. These questions were worded to elicit information about the user's needs, obstacles, and context, but were not technology-centric in their verbiage. Once two cycles of coding had been completed to convert participant verbatim excerpts into design space criteria, 71% of these criteria emerged from interview sessions, in which technology was not discussed. Although it was outside the scope of this research, future research could explore the utility of a stand-alone interview without a traditional participatory design session.

The design space criteria procured from the second-cycle thematic analysis also informed the creation of two representative personas. The current perception of persona use by designers is somewhat mixed, a major concern repetitively expressed is that personas are not always created from real data, or, if they are, they are created by "piecing together" several attributes of users to make this

representative user that isn't truly a representative persona. To guard against this "Frankenstein's monster" persona methodology, an algorithm called the situated data modeling algorithm was utilized to determine sets of criteria shared by two or more participants. Two distinct sets were selected, who had 4 participants each in common. In order to ensure the persona represented a real person, one representative participant was chosen for each set, and the persona was populated by referencing the original transcript lines that contained the identified criteria. Future research exploration could focus on evaluation of these personas, especially when compared to personas generated using current best practices. Additionally, the personas generated using SDM utilized a set of the *unique* design space criteria from a participant. In future research, repetitions of criteria could be included in a participant's data set and serve as an additional dimension for cross-comparison and grouping of participants.

Analysis results contained in this chapter provide many useful insights for designers. First, the design space criteria of the needs, obstacles, and context of use considerations for the young male veteran population as they reintegrate into society emerged from second-cycle coding analysis and were compiled (Appendix C.2) using grammar rules and linguistic structure to analyze and code the meaning units found from examining participant transcripts. Aside from the fascinating design space criteria that was elicited, several elicitation methods and combinations of elicitation methods were investigated in order to determine which were optimal for eliciting design space criteria. All elicitation methods examined from RQ2, RQ3a, RQ3b, and RQ3c were related to the original four methods employed during the elicitation phase. These relationships are presented for clarity in Figure 82 (RQ2), Figure 83 (RQ3a), Figure 84 (RQ3b), and Figure 85 (RQ3c), and the elicitation method acronyms are redefined for convenience:

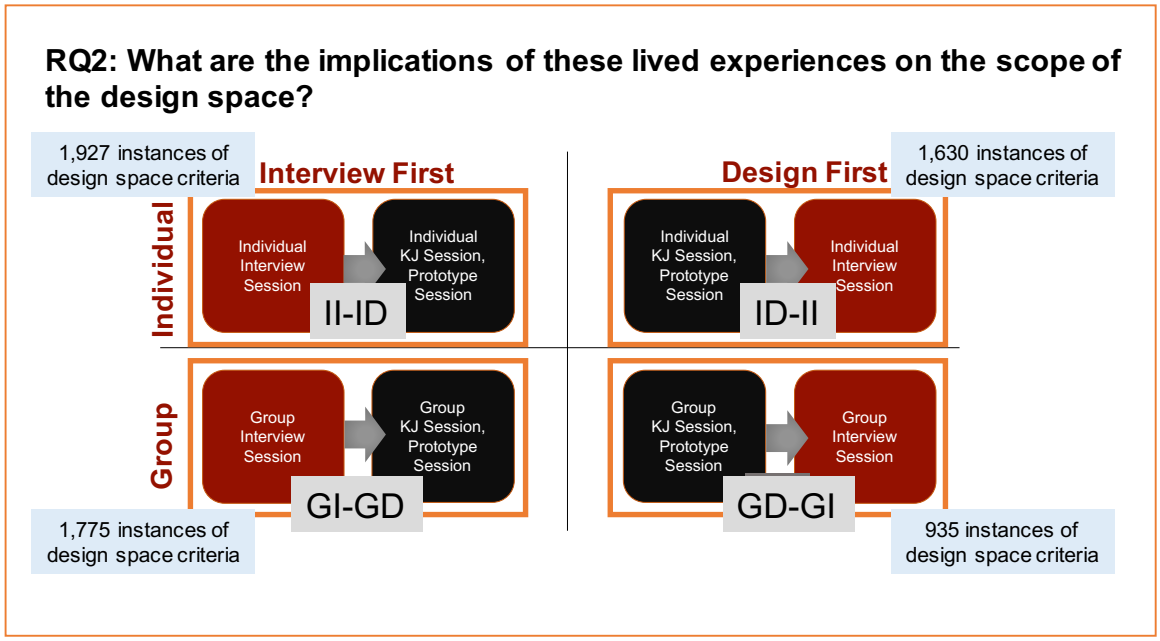

Figure 82. In order to address RQ2, all of the sessions were analyzed to discover over 6,200 design space criteria. After removing repetitions of criteria, over 1,500 distinct criteria were found to describe the needs, obstacles, and context of use considerations of military veterans as they reintegrate into civilian society.

The elicitation methods examined in RQ2:

Treatment II-ID: Individual setting, interview session first + design session second

Treatment GI-GD: Group setting, interview session first + design session second

Treatment ID-II: Individual setting, design session first + interview session second

Treatment GD-GI: Group setting, design session first + interview session second

The treatments were compared with respect to dependent measures (design criteria quantity and breadth). The GD-GI treatment participants contributed far less criteria than participants in the remaining treatments. It is important to note that these comparisons provide information about treatment differences, but ID-II and GD-GI treatments are not realistic to UCD in practice. Participatory design sessions would not necessarily include an interview, so RQ3 was formulated for additional elicitation method comparisons, with results that inform designers about method selection in practice.

RQ3: What is the impact of select elicitation methods on depth and breadth of the design space criteria?

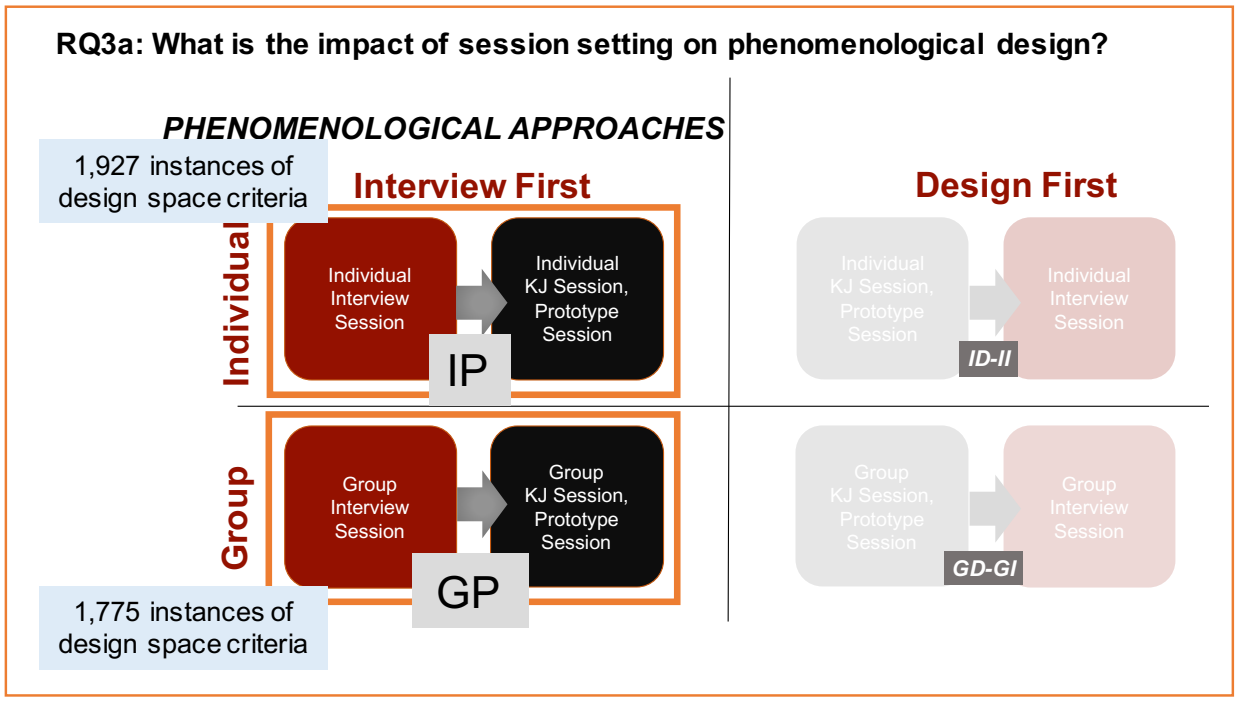

Figure 83. The purpose of RQ3a was to examine the impact of an individual versus a group setting on the dependent measures of a phenomenological design approach (interview occurs first, and resulting criteria are included in analysis).

The elicitation methods examined in RQ3a:

IP Approach: Individual Phenomenological Approach to Participatory Design, identical to II-ID treatment

GP Approach: Group Phenomenological Approach to Participatory Design, identical to GI-GD treatment

In order to address RQ3a, the resulting design space criteria from the II-ID and GI-GD sessions (sessions wherein the interview took place first) were compared. There were no significant differences detected between the session settings with respect to quantity of design space criteria, quantity of distinct design space criteria, or breadth of design space criteria. This could have important implications for designers, as it provides a choice in experimental design to best fit

their resources and scheduling. For example, if a designer does not wish to conduct several sessions, they could select the GI-GD treatment, as only five sessions were conducted in comparison to the ten sessions in the II-ID treatment. However, if the designer would like to employ a first-in-first-out strategy without constraining the elicitation process with scheduling of multiple participants to a single session, they could utilize the II-ID treatment. It is important to note that the duration of the sessions varied based on the treatment. For the II-ID treatment, the interview session duration mean was 61 minutes (*SD* = 12 minutes) and the design session was 42 minutes on average (*SD* = 17 minutes). For the GI-GD treatment, the interview session duration mean was 92 minutes (*SD* = 24.3 minutes) and the design session was 57 minutes on average (*SD* = 25 minutes). Therefore, despite the similar results from the 5 GI-GD sessions compared to the 10 II-ID sessions, the GI-GD sessions were roughly 45 minutes longer in duration than the II-ID sessions. This should be taken into account when evaluating available resources to select a treatment. All sessions were semi-structured and additional questions were asked by the researcher to promote rapport and flow, so the session durations are most likely longer than they would be if using a more stringent experiment procedure. However, rapport may suffer and information elicited could decrease if a more stringent approach is used (Bell, Fahmy, and Gordon, 2016). Further research opportunities could explore differences in dependent measures in larger GI-GD settings of three participants, four participants, etc.

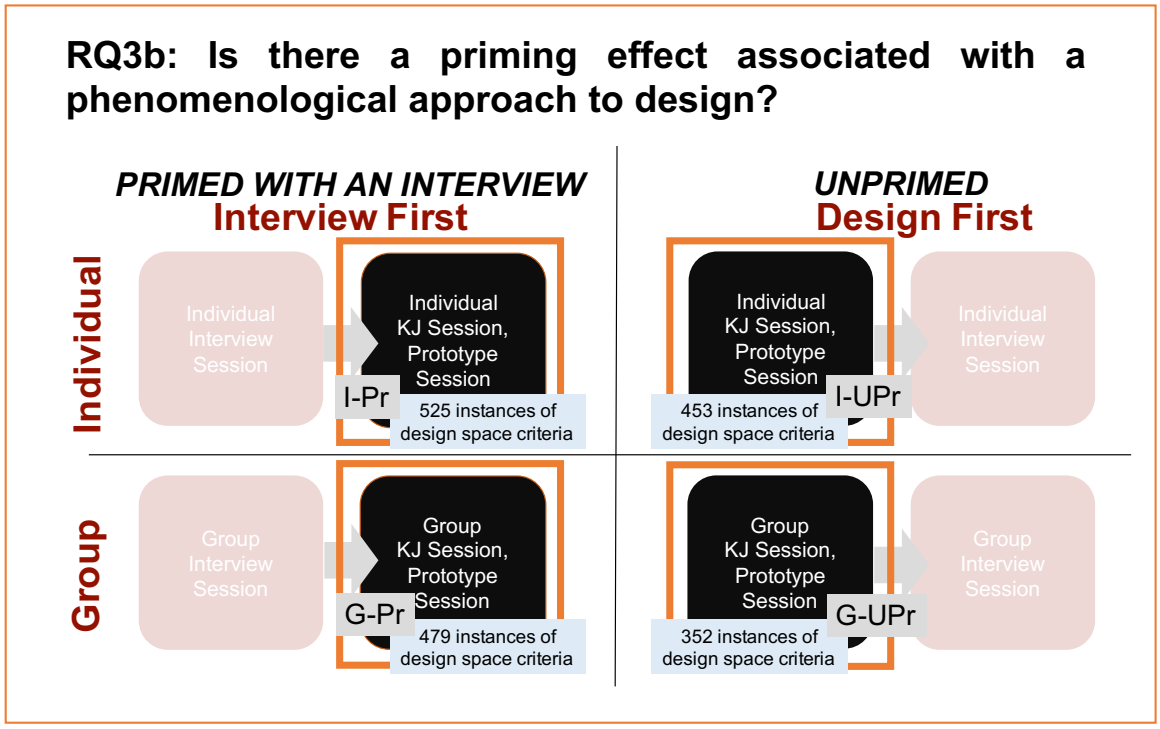

Figure 84. The purpose of RQ3b was to investigate if the interview session primed participants to contribute more breadth and depth of criteria in the design session than participants who did not experience the interview first.

The elicitation methods examined in RQ3b:

I-Pr Approach: "Individual Primed", utilized the criteria derived from the ***design session only*** from the II-ID treatment.

G-Pr Approach: "Group Primed", utilized the criteria derived from the ***design session only*** from the GI-GD treatment.

I-UPr Approach: "Individual Unprimed", utilized the criteria derived from the ***design session only*** from the ID-II treatment.

G-UPr Approach: "Group Unprimed", utilized the criteria derived from the ***design session only*** from the GD-GI treatment.

Although the participants who were primed provided more design space criteria, no statistically significant differences with respect to priming were found. The quantities of design space criteria were greatly reduced when the criteria elicited

during the interview sessions were excluded. This is further explored in detail in RQ3c.

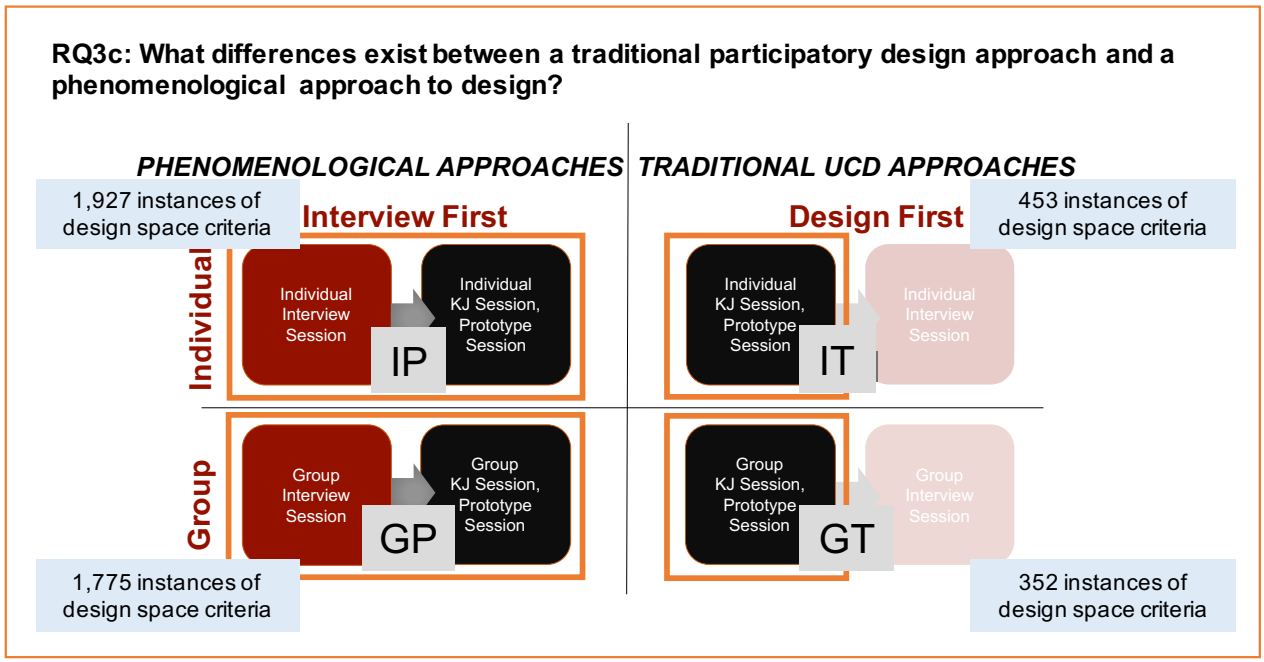

Figure 85. The purpose of RQ3c was to determine the impact on breadth and depth of criteria when including interview output in analysis.

The elicitation methods examined in RQ3c:

IP Approach: Individual Phenomenological Approach to Participatory Design, identical to II-ID treatment

GP Approach: Group Phenomenological Approach to Participatory Design, identical to GI-GD treatment

IT Approach: Individual Traditional Approach to Participatory Design, utilized the criteria derived from the ***design session only*** from ID-II treatment

GT Approach: Group Traditional Approach to Participatory Design, utilized the criteria derived from the ***design session only*** from GD-GI treatment

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Resulting design space criteria from the interview sessions were important for a more comprehensive understanding of the design space. When comparing

participants in the individual setting, 1,927 criteria were found in the phenomenological approach (IP), while only 453 were found from participants in the traditional approach (IT). Similarly, participants in the group setting provided 1,775 criteria (GP approach participants) and only 352 criteria (GT approach participants). Additionally, the breadth score was reduced when the interview was excluded. The breadth score for IP = (57 – 1)/57 = 0.982, for GP = 0.930. For the traditional approaches to participatory design, the breadth score of IT = 0.702, and GT = 0.491.

A few notable observations from these results include:

(1) The interview, although structured to elicit experience-based information rather than technology-centric information, was a successful tool for eliciting design space criteria.
(2) Absence of the interview greatly reduced the quantity and scope of design space criteria elicited.

A review of all elicitation methods investigated (as well as their measured dependent variables) is presented and discussed in the following sections. Although results from ID-II and GD-GI treatments are presented in the overview, bear in mind that these treatments are not likely to be implemented in *practice* by designers as an elicitation approach. The design sessions from ID-II and GD-GI sessions informed comparisons for RQ3b (as the unprimed participants) and RQ3c (as the traditional participatory design session participants). The interview was conducted after these design sessions during the elicitation phase in order to gather as many criteria as feasible to address RQ2.

4.4.1 Discussion: Design Space Criteria from Each Elicitation Method

4.4.1.1 Total Design Space Criteria. Participants in the II-ID treatment provided the highest overall quantity of criteria: 1927. The next highest quantities were elicited in the GI-GD and ID-II treatments: 1775 and 1630 criteria, respectively. The GD-GI treatment participants provided the fewest criteria: 935 (Figure 86).

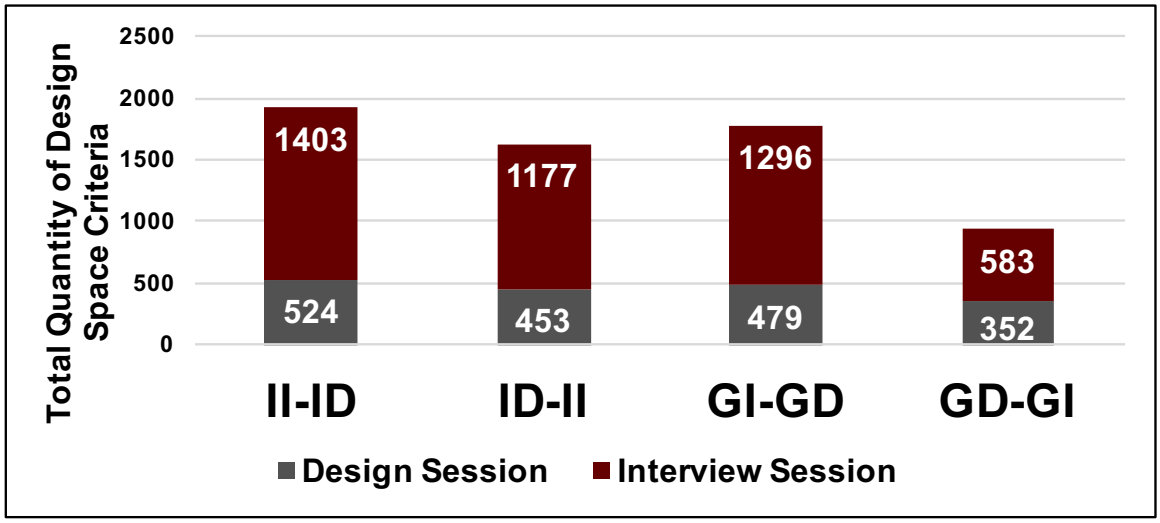

Figure 86. The majority of the design space criteria was elicited in the interview.

As was evident from the analyses of the design space criteria components variables, the GD-GI treatment was not nearly as fruitful as the other 3 treatments in eliciting design space criteria. While there was no statistically significant difference between the II-ID and GI-GD design criteria output, it should be noted that the 10 participants in the II-ID treatment produced a combined 150 additional design space criteria than the 10 participants in the GI-GD treatment (Figure 87).

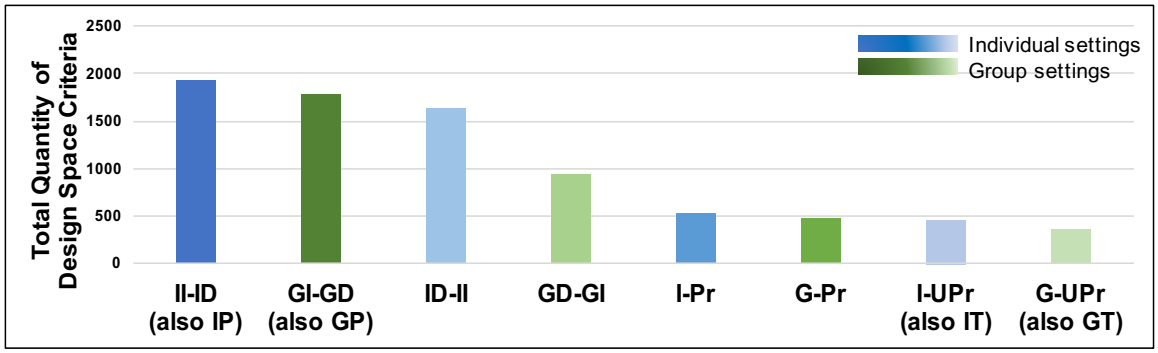

Figure 87. The most design criteria were elicited from participants in the phenomenological approaches.

4.4.1.2 All Needs. Participants in the II-ID treatment provided the highest overall quantity of needs: 590. The next highest quantity was 563, elicited in the GI-GD treatment (Figure 88). Both of these treatments utilized an interview before a

design session; the defining characteristic of a phenomenological approach to participatory design. Participants from the ID-II treatment provided 536 total needs, while the GD-GI participants provided only 394 total needs. More total needs were elicited in the design sessions of the treatments than in the interview sessions, which is not surprising considering the need-centric verbiage used in the design session prompts.

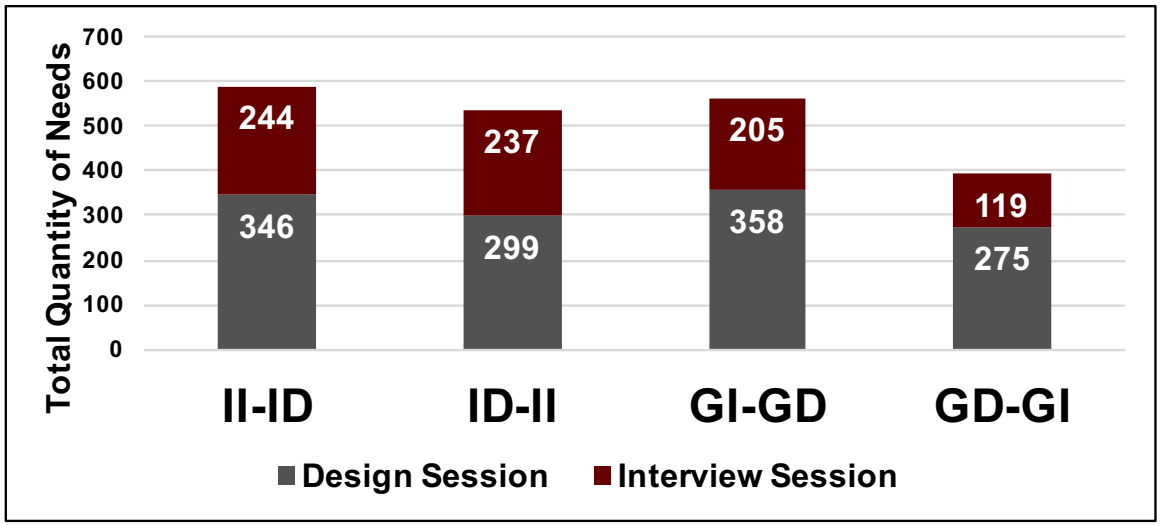

Figure 88. More needs were elicited in the design session than in the interview session.

As shown in Figure 89, the number of needs per elicitation method is apparent, and are represented below in order of highest quantity:

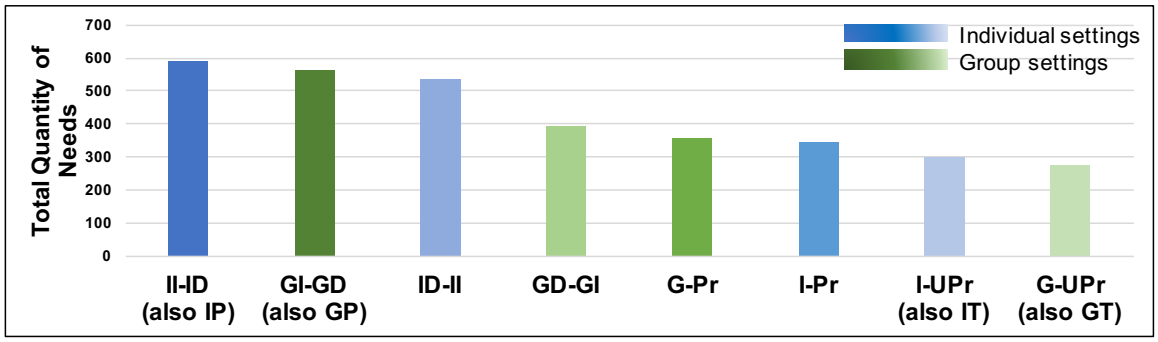

Figure 89. Use of phenomenological approaches to participatory design resulted in most needs.

Both the individual and group approaches to phenomenological design provided the highest quantities of needs, along with the ID-II treatment (which also considers needs elicited from both the design and interview sessions). The remaining elicitation methods employed did not elicit a comparatively high amount of needs, with group setting of the unprimed participants (design session only of the GD-GI group) eliciting the least amount of needs. The G-UPr elicitation is identical to the GT method: the group setting of the traditional approach to participatory design. A significant finding of this work is that a group approach to participatory design is often viewed as a best practice, fared the worst of all tested approaches.

4.4.1.3 Functional Needs. Participants in the II-ID treatment provided the highest overall quantity of functional needs: 439. The next highest quantity was elicited in the ID-II and GI-GD treatments: 407 and 406 functional needs, respectively. The GD-GI treatment participants lagged with 286 functional needs. More functional needs were elicited in the design sessions of the treatments than in the interview sessions (Figure 90), which, again, is not surprising considering the need-centric verbiage used in the design session prompts.

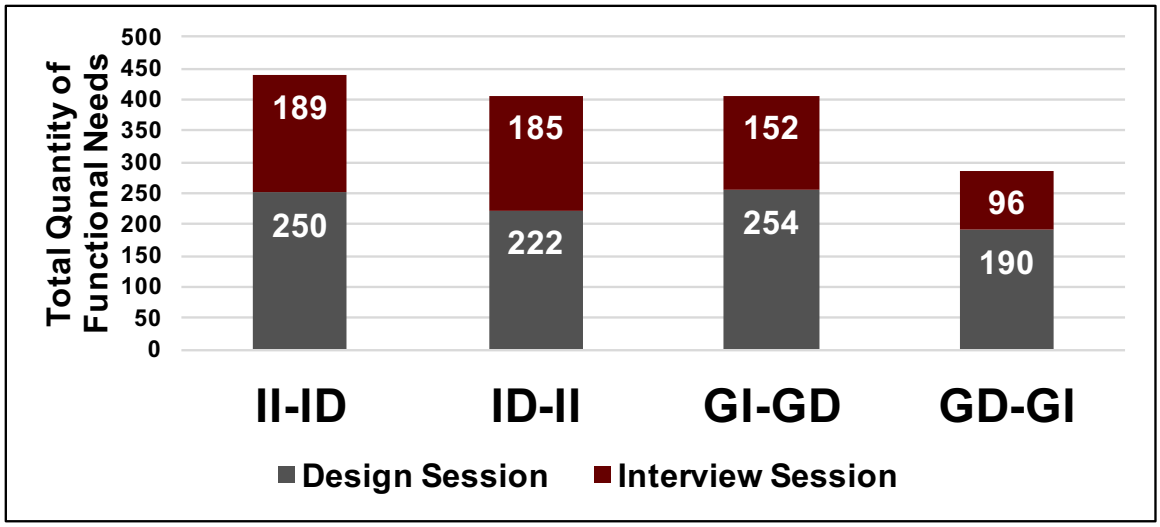

Figure 90. More functional needs were elicited during the design session than the interview session.

In Figure 91, the quantity of functional needs per elicitation method are apparent, and are represented below in order of highest quantity:

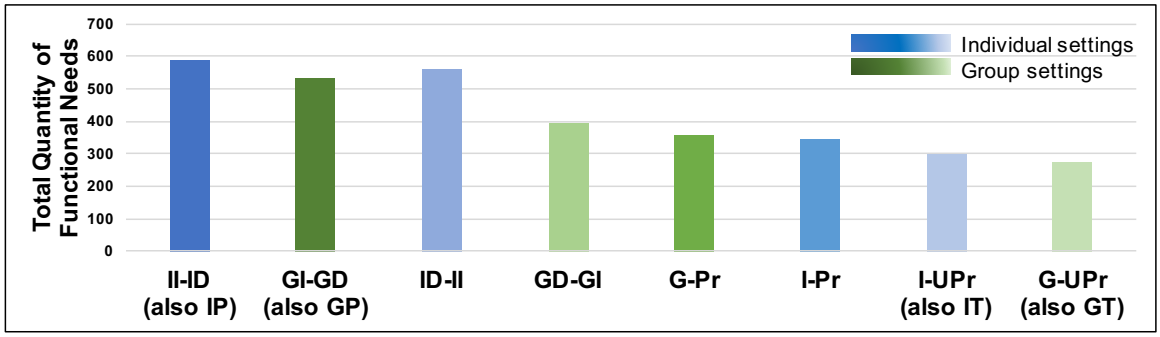

Figure 91. Use of phenomenological approaches to participatory design resulted in most functional needs.

These findings are in agreement with the ranking of all needs: II-ID participants provided the most functional needs, with GI-GD and ID-II closely following. The remaining methods findings demonstrated noticeably fewer needs, with the group traditional approach (GT) participants providing the least quantity of functional needs.

4.4.1.4 Nonfunctional Needs. Participants in the GI-GD treatment provided the highest overall quantity of nonfunctional needs: 157. The next highest quantities were elicited in the II-ID and ID-II treatments: 151 and 129 nonfunctional needs, respectively. The GD-GI treatment participants provided 108 nonfunctional needs. More nonfunctional needs were elicited in the design sessions of the treatments than in the interview sessions (Figure 92).

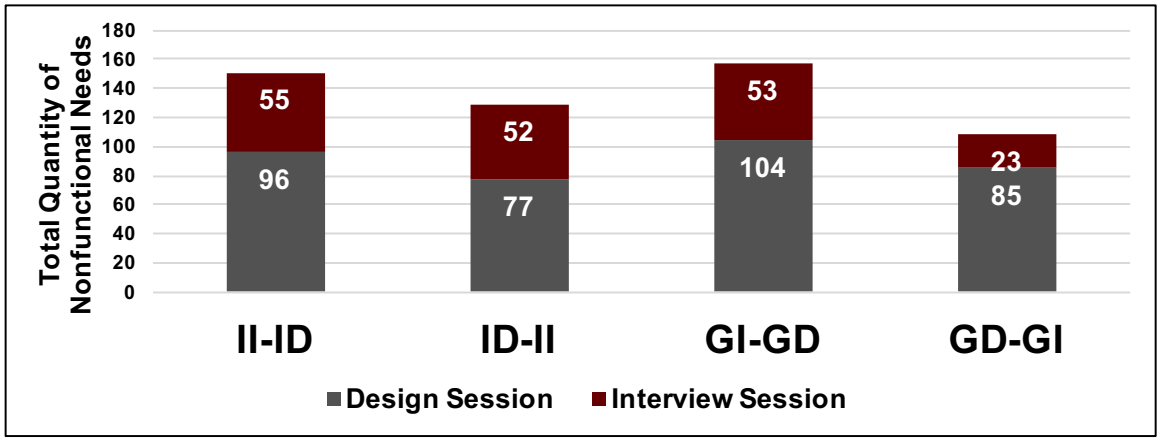

Figure 92. More nonfunctional needs were elicited during the design session than the interview session.

Recall that nonfunctional needs describe "how" exactly the functional needs will be implemented or accomplished. Nonfunctional need brainstorming is arguably more demanding than functional need brainstorming, as it requires the participant to offer solutions. These solutions could be hypothetical, anecdotal, or experience-based. This could explain the discrepancy between functional and nonfunctional need quantities. One participant even remarked during his session, ***"Do you think if I knew how to make reintegration happen, I would be here right now?"*** The trend observed suggests perhaps participants were more collaborative and disclosed their ideas for implementing needs more easily if they completed an interview first to establish rapport with the researcher and, in cases of group settings, another veteran.

Figure 93 displays the number of nonfunctional needs per elicitation method below in order of highest quantity.

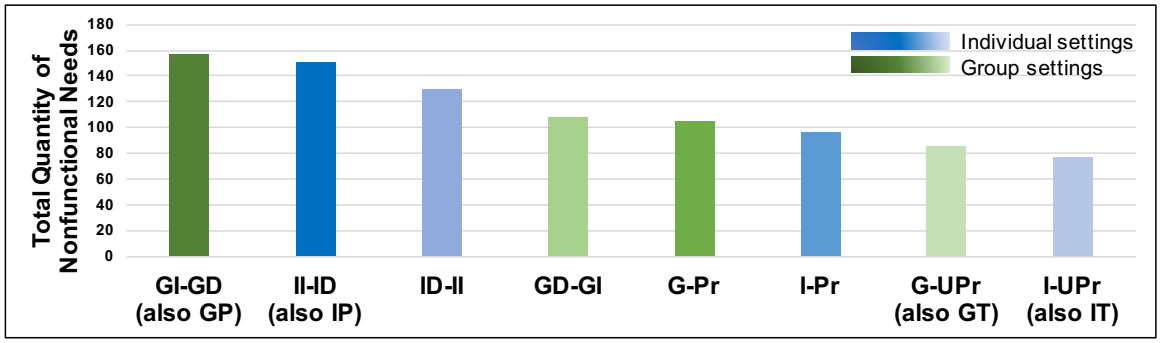

Figure 93. The most nonfunctional needs were elicited from participants in the phenomenological approaches.

The GI-GD participants, followed closely by II-ID participants, provided more nonfunctional needs than the remaining elicitation methods explored. This could be due to building rapport during the interview session, as these participants provided markedly more nonfunctional needs ideas in their design sessions than the ID-II and GD-GI participants. It also could be that the interview provides a sort of grounding exercise to allow participants to reflect and orally deliver their experiences, and then the design session gives them the opportunity to apply those experiences to ideas for design.

4.4.1.5 Obstacles. Participants in the II-ID treatment provided the highest overall quantity of obstacles: 757. The next highest quantity was elicited in the GI-GD and ID-II treatments: 716 and 630 obstacles, respectively. The GD-GI treatment participants lagged with 286 obstacles (Figure 94).

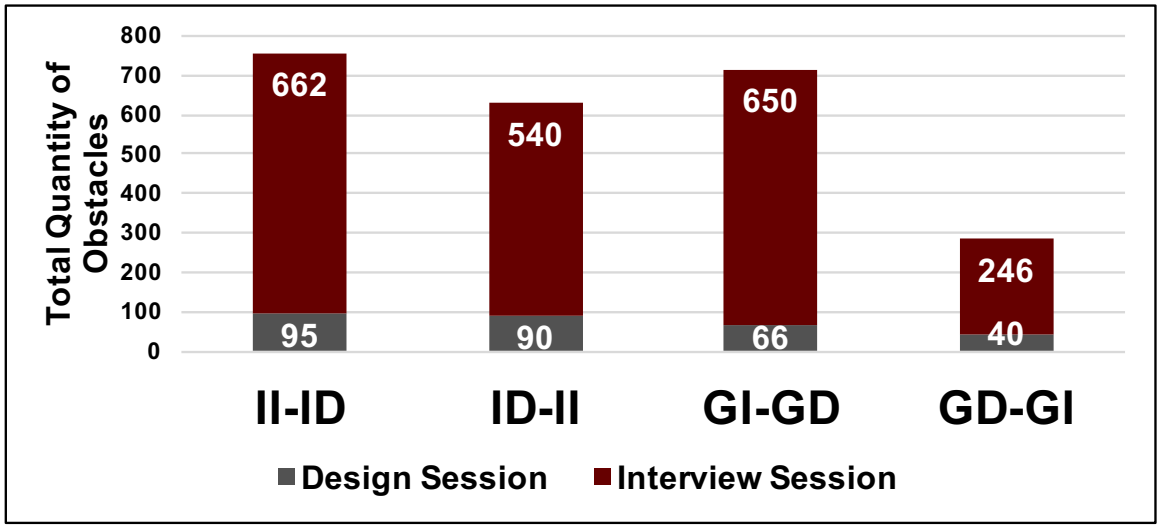

Figure 94. The most obstacles were elicited from participants in their interview.

Not surprisingly, most obstacles were elicited in the interview sessions. Interview questions were structured in order to capture challenges and barriers veterans face as they try to reintegrate into civilian society. While the design sessions were need-centric, interview sessions were more holistic, touching on needs, context considerations, and obstacles to reintegration veterans face (see Table 4).

Also of note is the drastic difference in obstacles elicited in the GD-GI treatment as compared to the other treatments. While it may be impulsive to hypothesize that group session attendees may not want to disclose obstacles they've faced while another veteran is in the room, this was not the case with the GI-GD treatment. Therefore, perhaps the order of the session exposure impacted interview session results in GD-GI treatment. ***Explanation of cause is purely speculative, but the group interview session difference between 650 obstacles and 246 obstacles is drastic, with all conditions the same except for the order in which sessions were completed.*** Perhaps failure to build rapport by way of the post-design-session interview exercise is the cause. Participants may have felt a level of constraint due to the technology design focus of the design session, and once the constraint was relaxed to discuss personal details (and in the case of obstacles, *negative* personal details), they chose not to divulge. This trend was also observed when comparing the II-ID treatment to ID-II treatment, though the difference in obstacle quantity was not as extreme.

From Figure 95, the number of obstacles per elicitation method are apparent, and are represented below in order of highest quantity:

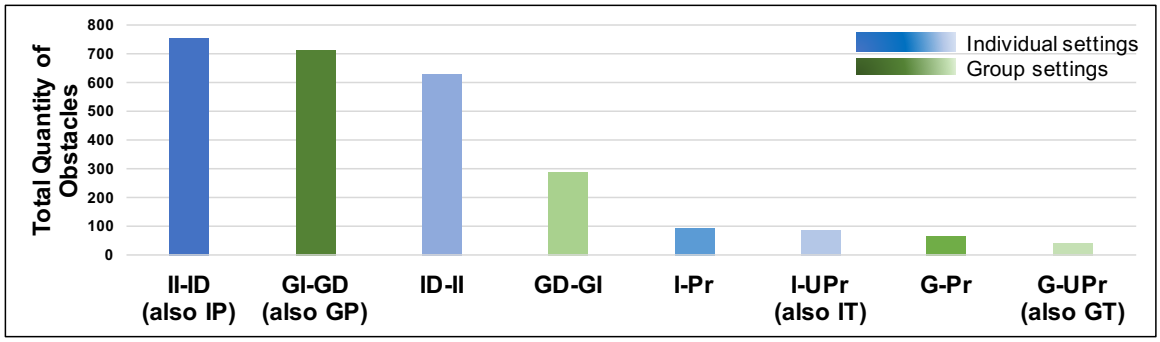

Figure 95. The most obstacles were elicited from participants in the phenomenological approaches.

Both the individual and group approaches to phenomenological design yielded the highest quantity of obstacles. Approaches that did not utilize the interview data produced less than 100 obstacles each.

4.4.1.6 Barriers. Participants in the II-ID treatment provided the highest overall quantity of barriers: 397. The next highest quantity was elicited in the GI-GD and ID-II treatments: 406 and 332 barriers, respectively. The GD-GI treatment participants lagged with 147 barriers (Figure 96).

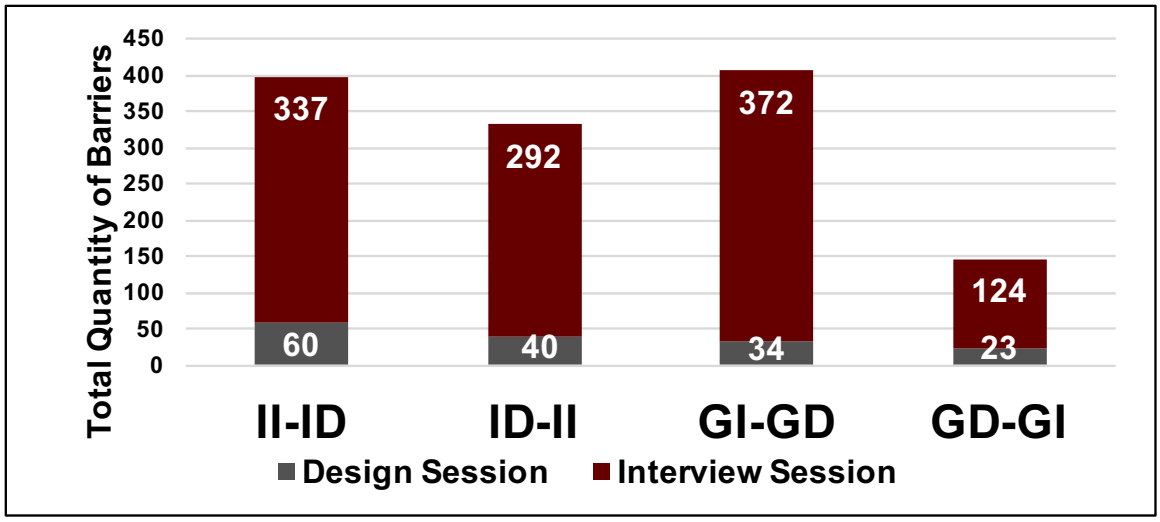

Figure 96. The most barriers were elicited during the interview.

These findings are in accord with findings related to the obstacles dependent variable, of which barriers is a component. It is noticeable from comparing the quantity of barriers per treatment that GD-GI participants did not disclose a similar number of barriers as participants in the other treatments.

In Figure 97, the number of barriers per elicitation method are apparent, and are represented below in order of highest quantity:

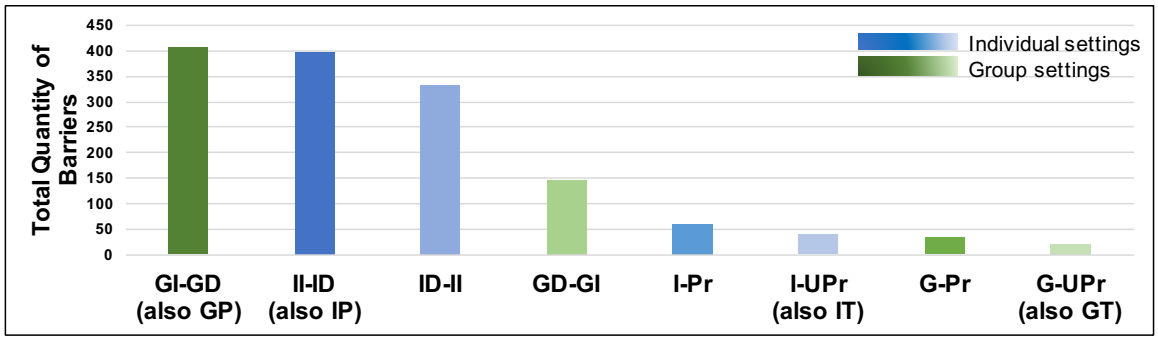

Figure 97. The most barriers were elicited from participants in the phenomenological approaches.

The interview is necessary to capture the barriers that should be considered in the design space. Additionally, the interview should take place prior to the design session, especially in a group setting. The individual and group approaches to phenomenological design elicited around 400 barriers compared to design-session-only approaches, which elicited around 50 or less total barriers. Also of note is the drastic decline in barriers elicited in the GD-GI setting, a noteworthy trend across variables, especially considering GD-GI analysis uses barriers elicited from both the interview and the design sessions.

4.4.1.7 Challenges. Participants in the II-ID treatment provided the highest overall quantity of challenges: 359. The next highest quantities were elicited in the GI-GD and ID-II treatments: 311 and 298 challenges, respectively. The GD-GI treatment participants provided fewer challenges: 139 (Figure 98).

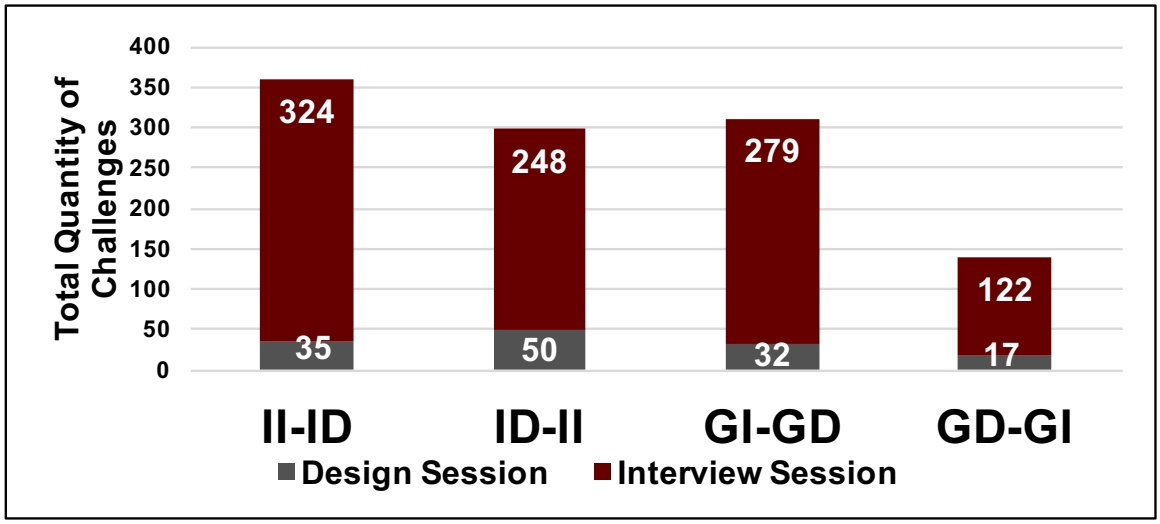

Figure 98. The most challenges were elicited from participants in the interview.

Similar to obstacles and barriers results, the interview is crucial to elicit the challenges, with more challenges being elicited when the interview is conducted prior to the design session. The order of sessions made a drastic difference in the group setting.

In Figure 99, the number of challenges per elicitation method are apparent, and are represented below in order of highest quantity:

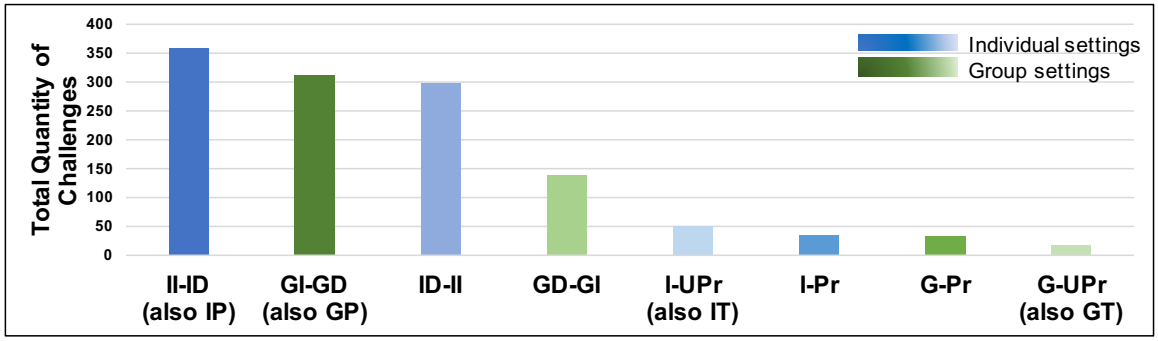

Figure 99. The most challenges were elicited from participants in the phenomenological approaches.

Participants in the individual setting of the phenomenological approach (IP) provided about 50 more challenges than the participants in the phenomenological group approach (GP). While ID-II participants provided roughly 300 challenges, remaining methods provided a sharp decline in overall challenges quantity, with

G-UPr (also the traditional approach to participatory design in a group session, participants complete the design session only) participants providing only 17 challenges total.

4.4.1.8 Context of Use Considerations. Participants in the II-ID treatment provided the highest overall quantity of context considerations: 581. The next highest quantities were elicited in the GI-GD and ID-II treatments: 495 and 464 context considerations, respectively. The GD-GI treatment participants provided fewest context of use considerations: 255 (Figure 100).

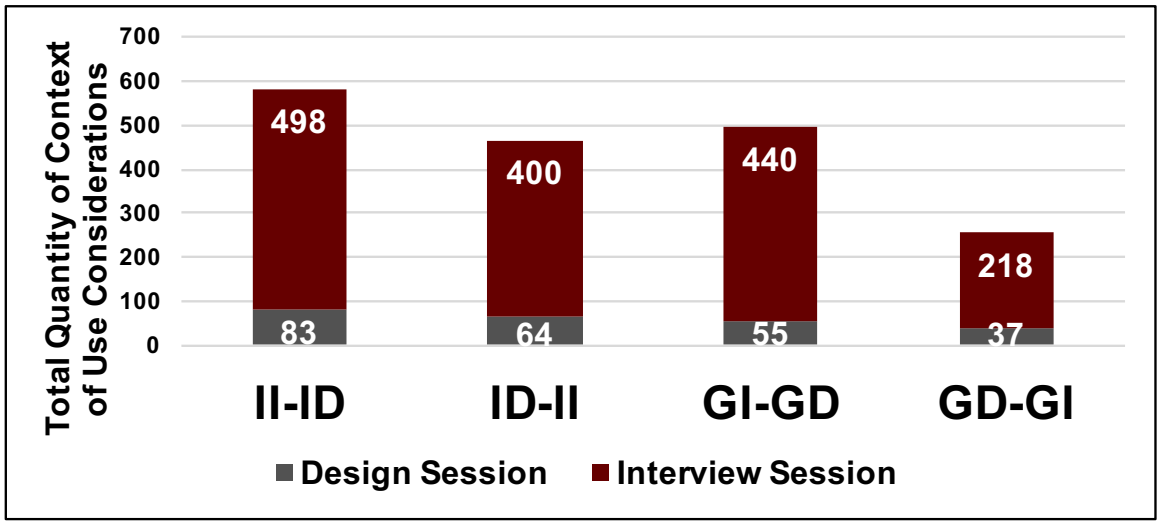

Figure 100. The majority of context considerations were provided in interviews.

A clear observation to be made from this figure is the stark differences between the quantities of context considerations elicited during the interview session versus the quantities elicited in the design sessions, across treatments. ***While context of use considerations are regarded as important by designers, their current methods for obtaining them (e.g. GT) may not be optimal.*** As technology becomes more personal, mobile, and ubiquitous, the lived experiences of users and the context in which they exist becomes more relevant to the design conversation. Additionally, it should be noted that the phenomenological approaches to design (i.e., II-ID and GI-GD) provided more context than the

treatments wherein participants completed the design session prior to the interview (Figure 101).

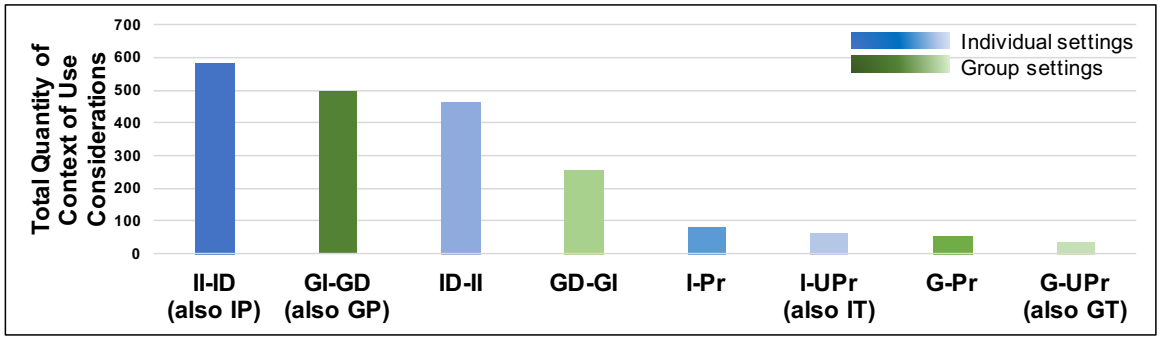

Figure 101. The most context considerations were elicited from participants in the phenomenological approaches.

Similar to other variables, no real noticeable difference was observed between primed and unprimed participants (when considering only their design session contributions). However, the quantity of context criteria increased significantly when analysis of their interview responses was included in elicitation method totals. Thus, the interview is crucial to understanding the design space, optimally executed when conducted prior to a design session, not after.

4.4.1.9 Breadth. Quantity of design space criteria was not the only measure employed to compare elicitation approaches. Breadth of design space criteria was also calculated, which examined the codebook theme coverage of each elicitation approach. The GT approach, which is the group approach to traditional participatory design, resulted in the fewest design criteria, with a breadth score of only 50%. As a group participatory design session is widely used and well-regarded in design practice, it is surprising that it was associated with the narrowest collection of design space criteria among tested approaches. However, when the interview session output criteria was taken into consideration, codebook coverage and quantity of criteria (and thus designer's exposure to understanding the design space) drastically improved (Figure 102).

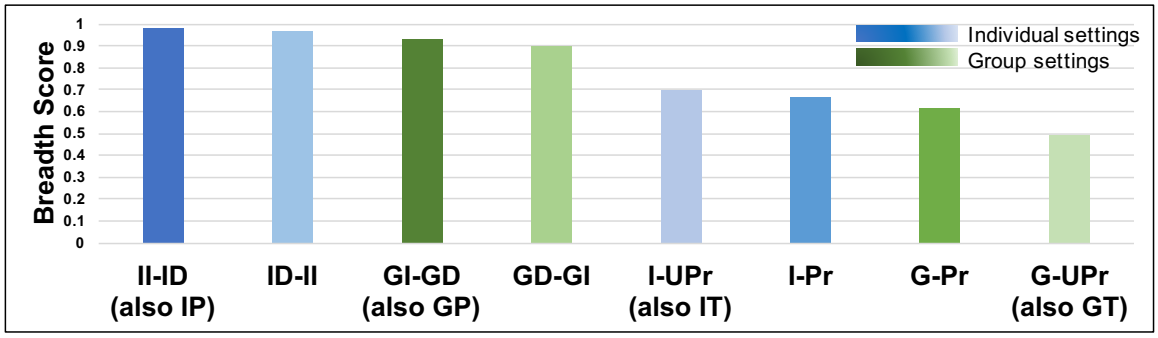

Figure 102. The interview session was essential to capture a higher breadth of design criteria.

4.4.1.10 Conclusion. In this research effort, results from measuring totals and averages of all dependent variables examined indicate that the interview session is a helpful and necessary step to not only building rapport but also gain insights about the design space via targeted questions about users' lived experiences with a phenomenon. In other words, removing the constraints of technology design framing from discussions with participants was impactful in defining the design space, and eliciting both breadth and depth of information that could be converted to design space criteria. This is interesting considering the interview was phenomenologically focused on the lived experience of veterans, as well as on the challenges the overall veteran population faces, not on technology or design. Despite the phenomenological framing of the interview session, 71% of the total design space criteria emerged from the interview sessions. It is recommended that designers not only conduct interviews that contain questions about the user's lived experience with a phenomenon, but analyze the interviews as well to discover information about the design space that may otherwise be omitted. Interview questions should be developed with the *intent* of the technology in mind. In this case, interview questions were created after a literature review to define what exactly it means to be integrated into a community. These research-based interview questions provided the prompts to elicit information helpful to identifying design space criteria for technology to assist with community reintegration. In this research, participants in the individual setting of this phenomenological approach performed slightly better than those in the group setting, but differences should be

explored in future research to identify differences between individual and group settings (as well as differences among group settings: 2 participants vs. 3 participants, etc.).

Separately, but informed by the design criteria data set, two personas were created to inform designers about the diverse needs, challenges, and context of use considerations of this population. The SDM algorithm efficiently determined which criteria participants had in common, and provided a consolidated reference of the maximum quantity of participants with the at least eight design space criteria in common from needs, obstacles, and context of use considerations. Two data sets containing four participants each was selected, and a persona was ideated from each set, based on a select participant within the set. The effectiveness and utility of these personas could be explored in further research, and the methodology for creating the personas may be expanded to investigate other user groups of interest.

CHAPTER 5. CONCLUSION

5.1 Summary of Research and Contributions

The objective of this research focused on the novel application of phenomenology to participatory design practices. In order to better understand the full scope of a user's lived experience, the metrics of the design space were adjusted accordingly, and a new conceptual model for design was presented (Figure 103).

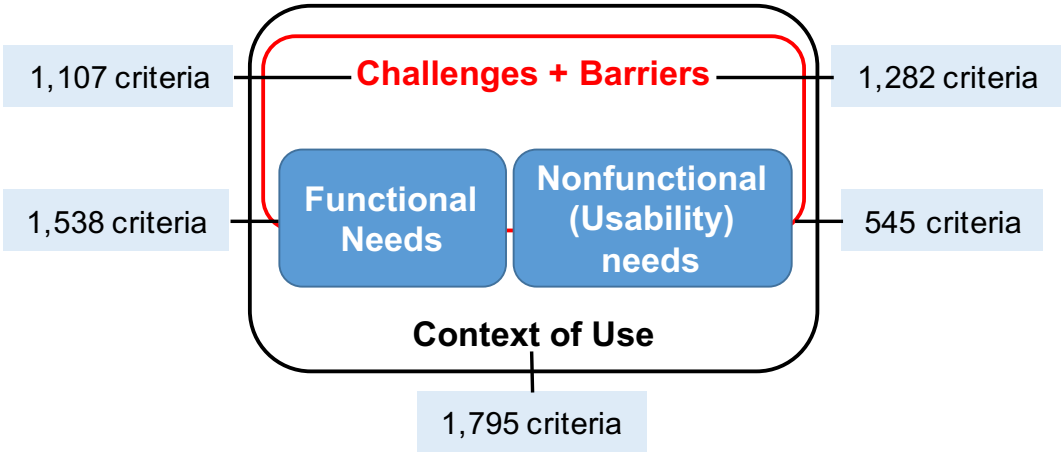

Figure 103. Design space conceptual model with counts of design space criteria.

In an effort to understand the lived experiences of users, the focus of inquiry was expanded from traditional approaches that include needs and context of use considerations to include challenges and barriers. Although designers do not seek to introduce challenges and barriers into their designs, it is beneficial to be aware of them, so that designers can address them when possible. Eliciting explicit challenges and barriers directly from users could arguably add a more robust understanding of users, their day-to-day experiences, and thus improve the design process and ultimately the resulting user experience.

There are several distinct contributions of this research to the field of user-centered design methods:

(1) comparison of *different elicitation methods* as measured by the depth and breadth of design space criteria elicited **(Section 4.3)**;

(2) *guidelines* for designer use of phenomenology **(Section 5.12)**;

(3) addition of obstacles to the design space, which include both challenges and barriers as important facets of design **(Section 1.2)**;
(4) new *grammar rules* for the construction of challenges and barriers to supplement pre-existing grammar rules **(Section 4.1.2.3.3)**, and;
(5) application of an algorithm as a *novel method for generating personas* rooted in a quantitative approach that cross-compares participant design space criteria **(Section 4.1.3)**.

Results of this research effort directly contribute to the field of veteran research as well. Specifically, this work provides:

(6) a phenomenological *summary of the lived experiences of veterans* as they reintegrate into the civilian community **(Section 3.2.5)**;
(7) a *codebook* that outlines the major topics veterans experience as they reintegrate **(Section 3.1.8.4)**;
(8) a set of *design space criteria* outlining the needs, obstacles, and context of use considerations of veterans reintegrating into the civilian community **(Appendix C.2)**, and;
(9) two *veteran personas* grounded in data procured from the analysis of the elicitation outputs **(Section 4.2.11)**.

5.1.1 Phenomenology and thematic analysis: Toolkits for designers

There were 3 research questions constructed for this research investigation. RQ1 was phenomenologically-focused: What are the experiences of young military veterans with reintegration into civilian society? This research question was addressed by the thematic analysis of participant transcripts. A codebook was developed concomitantly to cover topics addressed by veterans and their reintegration into civilian society. The thematic analysis of the transcripts resulted in a set of categorized meaning units which were then examined to generate a phenomenological summary of the young male veteran lived experience with community reintegration (Chapter 3, first-cycle coding and

results). In addition to gaining understanding of the lived experience, the meaning units set served as an input data set for additional, second-cycle analysis.

The remaining research questions shifted focus from phenomenology to design. RQ2 posed: What are the implications of these lived experiences on the design space? Second-cycle analysis using grammar rules converted the verbatim participant meaning units into meaningful design space criteria. Each criterion was structured as a need (with components functional needs and nonfunctional needs), obstacle (with components barriers and challenges), or context of use consideration using predefined linguistic structure rules (Gausepohl et al., 2011) as well as new linguistic structure rules. The standardization of the design space criteria across participants permitted the creation of representative personas, which were based on real data trends identified by the SDM algorithm. As RQ3 investigated these resulting design criteria by elicitation method, conclusions were surmised regarding effectiveness of each elicitation method. Both the depth and breadth of the resulting design space criteria per method was examined. This was accomplished by considering overall quantities of design space criteria by type, as well as by considering quantities of *distinct* criteria and coverage of the codebook themes of origin by the design space criteria. Across all measures, the phenomenological approaches to design were more effective in terms of quantity (depth) and distinct quantities (breadth) and topic coverage (codebook breadth). Thus, it is recommended that designers incorporate phenomenology into their user-centered design exercises, specifically participatory design exercises with representative users. Some design guidelines that reflect the methodologies of this work were developed as a reference for designers, and are presented in the following section, with this research effort as an example case study.

5.1.2 Guidelines for designers: using phenomenology to improve design

Background: These guidelines were developed under the assumption that designers must understand their users, not just the user's technology preferences and ideas, in order to create useful designs. Technology is a sometimes cumbersome and constraining framework through which users are forced to view a problem in a traditional participatory design setting. It is proposed that it is much

simpler, and perhaps richer for a user to discuss their "real life", their needs, their obstacles, and the environment and other context considerations they live in.

While representative users and their contributions can be invaluable to the design process, representative users are not typically technology designers. ***Instead, incorporation of an interview with carefully selected and developed questions can guide users to contribute their experience to inform a select technology design.*** The guidelines, along with examples for each (presented in blue), are provided below.

Execution: Follow the steps in this section to apply phenomenological practices and discover design opportunities.

1) **Select a lived experience.** Designers often have a topic area, objective and/or user group in mind at the beginning of the concept phase of the design process.

   Technology objective: Help military veterans with life after service

   Remember, ***in the interview, the objective will be eliciting the lived experience from a user.*** This lived experience topic should be broad enough to be relatable and applicable to all representative users, but should be targeted enough to elicit topic-focused design information. Designers will have the opportunity to ask pointed design-centric questions in a follow-up design session if necessary.

   Lived experience: Community reintegration of the young military veteran population

2) **Research the selected lived experience.** Do not immediately develop the interview questions. Careful inspection of past research and a thorough review of literature must first be conducted to become more familiar with the

user group and the phenomenon of design interest. Users will need to be guided in the interview. Vague questions may or may not lead to an accurate comprehension of the lived experience. After the review, begin preparing interview questions that are grounded in related past research. Avoid questions that are motivated by designer opinion or biases. Note that vague questions may or may not lead to an accurate comprehension of the lived experience. Lastly, take care in constructing the flow of questions since users will need to be guided in the interview.

Grounded interview topics: McColl et al. (1998) Definition of community integration:

- **Conformity**
- **Acceptance**
- **Orientation**
- **Close Relationships**
- **Diffuse Relationships**
- **Productivity**
- **Living Situation**
- **Leisure**
- **Independence**

3) **Consider the design space as interview script develops.** Remember, to fully understand the user and their lived experience, it is necessary to elicit information that will eventually address their needs, their obstacles, and their context of use considerations. ***Interview questions must be structured to ensure the capture of needs, obstacles, and context information.*** For example, consider a user who has information about something that has helped them in the past, and that this information may be able to inspire design that helps others. This information is an eventual user need. Additionally, perhaps a user has *ideas* of what *could* be helpful. This is also a potential eventual user need. Consider a representative user

that can't recall any negative experiences with a select interview topic. This would create a situation where that user did not provide any obstacles. Or, consider a user who may be wary of sharing their personal experience about an obstacle they encountered. Thus, it is necessary to create interview question dyads that inquire about the personal experience of the user with respect to obstacles, along with that user's information on personal experience of the *population* in general. At the beginning of a question set, be sure to define any terms for the user for clarity.

Example interview question: **Acceptance**

Interview Question Objectives:		Interview Prompt:
Define the theme		The next question I'm going to ask you is about acceptance. In this session, think of acceptance as your perception of being welcomed by the people of the community you are trying to integrate into.
Elicit experience **Elicit Needs** **Elicit Challenges and Barriers** **Elicit Needs**	**Elicit Context of use considerations**	1) Do you feel a good sense of acceptance in your community? Do you feel like you belong there? Please answer yes or no. 1a) *IF YES:* What are some examples of how you felt accepted by your community after becoming a veteran? 1b) *IF NO:* What are the issues, maybe on both your part and the community's part, that prevented you from feeling accepted? What would need to happen for you to feel accepted?
Elicit Challenges and Barriers		2) What challenges can you think of, that may prevent a veteran from feeling accepted?

4) **<u>Start specific, end big picture.</u>** After the interview questions based on the literature review have been asked, the designer should end the interview "big picture". Designers should give representative users the opportunity to contribute any other information that may not have been elicited during the interview. Interview questions can serve as a probe to elicit information that may not be obvious at first to the designer or the user. Additionally, interview questions may not be catered to the exact experience of the user, nonetheless, the user may still have useful experience to contribute.

Final Question: "Is there anything else you'd like to talk about relating to community reintegration?"

5) **Incorporate participatory design.** Based on the designer's thoughts on best practices, company culture, and preferences, a participatory design session may follow the interview session to elicit technology-specific opinions of the users. Depending on the stage of design, resources, etc., this determination should be made by the individual designer to cater to their specific project.

   KJ Session Prompt: Imagine you are designing an app to help veterans reintegrate into the civilian community. What features or functions would this app need?

6) **Elicit, Transcribe, Discover.** Audio recordings should be carefully transcribed for accuracy. Transcripts should be read in their entirety in order to immerse the designer in the design space. The complete set of transcripts may seem overwhelming to process, so first-cycle coding should be utilized to isolate and specify important verbatim excerpts (meaning units). These meaning units can be categorized using a codebook (Kurasaki, 2000) if desired. A codebook is an exemplar organizational tool that can provide insights regarding the meaning units, and groups meaning units of similar topics together, which fosters second-cycle coding analysis.

7) **Convert.** In this final step, grammar rules are utilized to standardize and specify the needs, obstacles, and context of use considerations that are grounded within the users' responses. Completion of this step provides scope to the design space when viewing the distinct set of criteria. Inspection of criteria by the designer informs a technology design that is grounded in the real experiences: needs, obstacles, and context of the user group.

Grammar Rules with Example Design Criteria:

Criterion	Grammar Rule(s)	Example Result	Origin
NEED: Functional Need	Active verb + object	Acquire job	Gausepohl, Beaton, & Winchester, 2011
NEED: Nonfunctional Need	Active verb + object + prepositional phrase Active verb + object + adverb	Acquire job in my city Acquire job quickly	Gausepohl, Beaton, & Winchester, 2011
OBSTACLE: Barrier	Object Adjective + object	Age gap Vision issues	Research Contribution
OBSTACLE: Challenge	Object + verb + object	VA cancels appointments VA ignores problems	Research Contribution
CONTEXT: Context of Use	Object + adjective Gerund + prepositional phrase Gerund + adjective	Land navigation easy Living in a homeless shelter Living alone	Gausepohl, Beaton, & Winchester, 2011

Results: Maintain integrity of data by linking each design criteria to its place of origin: the participant's transcript (marked by line numbers) and/or a timestamp from their audio recording. Design priority decisions can be made in congruence with participants, or at the sole discretion of the designer. What's important is the lived experiences of the user group are elicited and understood by the designer to support technologies that are truly user-centered.

5.2 Limitations of Research

5.2.1 Participant Selection

Several limitations must be acknowledged when considering the results presented herein. First, in order to fully understand the design space, ideally the opinions of *all* stakeholders would be elicited. Due to budgetary and time constraints, it wasn't possible to elicit experiences and resulting design criteria from other stakeholders such as VA employees, policy makers, therapists, doctors, veterans' family members, etc. Also, it was necessary to utilize four semi-homogeneous groups in order to compare results from the elicitation methods, and as such, representatives from a narrow age group and single gender were queried.

Originally, it was intended for the research to examine the male military veteran population who were diagnosed with PTSD. However, when recruitment materials went out that specifically sought PTSD-diagnosed veterans, the recruitment process stalled with little to no responses. When the flyers and other recruitment materials were revised to simply recruit male military veterans between 18 and 35 years old, several interested potential participants contacted the researcher, *including* participants who had been diagnosed with PTSD. In order to not exclude the original population of interest (veterans who had PTSD) while also including enough participants to compare the four elicitation methods, the participant pool was comprised of veterans who were diagnosed with PTSD as well as veterans who were not. Effort was made to balance the four groups such that half of the participants were PTSD-diagnosed and half were not, and this balancing method was successful except in the GD-GI treatment, in which there were six participants not diagnosed with PTSD and four who were. Although it is unlikely this factor contributed to the low quantities of design space criteria from the GD-GI treatment, the difference in PTSD/no-PTSD representation in only the GD-GI treatment must be acknowledged.

Participants in this study were residents of the southwest Virginia area, and their needs, challenges, and context considerations may not necessarily be generalizable to the national needs, challenges, and context considerations of all military veterans. For example, the orientation theme of community integration was not rated as a highly difficult theme to achieve, nor was it discussed as being particularly challenging by the participants during the interview sessions. It is unknown if this is truly due to the land navigation skills provided in military training, or if it is due to the relatively small size of southwest Virginia cities and towns when compared to some of the larger cities in America.

Additionally, all participants in this research were male. The most recent data available on military demographics indicates that over 15% of the armed forces is now female (*DMDC Report*, 2014). Future work could investigate the community reintegration experiences of female veterans in order to gather their unique experiences. Past research has indicated substance abuse, sexual trauma

and PTSD in the female veteran population (Davis & Wood, 1999), intentional overdose (LeBlanc, et al., 2017), as well as postpartum depression (Shroeder, 2016). Some research is palpable in the community reintegration topic area, including a paper that examined 12 female military veterans and their experiences attending college. The authors discussed a struggle with multiple identities and the need for specialized resources and support of this population as they attend college (Iverson et al., 2016).

5.2.2 Power

The sample size (*N*=40) was large given the qualitative nature of this research, but was necessary in order to compare the four elicitation treatments (*n*=10 participants per treatment). However, when conducting the inferential statistical analysis of the population, this sample size was insufficient in order to achieve adequate power associated with the quantitative calculations. For example, calculations were done to compare the importance rankings, difficulty rankings, and CIM of PTSD-diagnosed and non-diagnosed participants, as well as these scores amongst participants (See Chapter 3). A power of at least 80% is recommended to ensure that the scores for the dependent variables (importance, difficulty, and overall integration) can be accurately compared between the independent variables (PTSD vs no PTSD, and four elicitation settings). Underpowered studies with sample sizes that are too small produce inconsistent or misleading results (Maxwell & Kelley, 2011). For example, participant age was investigated to determine if any correlations with rankings for importance, difficulty, and overall integration (using CIM results) existed. While a negative correlation between age and difficulty of living situation was found (implying that younger participants found their living situation to be more difficult), the minimum sample size to achieve 80% power for a correlation analysis is roughly 50 participants, but the sample size was only 40.

5.2.3 Analysis method

While the analysis approach used employed previously used analytic methods, there are some acknowledgements of limitation that must be made. The use of analysis to find meaning units in interview transcripts is a well-known procedure, but it is unknown if it has ever been utilized for analyzing output from a participatory design session, or in an engineering-setting in general. While it seems that it was a fruitful approach in this research, comparisons with other analysis methods was outside the scope of this research.

In addition, although the thematic analysis procedure to specify the needs and context considerations has been employed in studies, it is not known if it is the most effective method to specify obstacles. The process of adapting this procedure to include user barriers and challenges was central to supporting the conceptual model of this research, but it has not been tested to discern if other designers find the list of challenges and barriers to be helpful.

The personas created using the SDM algorithm was a novel methodology in this research. Assessment of persona utility was outside the scope of this research. Additionally, the participant attributes impacted the resulting persona data sets. For example, minority veterans had a distinctly separate set of identified barriers (for example, confederate flags) but since over 80 percent of the participants interviewed were white and ethnicity was not accounted for in the algorithm, this may have weighted the personas generated. If an ethnic-minority persona was desired, it may be appropriate to isolate those ethnic-minority participants prior to execution of the algorithm to identify design criteria data sets.

5.3 Future Research Opportunities

As mentioned in the limitations, this research effort involved a single elicitation phase that included (only) the military veteran stakeholder. This provides the designer with only the veteran perspective of the reintegration experience. Additional research could seek to understand military veteran reintegration by interviewing other stakeholders such as spouses, children, doctors, policy makers, university administrators, and employers.

Additionally, research could be conducted to investigate the validity of this approach from the perspective of designers. Do designers agree that they know more about a user and their user requirements if they understand the obstacles that user faces? Does defining obstacles minimalize assumptions and design errors?

Future work could also explore the application of the guidelines in section 5.1.2 to ***other user groups*** and their lived experiences. Take caregivers of parents with dementia as an example user group.

Technology objective: Help caregivers with their work/family balance

Lived experience: Caring for parents who have dementia

Grounded interview topics: Schumacher (2010) Essential caregiving themes

- **Discovering memory loss**
- **Integrating parent demands with family needs**
- **Juggling multiple life challenges**
- **Balancing guilt and grief**
- **Crushing time and emotional pressure**
- **Acknowledging inequities**
- **Nursing home alters time**
- **Longing for spontaneity**
- **Evaluating time for self-care**
- **Partners grant a reprieve**
- **Garnering support**
- **Positive power**
- **Humor as a stabilizer**
- **Balanced perspective**
- **Yearning for old leisure**
- **Structured relief**
- **Modifying leisure**

Example interview question: **Modifying leisure**

Interview Question Objectives:	Interview Prompt:
Define the theme	The next question I'm going to ask you is about modifying leisure. In this session, think of modifying leisure as the act of changing or adapting what you do in your free time and who you spend your free time with as a result of your parent's dementia.
Elicit experience **Elicit Needs** **Elicit Challenges and Barriers** **Elicit Needs**	1) Do you feel that your parent's dementia impacted you in a way that forced you to modify your leisure? Were you able to modify your leisure? 1a) *IF YES:* What are some examples of how you successfully modified your leisure? 1b) *IF NO:* What are the issues that prevented you from modifying your leisure time? What are the issues that prevent you from having leisure time? What would need to happen for you to modify your leisure time?
Elicit Challenges and Barriers	2) What challenges can you think of, that other caregivers may have with modifying their leisure?

Researchers and designers should explore phenomenology as a tool for design. An interview created to consider a user's lived experience with a phenomenon is but one example of how phenomenology informs design. Other related fields such as ethnography, anthropology, and narrative studies offer a plethora of approaches to understanding people, though these have generally been under-utilized in design, while favor has been awarded to more technology-focused UCD methodologies. In order to maximize the quality and utility of a technology design, designers must make effort to understand the world through the eyes of their users.

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APPENDIX A. ELICITATION MATERIALS

A.1 Institutional Review Board Approval

A.1.1 Institutional Review Board Approval, Virginia Tech

VirginiaTech

Office of Research Compliance
Institutional Review Board
North End Center, Suite 4120, Virginia Tech
300 Turner Street NW
Blacksburg, Virginia 24061
540/231-4606 Fax 540/231-0959
email irb@vt.edu
website http://www.irb.vt.edu

MEMORANDUM

DATE: June 21, 2016

TO: Joseph L Gabbard Jr, Alice Haskins Lisle

FROM: Virginia Tech Institutional Review Board (FWA00000572, expires January 29, 2021)

PROTOCOL TITLE: User Requirements of Military Veterans for Technology to Facilitate Community Integration

IRB NUMBER: **15-688**

Effective June 20, 2016, the Virginia Tech Institution Review Board (IRB) Chair, David M Moore, approved the Continuing Review request for the above-mentioned research protocol.

This approval provides permission to begin the human subject activities outlined in the IRB-approved protocol and supporting documents.

Plans to deviate from the approved protocol and/or supporting documents must be submitted to the IRB as an amendment request and approved by the IRB prior to the implementation of any changes, regardless of how minor, except where necessary to eliminate apparent immediate hazards to the subjects. Report within 5 business days to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.

All investigators (listed above) are required to comply with the researcher requirements outlined at:

http://www.irb.vt.edu/pages/responsibilities.htm

(Please review responsibilities before the commencement of your research.)

PROTOCOL INFORMATION:

Approved As:	**Expedited, under 45 CFR 46.110 category(ies) 6,7**
Protocol Approval Date:	**July 8, 2016**
Protocol Expiration Date:	**July 7, 2017**
Continuing Review Due Date*:	**June 23, 2017**

*Date a Continuing Review application is due to the IRB office if human subject activities covered under this protocol, including data analysis, are to continue beyond the Protocol Expiration Date.

FEDERALLY FUNDED RESEARCH REQUIREMENTS:

Per federal regulations, 45 CFR 46.103(f), the IRB is required to compare all federally funded grant proposals/work statements to the IRB protocol(s) which cover the human research activities included in the proposal / work statement before funds are released. Note that this requirement does not apply to Exempt and Interim IRB protocols, or grants for which VT is not the primary awardee.

The table on the following page indicates whether grant proposals are related to this IRB protocol, and which of the listed proposals, if any, have been compared to this IRB protocol, if required.

Invent the Future

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An equal opportunity, affirmative action institution

A.1.2 Institutional Review Board Approval, Salem VAMC

Memorandum

Date: March 30, 2016

Alice Haskins Lisle, M.S.

Subj: Advertisement of Non-VA Research at Salem VAMC
To: IRB Chair or designee

Alice Haskins Lisle (PhD candidate from Virginia Tech) is requesting that an advertisement for a non-VA study, entitled "User Requirements of Military Veterans for Technology to Facilitate Community Integration" be posted or distributed at the Salem VA. This may include announcing, distributing, publishing, or advertising the study either electronically, by hard copy, or other means to anyone, including Veterans, clinicians, or other staff.

The IRB has reviewed the advertisement for this non-VA research project, and determined that the research:

- is relevant to Veterans and the mission of VA: ☑ yes ☐ no
- will not impede current VA research activities: ☑ yes ☐ no

The IRB has ensured that the advertisement:

- includes a clear and legible disclaimer statement that the **research** is not VA research, will not be conducted by VA, has not been approved by the Salem VAMC, and is not endorsed by VA ☑ yes ☐ no
- states that VA is not responsible for any costs incurred by a Veteran if the Veteran enters the study as a research subject ☑ yes ☐ no
- states that the advertisement is being provided for information only ☑ yes ☐ no

The IRB has evaluated whether or not the non-VA research activity should be submitted as a VA research activity (e.g., the Principal Investigator for the proposed non-VA activity is also a VA employee [i.e., dual appointee] wishing to recruit subjects at the Salem VA or could conduct some or all of the research at the VA): ☑ yes ☐ no

---

☑ The non-VA research advertisement may be posted or distributed at the Salem VA.

☐ The non-VA research advertisement may **not** be posted or distributed at the Salem VA.
Comments:

Shannon Munro, PhD, NP
Signature of IRB Chair or designee

VA FORM MAR 1989 **2105**

A.2 Recruitment Flyer

MILITARY VETERANS INVITED TO PARTICIPATE IN STUDY ABOUT TECHNOLOGY TO ASSIST WITH COMMUNITY INTEGRATION

Male military veterans who are between the ages of 18-35 are being recruited for a 30 minute-2 hour interview about community integration.

Participants will attend an interview to discuss requirements for a technology for veterans to use to help them integrate into their community. Interviews are audio-recorded and will take place at a location convenient for the veteran.

Compensation for participation is $15/hr. For more information, contact Ali Haskins Lisle at ahaskins@vt.edu or by phone at (540)-585-1588.

Ali H. Lisle (540)-585-1588
Military Veterans Study
ahaskins@vt.edu

Ali H. Lisle (540)-585-1588
Military Veterans Study
ahaskins@vt.edu

Ali H. Lisle (540)-585-1588
Military Veterans Study
ahaskins@vt.edu

Ali H. Lisle (540)-585-1588
Military Veterans Study
ahaskins@vt.edu

Ali H. Lisle (540)-585-1588
Military Veterans Study
ahaskins@vt.edu

Ali H. Lisle (540)-585-1588
Military Veterans Study
ahaskins@vt.edu

Ali H. Lisle (540)-585-1588
Military Veterans Study
ahaskins@vt.edu

Ali H. Lisle (540)-585-1588
Military Veterans Study
ahaskins@vt.edu

Ali H. Lisle (540)-585-1588
Military Veterans Study
ahaskins@vt.edu

Ali H. Lisle (540)-585-1588
Military Veterans Study
ahaskins@vt.edu

Ali H. Lisle (540)-585-1588
Military Veterans Study
ahaskins@vt.edu

Ali H. Lisle (540)-585-1588
Military Veterans Study
ahaskins@vt.edu

A.3 Screening Questionnaire

Thank you for your interest in our research. First, let me tell you a little bit about it, and you can decide if you may want to participate. I am interested in examining the needs of veterans who are trying to adjust to life after the military service and reintegrate into their communities. Once identified, these needs would be addressed with technology such as websites, e-health visits, or phone apps.

Your participation would involve an in-person interview session with me and a survey you fill out at the interview session. I would be interviewing you about topics related to community integration. Depending on which interview session you are assigned to, it could be a private interview or it could be a group interview with other veterans. If you do not wish to be in a group, I can probably accommodate you and interview you privately. I can interview you in Blacksburg or Roanoke, whichever is convenient for you. **All interviews are recorded with a sound recorder so my analysis after the interview may accurately reflect what was said in the interview.**

You will receive $15 for every hour you are in the interview session. This rate would be prorated and rounded up for every 20 minutes. Interviews will likely take between 30 minutes and 2 hours, depending on if it is an individual or group interview. You can withdraw from this research, discontinue the interview at any time, or reschedule it, all without any penalty.

Do you understand everything that I've stated so far?

<YES/NO>, explain anything that they indicate is unclear.

Are you interested in continuing to the screening questions to see if you would be a good fit for this study?

***<YES/NO>, if NO**:* Thank you for your call, have a nice day and please call back if you have any further questions or interest.

If YES:
Ok. I am going to ask you a series of questions, please answer these questions to the best of your ability. Let me know if you would prefer to skip or come back to a question. The answers you give me on this questionnaire will be used in my research if you end up deciding to come to the interview. If you decide not to participate, the data will be destroyed. Do I have your verbal consent to proceed with the first question?

1) What is your age? _____

*If not between 18-35: “I’m sorry, but at this time the required age range for this study is 18-35years old. If you’d like, I will keep your contact information on file and contact you if we expand our age range, if you’d like.”

2) When did you become a member of the military? _____

3) When did you become a veteran? _____

4) Have you ever been deployed? Y N

5) How many times have you been deployed?_____

6) Have you ever been diagnosed with PTSD?_____

7) Have you ever been diagnosed with anxiety or depression?_____

8) When were you diagnosed with PTSD ? _____

9) Have you ever had a traumatic brain injury (TBI)?_____

10) How often do you use the internet, on a computer or phone? <Every day, once or twice every week, once or twice every month, once every six months, yearly, or never>?

11) Is there a computer in your house? Y N

12) If yes, does it connect to the internet? Y N

13) Do you use the internet? Y N

14) Do you google search for topics? Y N

15) Do you view news media websites like CNN? Y N

16) Do you use social media like facebook Y N

or twitter?

17)Do you know how to bookmark a website? Y N

20) Do you have a smart phone (iphone, galaxy)? Y N

21) Have you ever downloaded an app? Y N

22) Do you text your contacts? Y N

23) Would you say you use your phone frequently, sometimes, or hardly at all?

24) Do you have a tablet like an ipad in your home? Y N

25) Do you own a handheld gaming system like PS Vita, Nintendo DS?
Y
N

26) Do you play games on your cell phone? Y
N

27) Do you own a home console like Xbox, Playstation, or Wii? Y
N

28) How many hours per week do you spend on leisure or game technology?_____

Okay. We are done with questions and it seems like you would be a fit for our research. If you'd like to continue, we can schedule your interview session. There is absolutely no penalty if you decide you do not want to participate. If you'd like to proceed, please tell me your general availability for an interview.

Okay. Could you please provide your email address or phone number? This way I can get in touch with you a few days before the interview so that I may remind you, and we can reschedule if necessary.

Please do not hesitate to call or email me if you have any questions. Do you have any further questions at this time for me?

<answer any questions>

Okay, great. Thanks again for your interest in our research. Goodbye.

_____ RESEARCHER USE_____

Participant # _____

A.4 Informed Consent Form

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

Informed Consent for Participation
in Human Subjects Research

Title of Project: User Requirements of Military Veterans for Technology to Facilitate Community Integration

Investigators: Ali Haskins Lisle, M.S. & Dr. Joseph Gabbard

I. Purpose
The objective of this project is to improve our knowledge of military veterans' needs and requirements for technologies to assist them with community integration as they are trying to adjust to life in their community after military service. You will help us obtain data that will be used to create a list of user needs to guide designers when they create technologies or applications for the military veteran user group.

II. Procedures
This project involves 1 study, but depending on how you are assigned, there are 4 possible procedures for this study. If you are uncomfortable participating in a group with other veterans, please let the researcher know and you may be assigned to a private individual session. Otherwise, you could be randomly placed in an individual or group session. Additionally, your session could involve an interview only, or, your session could involve an interview plus a design toolkit exercise. Each procedure is described below. For your session, the procedure will be reviewed again prior to beginning the session and you are free to ask questions at any time before or during the session. Procedures involving the interview and design exercise only are expected to last between 30 minutes and 1 hour. Procedures involving the interview, brainstorming session, and design exercise are expected to last between 1 hour and 2 hours.

If you decide you would like to participate, the first step of the procedure is completing the screening questionnaire, after which your interview session will be scheduled. On the day of your interview, you will be ushered to the interview room. The researcher will ask you if it is okay to begin recording with the audio recorder. If you do not wish to have your responses recorded, it will be necessary to compensate you for your time, after which you will exit the interview session. Your interview session will be audio recorded in order to have an accurate record of the discussions. Recordings will be confidential and your name will not be associated with the recording.

You will be assigned to ONE of the following procedures. You will not be asked to complete more than 1 of these procedures.

Procedure #1, Individual Interview + Design Exercise:

After being seated in the interview room, the interview will begin. With your permission, the audio recorder will be turned on. The interviewer will ask you questions about the following community integration topics: conformity, acceptance, orientation, independence, close relationships, diffuse relationships, productivity, and leisure. You may ask to skip a question at any time without penalty, or ask to come back to it later. You may withdraw from the study and

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Approved June 20, 2016 to July 7, 2017

be compensated for time already spent, or reschedule the session at any time without penalty. Once the interview is complete, you will be able to take a break if you'd like.

Next, we will do a design exercise. The first part of the exercise will involve filling out a survey. You will then draw up some of the most important features that you think an app or website needs to have to help veterans with community integration, and explain the features to the interviewer.

This will conclude the interview procedure.

Procedure #2, Group Interview + Design Exercise:

After being seated in the interview room, the interview will begin. With everyone's permission, the audio recorder will be turned on. The interviewer will ask everyone questions about the following community integration topics: conformity, acceptance, orientation, independence, close relationships, diffuse relationships, productivity, and leisure. You may ask to skip a question at any time without penalty, or ask to come back to it later. You may withdraw from the study and be compensated for time already spent, or reschedule the session at any time without penalty. Once the interview is complete, you will be able to take a break if you'd like.

Next, we will do a design exercise. The first part of the exercise will involve everyone filling out a survey. Then, as a group, you will then draw up some of the most important features that your group thinks an app or website needs to have in order to help veterans with community integration, and then your group will explain the features to the interviewer.

This will conclude the interview procedure.

Procedure #3, Individual Interview + KJ Session + Design Exercise:

After being seated in the interview room, the interview will begin. With your permission, the audio recorder will be turned on. The interviewer will ask you questions about the following community integration topics: conformity, acceptance, orientation, independence, close relationships, diffuse relationships, productivity, and leisure. You may ask to skip a question at any time without penalty, or ask to come back to it later. You may withdraw from the study and be compensated for time already spent, or reschedule the session at any time without penalty. Once the interview is complete, you will be able to take a break if you'd like.

Next, we will do a design exercise. The first part of the exercise will involve filling out a survey. After the survey is complete, you will come up with a list of all the functions you can think of that an app or website should have in order to help veterans with community integration (more on this later). You will then draw up some of the most important features that you think an app or website needs to have to help veterans with community integration, and explain the features to the interviewer.

This will conclude the interview procedure.

Procedure #4, Group Interview + KJ Session + Design Exercise:

After being seated in the interview room, the interview will begin. With your permission, the audio recorder will be turned on. The interviewer will ask you questions about the following community integration topics: conformity, acceptance, orientation, independence, close relationships, diffuse relationships, productivity, and leisure. You may ask to skip a question at any time without penalty, or ask to come back to it later. You may withdraw from the study and be compensated for time already spent, or reschedule the session at any time without penalty. Once the interview is complete, you will be able to take a break if you'd like.

Next, we will do a design exercise. The first part of the exercise will involve filling out a survey. After the survey is complete, you will come up with a list of all the functions you can think of that an app or website should have in order to help veterans with community integration (more on this later). You will then draw up some of the most important features that you think an app or website needs to have to help veterans with community integration, and explain the features to the interviewer.

This will conclude the interview procedure.

III. Risks and Benefits

The risks of this study are considered minimal. Should an injury occur, you will be responsible for the associated costs of treatment. Treatment costs are not the responsibility of the research team or Virginia Tech.

Although there are no direct benefits promised to you, your participation will help improve knowledge of technology as well as address how military veterans' knowledge and experience can contribute to technology design.

IV. Extent of Anonymity and Confidentiality

Your personal information and identity will be kept confidential. A unique participant ID code will be assigned to you, and all data, questionnaire responses, and experiment check sheets will be identified using only this participant ID code. Your name and any personal information you provide will never be connected with your unique data set. All individual information linking to a participant code will be collected in a file and locked when not being used. Only the investigators have access to the data. It is possible that the Institutional Review Board (IRB) may view this study's collected data for auditing purposes. The IRB is responsible for the oversight of the protection of human subjects involved in research.

V. Informed Consent

You will receive two copies of this informed consent document. One will be signed and kept on file with the research team, and the second is for your records.

VI. Compensation

You will be compensated for your participation at a rate of $15 per hour. Compensation will be limited to time spent in the experimental session (e.g., you will not be compensated for your travel to or from the study, or your completion of the online survey). Your total payment will vary, depending on the length of time for your testing, and portions of an hour will be compensated by rounding up to the nearest 20 minute portion of the hour.

VII. Freedom to Withdraw
You are free to withdraw from this study at any time without giving a reason, and there will be no penalty for doing so. If you choose to withdraw, you will be compensated for the testing time you've already completed. Furthermore, you are free not to answer any questions or to choose not to respond to experimental situations without penalty. There may be circumstances under which the investigator may determine that the experiment should not be continued. In this case, you will be compensated for the portion of the project completed.

VIII. Approval of Research
The Department of Industrial and Systems Engineering has approved this research, as well as the Institutional Review Board (IRB) for Research Involving Human Participants at Virginia Tech.

IX. Participant's Responsibilities
I voluntarily agree to participate in this study. I have the following responsibilities:

1. To read and understand the above instructions.
2. To answer questions, surveys, etc. honestly and to the best of my ability.
3. Be aware that I am free to ask questions or end my participation at any point in time.

X. Participant's Permission
I have read and understand the Informed Consent and conditions of this research project. I have had all my questions answered. I hereby acknowledge the above and give my voluntary consent for participation in this project.

If I participate, I reserve the right to withdraw at any time without penalty. I agree to fulfill the responsibilities, noted above, to the best of my ability, or to inform the investigators if I am unable to do so.

Participant's Signature Date

Experimenter's Signature Date

I acknowledge that for accurate data collection, an audio recording device is used to provide data to the researcher. I give my consent for the researcher to record the interview session. I understand I may ask the researcher to stop recording at any time.

Participant's Signature Date

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Approved June 20, 2016 to July 7, 2017

Should I have any questions about this research or its conduct, and research subjects' rights, and whom to contact in the event of a research-related injury to the subject, I may contact:

Ali Haskins Lisle, M.S. 540-585-1588 / ahaskins@vt.edu
Investigator Telephone/e-mail

Dr. Joseph L. Gabbard 540-231-3559/ jgabbard@vt.edu
Faculty Advisor Telephone/e-mail
Professor
Department of Industrial and Systems Engineering
557 Whittemore Hall (0118)
Blacksburg, VA 24061

David M. Moore 540-231-4991/moored@vt.edu
Telephone/e-mail
Chair, Virginia Tech Institutional Review Board for the Protection of Human Subjects
Office of Research Compliance
300 Turner Street NW, Suite 4120
Blacksburg, VA 24061

A.5 Glossary provided to participant

CONFORMITY your ability to fit in to your community and observe community rules and laws after becoming a veteran.

ACCEPTANCE your perception of being welcomed by the people of the community you are trying to integrate into.

ORIENTATION knowing your way around your community and how to get to important places.

CLOSE RELATIONSHIPS relationships that matter the most to you – perhaps with your parents, spouse, children, or close friends.

DIFFUSE RELATIONSHIPS relationships that aren't necessarily the most important, but the ones with people you come in contact with on a nearly daily basis. Your neighbors, cashiers, bus drivers, etc. People who work with you or work around you.

PRODUCTIVITY having a sense of purpose and structure to your day, whether it be through education you are pursuing, jobs or employment, or volunteer work.

LEISURE how you spend your free time in your community and who you interact with while doing so.

INDEPENDENCE the ability to do what you want when you want without help from other people or permission from other people.

LIVING SITUATION where you live and who you live with.

A.6 Interview Scripts

A.6.1 Individual Interview, Individual Design (II-ID) Script

Introduction

My name is Ali Lisle and I am a graduate student in the department of Industrial and Systems Engineering at Virginia Tech. The goal of today's experiment session is to improve our understanding of readjustment to civilian life of military veterans so that we can design products to meet veterans' needs.

Informed Consent

Before we begin, there are a few important things I need to review with you.

1.) Your participation in this interview is completely voluntary.
2.) If you decide not to participate, it will not impact you in any way.
3.) If there is a question you would rather not answer, just tell me and I will skip it.
4.) You can stop the session at any time, or we can reschedule the remainder of the session for another time.

This interview is completely confidential. Your name will not be used in any of the data analysis or report publications. We will assign a random participant number to your data and there will be a single sheet that lists participant names with their participant numbers, and this will be kept in a locked cabinet and destroyed after 3 years.

1.) Please read this informed consent form from Virginia Tech.
2.) Do you have any questions?
3.) If everything looks ok and you agree to participate, please sign and date the form.
4.) Please note that we would like to record this conversation, but we need your consent to do so. Please indicate your agreement or non-agreement with audio taping.

If the participant does not sign the form or chooses to leave before starting the interview: Thank you very much for your time and willingness to hear about our research.

If the participant signs the form: Thank you. Remember, let me know if you'd like to skip a question or stop the interview at any time, without penalty.

<u>Session Begins</u>

*****TURN ON TAPE RECORDER*****

This interview is more casual than formal. We are trying to learn as much as we can about the experiences veterans have with the adjustment back to civilian life.

We want to know about experiences you may have had, or possibly the experiences of other veterans that you know. The experiences and knowledge we gather from you here today will be used to guide and inspire new technology products and designs to help veterans integrate into their community. These are the topics we will be discussing today. ****GIVE PARTICIPANT THE GLOSSARY***
Do you have any questions so far?

Answer any questions the participant may have. If no questions, continue.

DOUBLE CHECK RECORDER IS ON

Ice Breaker
Before we get started on the research questions, please tell me about your military experience. Why did you join? When did you join? How many deployments did you experience? When did you become a veteran?

It is ok to ask additional questions if needed to promote conversation flow.

Ok, now we are going to talk about different themes of community reintegration. Difficulties with community reintegration was something identified by thousands of veterans in a study done by the VA in 2010. So we are trying to address it in our research. For each question, you can tell me about an experience that you had, or that another friend of yours from the military had. Basically we are trying to gather as much information as we can.

Conformity

The first question I'm going to ask you is about conformity. In this session, think of conformity as your ability to fit in to your community and observe community rules and laws after becoming a veteran.

1.) Do you feel a good sense of conformity in your community? Do you feel like you fit in? Please answer yes or no.

1 a.) IF *YES*:
What are some examples of how you were able to conform after becoming a veteran?

1 b.) IF *NO*:
What are the issues, maybe on both your part and the community's part, that make you feel this way?

What would need to happen for you to feel like you fit in?

2.) What challenges might veterans face in order to fit in and observe rules and laws in the civilian community?

Acceptance

The next question I'm going to ask you is about acceptance. In this session, think of acceptance as your perception of being accepted by the people of the community you are trying to integrate into.

1.) Do you feel a good sense of acceptance in your community? Do you feel like you belong there? Please answer yes or no.

1 a.) IF *YES*:
What are some examples of how you felt accepted by your community after becoming a veteran?

1 b.) IF *NO*:
What are the issues, maybe on both your part and the community's part, that prevented you from feeling accepted?

What would need to happen for you to feel accepted?

2.) What challenges can you think of, that may prevent a veteran from feeling accepted?

Orientation

The next question I'm going to ask you is about orientation. In this session, think of orientation as knowing your way around your community and how to get to important places.

1.) When you became a veteran, did you move to a brand new community or did you live in the same community that you lived in before your military career?

2.) Do you feel a good sense of orientation in your community? Do you feel like you don't need to worry about getting lost? Please answer yes or no.

2 a.) IF *YES*:
What are some examples of why you feel this way?

2 b.) IF *NO*:
What are the issues, maybe on both your part and the community's part, that

prevented you from feeling a good sense of orientation?

What would need to happen for you to feel orientation?

3.) What challenges can you think of, that may prevent a veteran from feeling a good sense of orientation?

Close Relationships

The next question I'm going to ask you is about close relationships. In this session, think of close relationships as those that matter the most to you – perhaps with your parents, spouse, children, or close friends.

1.) Do people you have close relationships with live in your community? Do you have easy access to these people? Please answer yes or no.

1 a.) IF *YES*:
What kinds of things make you feel supported in your close relationships in the community?

1 b.) IF *NO*:
What would need to happen for you to feel satisfied in your close relationships?

2.) What challenges can you think of, that may prevent a veteran from having close relationships in their communities?

Diffuse Relationships

The next question I'm going to ask you is about diffuse relationships. In this session, think of diffuse relationships as those relationships that aren't necessarily the most important, but the ones with people you come in contact with on a nearly daily basis. Your neighbors, cashiers, bus drivers, etc. People who work with you or work around you.

1.) Do you feel able to interact with people you are acquainted with? Do you feel you have access to them and can easily approach them? Please answer yes or no.

1 a.) IF *YES*:
What kinds of things make you feel supported in your diffuse relationships in the community?

1 b.) IF *NO*:

What would need to happen for you to feel like you have good support from people in your community that you have diffuse relationships with?

2.) What challenges can you think of, that may prevent a veteran from feeling at ease in approaching or talking to acquaintances in their communities?

Productivity

The next question I'm going to ask you is about productivity. In this session, think of productivity as having a sense of purpose and structure to your day, whether it be through education you are pursuing, jobs or employment, or volunteer work.

1.) Do you feel productive in your community? Please answer yes or no.

1 a.) IF *YES*:
What kinds of things make you feel productive in your community?

1 b.) IF *NO*:
What would need to happen for you to feel like you are productive in your community?

2.) What challenges can you think of, that may prevent veterans from feeling productive in their communities?

Leisure

The next question I'm going to ask you is about leisure. In this session, think of leisure as how you spend your free time in your community and who you interact with while doing so.

1.) Do you enjoy leisure time in your community? Please answer yes or no.

1 a.) IF *YES*:
What kinds of things are enjoyable leisure activities your community?

1 b.) IF *NO*:
What would need to happen for you to enjoy leisure time in your community?

2.) What challenges can you think of, that may prevent veterans from joining leisure activities in their community?

Independence

The next question I'm going to ask you is about independence. In this session,

think of independence as the ability to do what you want when you want without help from other people or permission from other people.

1.) Do you feel independent in your community? Please answer yes or no.

1 a.) IF *YES*:
What are some examples of why you feel independent your community?

1 b.) IF *NO*:
What would need to happen for you to feel independent in your community?

2.) What challenges can you think of, that may prevent veterans from feeling independence in their community?

Living Situation

The next question I'm going to ask you is about your living situation. In this session, think of living situation as where you live and who you live with.

1.) Since becoming a veteran, have you enjoyed your living situation in your community? Please answer yes or no.

1 a.) IF *YES*:
What kinds of things are enjoyable about your living situation in your community?

1 b.) IF *NO*:
What would need to happen for you to enjoy your living situation in your community?

2.) What challenges can you think of, that veterans may face with their living situation in their community?

Close Interview

What do you think is the hardest part about rejoining the civilian community when becoming a veteran?

Is there anything else you would like us to know about your experiences relating to community integration and transitioning?

****BREAK****

Would you like a break before we work on the next part of this exercise?

<u>Qualtrics Survey</u>

Please use the iPad to fill out this survey, after you complete this, we will begin our interview. You are participant #____.

KJ Session

For the next part of the exercise, you're going to make an affinity diagram with post-it notes. Don't worry if you have no idea what I'm talking about, I am going to guide you through the process. You will see a stack of post-it notes in front of you. Think about the questions you just answered in the interview. Now, I am going to ask you a question, and you will write down your response on the post-it notes. Please make sure you only write down one response per post-it note. Use as many post-it notes as you need. At the end you will have a bunch of post-it notes with single answers on them. The question is this: **Imagine that you are designing an app or website for veterans to use to help them with community integration. What features would this app or website need?**

Remember, one feature per post-it note.

1. Place your notes on the board. Take a moment to read over them and add any additional thoughts that you have.

2. Now we are going to make groups. Take two items that seem like they belong together and place them together, away from any other sticky notes. Then keep moving other like items into that group. Proceed with this by making more groups until your ideas are organized.

3. If, when reviewing a group, it doesn't quite make sense to you, please feel free to rearrange the items until the grouping makes sense.

4. Every item has to be in a group, though there are likely to be a few groups with only one item.

5. I want you to now give each group a name. Read through each group and write down a name that best represents each group on the new set of sticky notes I just gave you.

   A name is a noun cluster, such as 'Privacy Settings'. Please refrain from writing entire sentences.

   As you read through each group, you may realize that the group really has

   two themes. Feel free to split those groups up, as appropriate.

You may also notice that two groups really share the same theme. In that case, you can feel free to combine the two groups into one.

6. What are the most 3 important features that users need for this app to help with community integration? Answer this question by writing down the 3 groups that you feel are the most important.

   Now, please RANK these 3 groups from most important to least important. Place 3 “Xs” on the most important group, 2 “Xs” on the second most important, and a single X on the third most important group.

7. Please tell me why these 3 groups are so important.

*****DESIGN EXERCISE*****

PROTOTYPE

I want you to think about what this website or app that is meant to help a veteran with community integration would look like. Then, you can work on drawing out and explaining a few features that are important to you. You can draw out some examples of these 3 most important groups, or you can draw out some other features that you want to emphasize.

PERSONAS

Please take a couple of minutes to review these personas, based on real people. A persona is something we use in design to help us understand the people we are designing for. Veterans, though they are all in a group based on their military experience, can be very different people in different stages of their lives. These 2 personas represent those differences. Please read over the personas, and comment using your diagram and prototype as to how their needs will be addressed by your designs.

Okay, please begin your designs and please speak your thoughts, as we will be analyzing the audio recording. You may begin.

Can you think of anything else that’s very important that this app should do?

Thank you for your participation!

****Close session, pay participant****

A.6.2 Group Interview, Group Design (GI-GD) Script

Introduction

My name is Ali Lisle and I am a graduate student in the department of Industrial and Systems Engineering at Virginia Tech. The goal of today's experiment session is to improve our understanding of readjustment to civilian life of military veterans so that we can design products to meet your needs.

Informed Consent

Before we begin, there are a few important things I need to review with you.

1.) Your participation in this interview is completely voluntary.
2.) If you decide not to participate, it will not impact you in any way.
3.) If there is a question you would rather not answer, just tell me and I will skip it.
4.) You can stop the session at any time, or we can reschedule the remainder of the session for another time.

This interview is completely confidential. Your name will not be used in any of the data analysis or report publications. We will assign a random participant number to your data and there will be a single sheet that lists participant names with their participant numbers, and this will be kept in a locked cabinet and destroyed after 3 years.

1.) Please read this informed consent form from Virginia Tech.
2.) Do you have any questions?
3.) If everything looks ok and you agree to participate, please sign and date the form.
4.) Please note that we would like to record this conversation, but we need your consent to do so. Please indicate your agreement or non-agreement with audio taping.

If the participant does not sign the form or chooses to leave before starting the interview: Thank you very much for your time and willingness to hear about our research.

If the participant signs the form: Thank you. Remember, let me know if you'd like to skip a question or stop the interview at any time, without penalty.

<u>Session Begins</u>

*****TURN ON TAPE RECORDER*****

This interview is more casual than formal. We are trying to learn as much as we can about the experiences veterans have with the adjustment back to civilian life. We want to know about experiences you may have had, or possibly the experiences of other veterans that you know. The experiences and knowledge

we gather from you here today will be used to guide and inspire new technology products and designs to help veterans integrate into their community. These are the topics we will be discussing today ****GIVE PARTICIPANT THE GLOSSARY***
Do you have any questions so far?

Answer any questions the participant may have. If no questions, continue.

DOUBLE CHECK RECORDER IS ON

Ice Breaker
Before we get started on the research questions, please tell me about each of your military experience. Why did you join? When did you join? How many deployments did you experience? When did you become a veteran?

It is ok to ask additional questions if needed to promote conversation flow.

Ok, now we are going to talk about different themes of community reintegration. For each question, you can tell me about an experience that you had, or that another friend of yours from the military had.

Conformity

The first question I'm going to ask you all is about conformity. In this session, think of conformity as your ability to fit in to your community and observe community rules and laws after becoming a veteran.

1.) Do you feel a good sense of conformity in your community? Do you feel like you fit in? Please answer yes or no.

1 a.) IF *YES*:
What are some examples of how you were able to conform after becoming a veteran?

1 b.) IF *NO*:
What are the issues, maybe on both your part and the community's part, that make you feel this way?

What would need to happen for you to feel like you fit in?
*** Make sure each participant has a chance to answer***
2.) What challenges might veterans face in order to fit in and observe rules and laws in the civilian community?

Acceptance

The next question I'm going to ask you is about acceptance. In this session, think of acceptance as your perception of being welcomed by the people of the community you are trying to integrate into.

1.) Do you feel a good sense of acceptance in your community? Do you feel like you belong there? Please answer yes or no.

1 a.) IF *YES*:
What are some examples of how you felt accepted by your community after becoming a veteran?

1 b.) IF *NO*:
What are the issues, maybe on both your part and the community's part, that prevented you from feeling accepted?

What would need to happen for you to feel accepted?

*** Make sure each participant has a chance to answer***

2.) What challenges can you think of, that may prevent a veteran from feeling accepted?

Orientation

The next question I'm going to ask you is about orientation. In this session, think of orientation as knowing your way around your community and how to get to important places.

1.) When you became a veteran, did you move to a brand new community or did you live in the same community that you lived in before your military career?

2.) Do you feel a good sense of orientation in your community? Do you feel like you don't need to worry about getting lost? Please answer yes or no.

2 a.) IF *YES*:
What are some examples of why you feel this way?

2 b.) IF *NO*:
What are the issues, maybe on both your part and the community's part, that prevented you from feeling a good sense of orientation?

What would need to happen for you to feel orientation?

*** Make sure each participant has a chance to answer***

3.) What challenges can you think of, that may prevent a veteran from feeling a good sense of orientation?

Close Relationships

The next question I'm going to ask you is about close relationships. In this session, think of close relationships as those that matter the most to you – perhaps with your parents, spouse, children, or close friends.

1.) Do people you have close relationships with live in your community? Do you have easy access to these people? Please answer yes or no.

1 a.) IF *YES*:
What kinds of things make you feel supported in your close relationships in the community?

1 b.) IF *NO*:
What would need to happen for you to feel satisfied in your close relationships?

*** Make sure each participant has a chance to answer***

2.) What challenges can you think of, that may prevent a veteran from having close relationships in their communities?

Diffuse Relationships

The next question I'm going to ask you is about diffuse relationships. In this session, think of diffuse relationships as those relationships that aren't necessarily the most important, but the ones with people you come in contact with on a nearly daily basis. Your neighbors, cashiers, bus drivers, etc. People who work with you or work around you.

1.) Do you feel able to interact with people you are acquainted with? Do you feel you have access to them and can easily approach them? Please answer yes or no.

1 a.) IF *YES*:
What kinds of things make you feel supported in your diffuse relationships in the community?

1 b.) IF *NO*:
What would need to happen for you to feel like you have good support from people in your community that you have diffuse relationships with?

*** Make sure each participant has a chance to answer***

2.) What challenges can you think of, that may prevent a veteran from feeling at ease in approaching or talking to acquaintances in their communities?

Productivity

The next question I'm going to ask you is about productivity. In this session, think of productivity as having a sense of purpose and structure to your day, whether it be through education you are pursuing, jobs or employment, or volunteer work.

1.) Do you feel productive in your community? Please answer yes or no.

1 a.) IF *YES*:
What kinds of things make you feel productive in your community?

1 b.) IF *NO*:
What would need to happen for you to feel like you are productive in your community?

*** Make sure each participant has a chance to answer***

2.) What challenges can you think of, that may prevent veterans from feeling productive in their communities?

Leisure

The next question I'm going to ask you is about leisure. In this session, think of leisure as how you spend your free time in your community and who you interact with while doing so.

1.) Do you enjoy leisure time in your community? Please answer yes or no.

1 a.) IF *YES*:
What kinds of things are enjoyable leisure activities your community?

1 b.) IF *NO*:
What would need to happen for you to enjoy leisure time in your community?

*** Make sure each participant has a chance to answer***

2.) What challenges can you think of, that may prevent veterans from joining leisure activities in their community?

Independence

The next question I'm going to ask you is about independence. In this session, think of independence as the ability to do what you want when you want without help from other people or permission from other people.

1.) Do you feel independent in your community? Please answer yes or no.

1 a.) IF *YES*:
What are some examples of why you feel independent your community?

1 b.) IF *NO*:
What would need to happen for you to feel independent in your community?

*** Make sure each participant has a chance to answer***

2.) What challenges can you think of, that may prevent veterans from feeling independence in their community?

Living Situation

The next question I'm going to ask you is about your living situation. In this session, think of living situation as where you live and who you live with.

1.) Since becoming a veteran, have you enjoyed your living situation in your community? Please answer yes or no.

1 a.) IF *YES*:
What kinds of things are enjoyable about your living situation in your community?

1 b.) IF *NO*:
What would need to happen for you to enjoy your living situation in your community?

*** Make sure each participant has a chance to answer***

2.) What challenges can you think of, that veterans may face with their living situation in their community?

Close Interview

What do you think is the hardest part about rejoining the civilian community when becoming a veteran?

Is there anything else you would like us to know about your experiences relating to community integration and transitioning?

****BREAK****

Would you like a break before we work on the last part of this exercise?

Qualtrics Survey

****bring two iPads, make sure each participant has a chance to complete****
Please use the iPad to fill out this survey, after you complete this, we will begin our interview. You are participant #____.

KJ Session

For the next part of the exercise, you're going to make an affinity diagram with post-it notes. I am going to guide you through the process. You will see a stack of post-it notes in front of you. Think about the questions you just answered in the interview. Now, I am going to ask you a new question, and you will write down your response on the post-it notes. Please make sure you only write down one response or item per post-it note. Use as many post-it notes as you need. At the end you will have a bunch of post-it notes with your answers on them. The question is this: **Imagine that you are designing an app or website for veterans to use to help them with community integration. What features would this app or website need?**

Remember, one feature per post it note.

1. Place your notes on the board. Take a moment to read over them and add any additional thoughts that you have.

2. Now we are going to make groups. Take two items that seem like they belong together and place them together, away from any other sticky notes. Then keep moving other like items into that group. Feel free to move items into groups other people create. If, when reviewing someone else's group, it doesn't quite make sense to you, please feel free to rearrange the items until the grouping makes sense. Complete this step without any discussion of the sticky notes or the groups. Every item has to be in a group, it's okay if there are a few groups with only one item.

3. I want you to now give each group a name. Read through each group and write down a name that best represents each group on the new set of sticky notes I just gave you.

A name is a noun cluster, such as ‘Privacy Settings’. Please refrain from writing entire sentences.

As you read through each group, you may realize that the group really has two themes. Feel free to split those groups up, as appropriate.

You may also notice that two groups really share the same theme. In that case, you can feel free to combine the two groups into one.

Please give every group a name. A group can have more than one name. The only time you’re excused from giving a group a name is if someone has already used the EXACT WORDS you had intended to use.

Do not discuss the group names amongst the group.

4. What are the most 3 important features that users need for this app to help with community integration? Answer this question by writing down the 3 items that you feel are the most important on a piece of paper.

   Now, please RANK these 3 items from most important to least important on the board. Place 3 “Xs” on the item you feel is most important, 2 “Xs” on the second most important, and a single X on the third most important item.

5. **Grab the item name post it notes with votes and put them in order from most votes to least votes. Facilitator reads off item names.**

6. Please tell me why the top 3 of these are the most important.

Design Exercise

PROTOTYPE

I want you to think about what this website or app that is meant to help a veteran with community integration would look like. Then, you can work on drawing out and explaining a few features that are important to you. You can draw out some examples of these 3 most important groups, or you can draw out some other features that you want to emphasize.

Okay, please begin your designs and please speak your thoughts, as we will be analyzing the audio recording. You may begin.

PERSONAS

Please take a couple of minutes to review these personas, based on real people. A persona is something we use in design to help us understand the people we are designing for. Veterans, though they are all in a group based on their military experience, can be very different people in different stages of their lives. These 2 personas represent those differences. Please read over the personas, and comment using your diagram and prototype as to how their needs will be addressed by your designs.
Can you think of anything else that's very important that this app should do?
Thank you for your participation!

****Close session, pay participants****

A.6.3 Individual Design, Individual Interview (ID-II) Script

Introduction

My name is Ali Lisle and I am a graduate student in the department of Industrial and Systems Engineering at Virginia Tech. The goal of today's experiment session is to improve our understanding of readjustment to civilian life of military veterans so that we can design products to meet veterans' needs.

Informed Consent

Before we begin, there are a few important things I need to review with you.

5.) Your participation in this interview is completely voluntary.
6.) If you decide not to participate, it will not impact you in any way.
7.) If there is a question you would rather not answer, just tell me and I will skip it.
8.) You can stop the session at any time, or we can reschedule the remainder of the session for another time.

This interview is completely confidential. Your name will not be used in any of the data analysis or report publications. We will assign a random participant number to your data and there will be a single sheet that lists participant names with their participant numbers, and this will be kept in a locked cabinet and destroyed after 3 years.

5.) Please read this informed consent form from Virginia Tech.
6.) Do you have any questions?
7.) If everything looks ok and you agree to participate, please sign and date the form.
8.) Please note that we would like to record this conversation, but we need your consent to do so. Please indicate your agreement or non-agreement with audio taping.

If the participant does not sign the form or chooses to leave before starting the interview: Thank you very much for your time and willingness to hear about our research.

If the participant signs the form: Thank you. Remember, let me know if you'd like to skip a question or stop the interview at any time, without penalty.

<u>Session Begins</u>

*****TURN ON TAPE RECORDER*****

This exercise is more casual than formal. We are trying to learn as much as we can about the experiences veterans have with the adjustment back to civilian life. We want to know about experiences you may have had, or possibly the

experiences of other veterans that you know. The experiences and knowledge we gather from you here today will be used to guide and inspire new technology products and designs to help veterans integrate into their community. These are the topics we will be discussing today. ****GIVE PARTICIPANT THE GLOSSARY***
Do you have any questions so far?

Answer any questions the participant may have. If no questions, continue.

DOUBLE CHECK RECORDER IS ON

Ice Breaker
Before we get started on the research questions, please tell me about your military experience. Why did you join? When did you join? How many deployments did you experience? When did you become a veteran?

It is ok to ask additional questions if needed to promote conversation flow.

KJ Session
For this part of the exercise, you're going to make an affinity diagram with post-it notes. Don't worry if you have no idea what I'm talking about, I am going to guide you through the process. You will see a stack of post-it notes in front of you. Think about the questions you just answered in the interview. Now, I am going to ask you a question, and you will write down your response on the post-it notes. Please make sure you only write down one response per post-it note. Use as many post-it notes as you need. At the end you will have a bunch of post-it notes with single answers on them. The question is this: **Imagine that you are designing an app or website for veterans to use to help them with community integration. What features would this app or website need?**

Remember, one feature per post-it note.

1. Place your notes on the board. Take a moment to read over them and add any additional thoughts that you have.

2. Now we are going to make groups. Take two items that seem like they belong together and place them together, away from any other sticky notes. Then keep moving other like items into that group. Proceed with this by making more groups until your ideas are organized.

3. If, when reviewing a group, it doesn't quite make sense to you, please feel free to rearrange the items until the grouping makes sense.

4. Every item has to be in a group, though there are likely to be a few groups with only one item.

5. I want you to now give each group a name. Read through each group and write down a name that best represents each group on the new set of sticky notes I just gave you.

   A name is a noun cluster, such as 'Privacy Settings'. Please refrain from writing entire sentences.

   As you read through each group, you may realize that the group really has

   two themes. Feel free to split those groups up, as appropriate.

   You may also notice that two groups really share the same theme. In that

   case, you can feel free to combine the two groups into one.

6. What are the most 3 important features that users need for this app to help with community integration? Answer this question by writing down the 3 groups that you feel are the most important.

   Now, please RANK these 3 groups from most important to least important. Place 3 "Xs" on the most important group, 2 "Xs" on the second most important, and a single X on the third most important group.

7. Please tell me why these 3 groups are so important.

*****DESIGN EXERCISE*****

PROTOTYPE

I want you to think about what this website or app that is meant to help a veteran with community integration would look like. Then, you can work on drawing out and explaining a few features that are important to you. You can draw out some examples of these 3 most important groups, or you can draw out some other features that you want to emphasize.

PERSONAS

Please take a couple of minutes to review these personas, based on real people. A persona is something we use in design to help us understand the people we are designing for. Veterans, though they are all in a group based on their military experience, can be very different people in different stages of their lives. These 2 personas represent those differences. Please read over the personas, and comment using your diagram and prototype as to how their needs will be

addressed by your designs.

Okay, please begin your designs and please speak your thoughts, as we will be analyzing the audio recording. You may begin.

Can you think of anything else that's very important that this app should do?

****BREAK****

Would you like a break before we work on the next part of this exercise?

Ok, now we are going to talk about different themes of community reintegration. Difficulties with community reintegration was something identified by thousands of veterans in a study done by the VA in 2010. So we are trying to address it in our research. For each question, you can tell me about an experience that you had, or that another friend of yours from the military had. Basically we are trying to gather as much information as we can.

Conformity

The first question I'm going to ask you is about conformity. In this session, think of conformity as your ability to fit in to your community and observe community rules and laws after becoming a veteran.

1.) Do you feel a good sense of conformity in your community? Do you feel like you fit in? Please answer yes or no.

1 a.) IF *YES*:
What are some examples of how you were able to conform after becoming a veteran?

1 b.) IF *NO*:
What are the issues, maybe on both your part and the community's part, that make you feel this way?

What would need to happen for you to feel like you fit in?

2.) What challenges might veterans face in order to fit in and observe rules and laws in the civilian community?

Acceptance

The next question I'm going to ask you is about acceptance. In this session, think of acceptance as your perception of being accepted by the people of the

community you are trying to integrate into.

1.) Do you feel a good sense of acceptance in your community? Do you feel like you belong there? Please answer yes or no.

1 a.) IF *YES*:
What are some examples of how you felt accepted by your community after becoming a veteran?

1 b.) IF *NO*:
What are the issues, maybe on both your part and the community's part, that prevented you from feeling accepted?

What would need to happen for you to feel accepted?

2.) What challenges can you think of, that may prevent a veteran from feeling accepted?

Orientation

The next question I'm going to ask you is about orientation. In this session, think of orientation as knowing your way around your community and how to get to important places.

1.) When you became a veteran, did you move to a brand new community or did you live in the same community that you lived in before your military career?

2.) Do you feel a good sense of orientation in your community? Do you feel like you don't need to worry about getting lost? Please answer yes or no.

2 a.) IF *YES*:
What are some examples of why you feel this way?

2 b.) IF *NO*:
What are the issues, maybe on both your part and the community's part, that prevented you from feeling a good sense of orientation?

What would need to happen for you to feel orientation?

3.) What challenges can you think of, that may prevent a veteran from feeling a good sense of orientation?

Close Relationships

The next question I'm going to ask you is about close relationships. In this session, think of close relationships as those that matter the most to you – perhaps with your parents, spouse, children, or close friends.

1.) Do people you have close relationships with live in your community? Do you have easy access to these people? Please answer yes or no.

1 a.) IF *YES*:
What kinds of things make you feel supported in your close relationships in the community?

1 b.) IF *NO*:
What would need to happen for you to feel satisfied in your close relationships?

2.) What challenges can you think of, that may prevent a veteran from having close relationships in their communities?

Diffuse Relationships

The next question I'm going to ask you is about diffuse relationships. In this session, think of diffuse relationships as those relationships that aren't necessarily the most important, but the ones with people you come in contact with on a nearly daily basis. Your neighbors, cashiers, bus drivers, etc. People who work with you or work around you.

1.) Do you feel able to interact with people you are acquainted with? Do you feel you have access to them and can easily approach them? Please answer yes or no.

1 a.) IF *YES*:
What kinds of things make you feel supported in your diffuse relationships in the community?

1 b.) IF *NO*:
What would need to happen for you to feel like you have good support from people in your community that you have diffuse relationships with?

2.) What challenges can you think of, that may prevent a veteran from feeling at ease in approaching or talking to acquaintances in their communities?

Productivity

The next question I'm going to ask you is about productivity. In this session, think of productivity as having a sense of purpose and structure to your day, whether it be through education you are pursuing, jobs or employment, or volunteer work.

1.) Do you feel productive in your community? Please answer yes or no.

1 a.) IF *YES*:
What kinds of things make you feel productive in your community?

1 b.) IF *NO*:
What would need to happen for you to feel like you are productive in your community?

2.) What challenges can you think of, that may prevent veterans from feeling productive in their communities?

Leisure

The next question I'm going to ask you is about leisure. In this session, think of leisure as how you spend your free time in your community and who you interact with while doing so.

1.) Do you enjoy leisure time in your community? Please answer yes or no.

1 a.) IF *YES*:
What kinds of things are enjoyable leisure activities your community?

1 b.) IF *NO*:
What would need to happen for you to enjoy leisure time in your community?

2.) What challenges can you think of, that may prevent veterans from joining leisure activities in their community?

Independence

The next question I'm going to ask you is about independence. In this session, think of independence as the ability to do what you want when you want without help from other people or permission from other people.

1.) Do you feel independent in your community? Please answer yes or no.

1 a.) IF *YES*:

What are some examples of why you feel independent your community?

1 b.) IF *NO*:
What would need to happen for you to feel independent in your community?

2.) What challenges can you think of, that may prevent veterans from feeling independence in their community?

Living Situation

The next question I'm going to ask you is about your living situation. In this session, think of living situation as where you live and who you live with.

1.) Since becoming a veteran, have you enjoyed your living situation in your community? Please answer yes or no.

1 a.) IF *YES*:
What kinds of things are enjoyable about your living situation in your community?

1 b.) IF *NO*:
What would need to happen for you to enjoy your living situation in your community?

2.) What challenges can you think of, that veterans may face with their living situation in their community?

Close Interview

What do you think is the hardest part about rejoining the civilian community when becoming a veteran?

Is there anything else you would like us to know about your experiences relating to community integration and transitioning?

Qualtrics Survey

Please use the iPad to fill out this survey, after you complete this, we will begin our interview. You are participant #____.

Thank you for your participation!

****Close session, pay participant****

A.6.4 Group Design, Group Interview (GD-GI) Script

Introduction

My name is Ali Lisle and I am a graduate student in the department of Industrial and Systems Engineering at Virginia Tech. The goal of today's experiment session is to improve our understanding of readjustment to civilian life of military veterans so that we can design products to meet your needs.

Informed Consent

Before we begin, there are a few important things I need to review with you.

5.) Your participation in this interview is completely voluntary.
6.) If you decide not to participate, it will not impact you in any way.
7.) If there is a question you would rather not answer, just tell me and I will skip it.
8.) You can stop the session at any time, or we can reschedule the remainder of the session for another time.

This interview is completely confidential. Your name will not be used in any of the data analysis or report publications. We will assign a random participant number to your data and there will be a single sheet that lists participant names with their participant numbers, and this will be kept in a locked cabinet and destroyed after 3 years.

5.) Please read this informed consent form from Virginia Tech.
6.) Do you have any questions?
7.) If everything looks ok and you agree to participate, please sign and date the form.
8.) Please note that we would like to record this conversation, but we need your consent to do so. Please indicate your agreement or non-agreement with audio taping.

If the participant does not sign the form or chooses to leave before starting the interview: Thank you very much for your time and willingness to hear about our research.

If the participant signs the form: Thank you. Remember, let me know if you'd like to skip a question or stop the interview at any time, without penalty.

<u>Session Begins</u>

*****TURN ON TAPE RECORDER*****

This session is more casual than formal. We are trying to learn as much as we can about the experiences veterans have with the adjustment back to civilian life. We want to know about experiences you may have had, or possibly the experiences of other veterans that you know. The experiences and knowledge

we gather from you here today will be used to guide and inspire new technology products and designs to help veterans integrate into their community. These are the topics we will be discussing today ****GIVE PARTICIPANT THE GLOSSARY***
Do you have any questions so far?

Answer any questions the participant may have. If no questions, continue.

DOUBLE CHECK RECORDER IS ON

Ice Breaker
Before we get started on the research questions, please tell me about each of your military experience. Why did you join? When did you join? How many deployments did you experience? When did you become a veteran?

It is ok to ask additional questions if needed to promote conversation flow.

KJ Session

For the next part of the exercise, you're going to make an affinity diagram with post-it notes. I am going to guide you through the process. You will see a stack of post-it notes in front of you. Think about the questions you just answered in the interview. Now, I am going to ask you a new question, and you will write down your response on the post-it notes. Please make sure you only write down one response or item per post-it note. Use as many post-it notes as you need. At the end you will have a bunch of post-it notes with your answers on them. The question is this: **Imagine that you are designing an app or website for veterans to use to help them with community integration. What features would this app or website need?**

Remember, one feature per post it note.

1. Place your notes on the board. Take a moment to read over them and add any additional thoughts that you have.

2. Now we are going to make groups. Take two items that seem like they belong together and place them together, away from any other sticky notes. Then keep moving other like items into that group. Feel free to move items into groups other people create. If, when reviewing someone else's group, it doesn't quite make sense to you, please feel free to rearrange the items until the grouping makes sense. Complete this step without any discussion of the sticky notes or the groups. Every item has to

be in a group, it's okay if there are a few groups with only one item.

3. I want you to now give each group a name. Read through each group and write down a name that best represents each group on the new set of sticky notes I just gave you.

   A name is a noun cluster, such as 'Privacy Settings'. Please refrain from writing entire sentences.

   As you read through each group, you may realize that the group really has two themes. Feel free to split those groups up, as appropriate.

   You may also notice that two groups really share the same theme. In that case, you can feel free to combine the two groups into one.

   Please give every group a name. A group can have more than one name. The only time you're excused from giving a group a name is if someone has already used the EXACT WORDS you had intended to use.

   Do not discuss the group names amongst the group.

4. What are the most 3 important features that users need for this app to help with community integration? Answer this question by writing down the 3 items that you feel are the most important on a piece of paper.

   Now, please RANK these 3 items from most important to least important on the board. Place 3 "Xs" on the item you feel is most important, 2 "Xs" on the second most important, and a single X on the third most important item.

5. **Grab the item name post it notes with votes and put them in order from most votes to least votes. Facilitator reads off item names.**

6. Please tell me why the top 3 of these are the most important.

   <u>Design Exercise</u>

PROTOTYPE

I want you to think about what this website or app that is meant to help a veteran with community integration would look like. Then, you can work on drawing out and explaining a few features that are important to you. You can draw out some examples of these 3 most important groups, or you can draw out some other features that you want to emphasize.

Okay, please begin your designs and please speak your thoughts, as we will be analyzing the audio recording. You may begin.

PERSONAS

Please take a couple of minutes to review these personas, based on real people. A persona is something we use in design to help us understand the people we are designing for. Veterans, though they are all in a group based on their military experience, can be very different people in different stages of their lives. These 2 personas represent those differences. Please read over the personas, and comment using your diagram and prototype as to how their needs will be addressed by your designs.
Can you think of anything else that's very important that this app should do?

Thank you for your participation!

****BREAK****

Would you like a break before we work on the last part of this exercise?

Ok, now we are going to talk about different themes of community reintegration. Difficulties with community reintegration was something identified by thousands of veterans in a study done by the VA in 2010. So we are trying to address it in our research. For each question, you can tell me about an experience that you had, or that another friend of yours from the military had. Basically we are trying to gather as much information as we can.

Conformity

The first question I'm going to ask you all is about conformity. In this session, think of conformity as your ability to fit in to your community and observe community rules and laws after becoming a veteran.

1.) Do you feel a good sense of conformity in your community? Do you feel like you fit in? Please answer yes or no.

1 a.) IF *YES*:
What are some examples of how you were able to conform after becoming a

veteran?

1 b.) IF *NO*:
What are the issues, maybe on both your part and the community's part, that make you feel this way?

What would need to happen for you to feel like you fit in?

*** Make sure each participant has a chance to answer***

2.) What challenges might veterans face in order to fit in and observe rules and laws in the civilian community?

Acceptance

The next question I'm going to ask you is about acceptance. In this session, think of acceptance as your perception of being welcomed by the people of the community you are trying to integrate into.

1.) Do you feel a good sense of acceptance in your community? Do you feel like you belong there? Please answer yes or no.

1 a.) IF *YES*:
What are some examples of how you felt accepted by your community after becoming a veteran?

1 b.) IF *NO*:
What are the issues, maybe on both your part and the community's part, that prevented you from feeling accepted?

What would need to happen for you to feel accepted?

*** Make sure each participant has a chance to answer***

2.) What challenges can you think of, that may prevent a veteran from feeling accepted?

Orientation

The next question I'm going to ask you is about orientation. In this session, think of orientation as knowing your way around your community and how to get to important places.

1.) When you became a veteran, did you move to a brand new community or did you live in the same community that you lived in before your military career?

2.) Do you feel a good sense of orientation in your community? Do you feel like

you don't need to worry about getting lost? Please answer yes or no.

2 a.) IF *YES*:
What are some examples of why you feel this way?

2 b.) IF *NO*:
What are the issues, maybe on both your part and the community's part, that prevented you from feeling a good sense of orientation?

What would need to happen for you to feel orientation?

*** Make sure each participant has a chance to answer***

3.) What challenges can you think of, that may prevent a veteran from feeling a good sense of orientation?

Close Relationships

The next question I'm going to ask you is about close relationships. In this session, think of close relationships as those that matter the most to you – perhaps with your parents, spouse, children, or close friends.

1.) Do people you have close relationships with live in your community? Do you have easy access to these people? Please answer yes or no.

1 a.) IF *YES*:
What kinds of things make you feel supported in your close relationships in the community?

1 b.) IF *NO*:
What would need to happen for you to feel satisfied in your close relationships?

*** Make sure each participant has a chance to answer***

2.) What challenges can you think of, that may prevent a veteran from having close relationships in their communities?

Diffuse Relationships

The next question I'm going to ask you is about diffuse relationships. In this session, think of diffuse relationships as those relationships that aren't necessarily the most important, but the ones with people you come in contact with on a nearly daily basis. Your neighbors, cashiers, bus drivers, etc. People who work with you or work around you.

1.) Do you feel able to interact with people you are acquainted with? Do you feel you have access to them and can easily approach them? Please answer yes or no.

1 a.) IF *YES*:
What kinds of things make you feel supported in your diffuse relationships in the community?

1 b.) IF *NO*:
What would need to happen for you to feel like you have good support from people in your community that you have diffuse relationships with?

*** Make sure each participant has a chance to answer***

2.) What challenges can you think of, that may prevent a veteran from feeling at ease in approaching or talking to acquaintances in their communities?

Productivity

The next question I'm going to ask you is about productivity. In this session, think of productivity as having a sense of purpose and structure to your day, whether it be through education you are pursuing, jobs or employment, or volunteer work.

1.) Do you feel productive in your community? Please answer yes or no.

1 a.) IF *YES*:
What kinds of things make you feel productive in your community?

1 b.) IF *NO*:
What would need to happen for you to feel like you are productive in your community?

*** Make sure each participant has a chance to answer***

2.) What challenges can you think of, that may prevent veterans from feeling productive in their communities?

Leisure

The next question I'm going to ask you is about leisure. In this session, think of leisure as how you spend your free time in your community and who you interact with while doing so.

1.) Do you enjoy leisure time in your community? Please answer yes or no.

1 a.) IF *YES*:

What kinds of things are enjoyable leisure activities your community?

1 b.) IF *NO*:
What would need to happen for you to enjoy leisure time in your community?
*** Make sure each participant has a chance to answer***

2.) What challenges can you think of, that may prevent veterans from joining leisure activities in their community?

Independence

The next question I'm going to ask you is about independence. In this session, think of independence as the ability to do what you want when you want without help from other people or permission from other people.

1.) Do you feel independent in your community? Please answer yes or no.

1 a.) IF *YES*:
What are some examples of why you feel independent your community?

1 b.) IF *NO*:
What would need to happen for you to feel independent in your community?
*** Make sure each participant has a chance to answer***

2.) What challenges can you think of, that may prevent veterans from feeling independence in their community?

Living Situation

The next question I'm going to ask you is about your living situation. In this session, think of living situation as where you live and who you live with.

1.) Since becoming a veteran, have you enjoyed your living situation in your community? Please answer yes or no.

1 a.) IF *YES*:
What kinds of things are enjoyable about your living situation in your community?

1 b.) IF *NO*:
What would need to happen for you to enjoy your living situation in your community?
*** Make sure each participant has a chance to answer***

2.) What challenges can you think of, that veterans may face with their living situation in their community?

Close Interview

What do you think is the hardest part about rejoining the civilian community when becoming a veteran?
Is there anything else you would like us to know about your experiences relating to community integration and transitioning?
Qualtrics Survey
****bring two iPads, make sure each participant has a chance to complete****Please use the iPad to fill out this survey, after you complete this, we will begin our interview. You are participant #____.

Thank you for your participation!
****Close session, pay participants****

A.7 Personas provided to participant

KEITH WILSON

Goals: Connect with other military veterans, keep life organized, balance family dynamics.

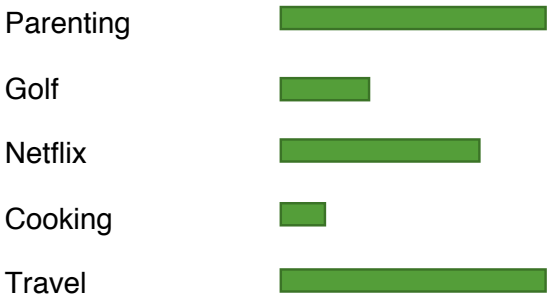
Pain Points: Helping more with the kids while his wife furthers her education. Trying to get in the groove of the day to day appointments, lessons, and pickups. He feels his previous identity from the military is becoming blurred. Tries not to argue with his wife but is feeling overwhelmed with all the family and household work he is doing. Is debating getting a part time job and pay a sitter to save his sanity.

Backstory:

Keith was in the Navy for 10 years and then medically retired. Coming home to his wife and kids was a welcome relief, but is beginning to feel a little suffocating. Being in a town your family has lived in for years has its benefits of familiarity, but it also can feel confining and boring.

Keith loves being home with his wife and kids but is also feeling like no one really “gets” him. He is exhausted a lot but also feels like he could be doing something else to improve life for his family.

Activities + Interests:



On His Radar:

Wife + Kids

Job?

Other vets

Other method for support?

MARK STEPHENSON

Goals: Become an active member of his new community. Investigate new possibilities for housing. Adjust to life back in U.S.

Pain Points: Kind of keeps to himself, feels a little disconnected now that his Army buddies are scattered in different places. Having difficulty with the day-to-day mundane, and finding a sense of purpose.

Backstory:

Mark was in the Army for 5 years and then medically retired. He returned to his hometown but quickly realized that he wanted to be somewhere different and do something different. Always passionate about technology, Mark decided to move to a new city that was well known for companies that hire technology-minded people.

Mark has never visited the city before and plans to job search as soon as he secures housing. He doesn't know any people who live in this city. He is a little worried but excited about this new chapter in his life.

Mark has never formally been diagnosed with PTSD or anxiety, but finds that sometimes he is wary of new people, and sometimes situations that are seemingly innocent create "panic for no reason". This is difficult to manage given Mark's desire to transplant his life to a totally new place and career.

Activities + Interests:

- Halo / Call of Duty
- Hiking
- Military History
- Shooting Range
- Socializing
- Computers

On His Radar:

- Housing
- Employment
- Find Way around City
- Find New Friends
- Contact new VA/See Doctor?

A.8 Post-Interview Qualtrics Survey

A.8.1 Community Integration Measure

For each of the following statements, please indicate whether you agree or disagree:				
1. I feel like part of this community, like I belong here.				
□ Always agree	□ Sometimes agree	□ Neutral	□ Sometimes disagree	□ Always disagree
2. I know my way around this community.				
□ Always agree	□ Sometimes agree	□ Neutral	□ Sometimes disagree	□ Always disagree
3. I know the rules in this community and I can fit in with them.				
□ Always agree	□ Sometimes agree	□ Neutral	□ Sometimes disagree	□ Always disagree
4. I feel that I am accepted in this community.				
□ Always agree	□ Sometimes agree	□ Neutral	□ Sometimes disagree	□ Always disagree
5. I can be independent in this community.				
□ Always agree	□ Sometimes agree	□ Neutral	□ Sometimes disagree	□ Always disagree
6. I like where I'm living now.				
□ Always agree	□ Sometimes agree	□ Neutral	□ Sometimes disagree	□ Always disagree
7. There are people I feel close to in this community.				
□ Always agree	□ Sometimes agree	□ Neutral	□ Sometimes disagree	□ Always disagree
8. I know a number of people in this community well enough to say hello and have them say hello back.				
□ Always agree	□ Sometimes agree	□ Neutral	□ Sometimes disagree	□ Always disagree
9. There are things that I can do in this community for fun in my free time.				
□ Always agree	□ Sometimes agree	□ Neutral	□ Sometimes disagree	□ Always disagree
10. I have something to do in this community during that main part of my day that is useful and productive.				
□ Always agree	□ Sometimes agree	□ Neutral	□ Sometimes disagree	□ Always disagree

Coding: 5, always agree; 4, sometimes agree; 3, neutral; 2, sometimes disagree; 1, always disagree.

Taken from McColl, M.A., Davies, D., Carlson, P., Johnston, J., & Minnes, P. (2001). The community integration measure: Development and preliminary validation. *Physical Medicine and Rehabilitation*, *82*(4), 429-434.

A.8.2 Demographic Questionnaire and Theme Ranking

Q1 Participant #

Q2 Marital Status
- ❍ Single (1)
- ❍ Married (2)
- ❍ Divorced/Separated (3)
- ❍ Widower (4)

Q3 Ethnicity
- ❍ African American (1)
- ❍ Asian/Pacific Islander (2)
- ❍ Caucasian/White (3)
- ❍ Hispanic/Latino (4)
- ❍ Middle Eastern (5)
- ❍ Native American (6)
- ❍ Other (7) _____

Q4 Branch(es) of the Military
- ❑ Air Force (1)
- ❑ Army (2)
- ❑ Coast Guard (3)
- ❑ Marine Corps (4)
- ❑ Navy (5)

Q5 Highest level of education completed
- ❍ High School/GED (1)
- ❍ Some College (2)
- ❍ Bachelor's Degree (3)
- ❍ Bachelor's and some Graduate Work (4)
- ❍ Graduate (ex. M.S., Ph.D.) Degree (5)

Q6 With the interview we just had in mind, please rank these community integration themes from most important (#1 position) to least important (#9

position) to you. Drag and drop the words with your finger until you are satisfied with your rankings.

_____ Acceptance (1)

_____ Close Relationships (2)

_____ Conformity (3)

_____ Diffuse Relationships (4)

_____ Independence (5)

_____ Leisure (6)

_____ Living Situation (7)

_____ Orientation (8)

_____ Productivity (9)

Q7 With the interview we just had in mind, please rank these community integration themes from most difficult to achieve (#1 position) to least difficult to achieve (#9
position) to you. Drag and drop the words with your finger until you are satisfied with your rankings. MOST DIFFICULT #1, LEAST DIFFICULT #9

_____ Acceptance (1)

_____ Close Relationships (2)

_____ Conformity (3)

_____ Diffuse Relationships (4)

_____ Independence (5)

_____ Leisure (6)

_____ Living Situation (7)

_____ Orientation (8)

_____ Productivity (9)

APPENDIX B. FIRST-CYCLE CODING MATERIALS + ANALYSES

B.1 Coding Instructions

B.1.1 Coding

4994 General Guide to Transcribing and Coding

Transcribing

1. Ali will be conducting interviews and will record them with an audio recorder. She will post the audio file to Scholar project site. These audio files have to be transcribed and validated. One person will be the transcriber and another person will validate the transcribed file to catch any mistakes of the first transcriber. Ali does a final verification of the transcripts.

2. Ali has 4 different interview settings that will determine what the veteran(s) will be doing in that specific experiment. The session can either be an individual or group session. Also, they may do the interview session first or the design session first. You will be able to tell which one was done first by the icebreaker. When Ali asks about their military experience at the beginning of the recording, you know that was the first session. Every setting will have a different naming convention for the word document of the transcript. Below you can see what to name these files once you have either transcribed or validated a file.

3. Each transcribed interview should be Times New Roman 12 pt. font. The page should have line numbers on the left side. This is a setting in Word. Anything the veteran says should be bolded. Notate the speaker by P#. Place a line space between P# speaking and Ali speaking. See Figure 1. for a transcript example. The naming convention for the word documents of transcripts is in Table 1.

Table 1. Naming Convention for Transcribed Interviews

Setting	Naming Convention-Transcribed First Draft Version	Naming Convention-Verified Final Version
Individual	P#_I_Transcribed.doc for the Interview section. P#_KJD_Transcribed.doc for the KJ + Design section	P#_I_Verified.doc for the validated Interview section. P#_KJD_Verified.doc for the validated KJ + Design section

Group	P#P#_KJD_ Transcribed.doc fo the Design section	P#P#_KJD_ Verified.doc for the Design section

4. Use the scholar project site to find transcripts. Track progress and assign yourself audio files or verification of first draft transcripts by viewing the google sheet that's been shared with you "Coder Assignments", and signing up with your name in any blank spaces. Notice the rows are the participant number, and the columns distinguish where in the process the participant transcript is: Transcribed, Verified, or Final.

5. ALL ANALYSIS FOR MEANING UNITS MUST USE THE FINAL TRANSCRIPT FILE!!!!!!!

Coding

1. READ THE INTERVIEW TRANSCRIPT.

   Ali: What challenges might veterans face in order to fit in and observe rules and laws in the civilian community?

   P31: Just not for me but for veterans in general... I think for Joe the big issue is, you know, you are around people your own age and same job essentially for a large part of your life and you're always kind of supporting each other and looking out for each other and then finding yourself essentially without that supervision if you want to call it that in the community, I think that results in maybe more run-ins with the law and some things like that just because they don't have their buddy to, you know, pull them out of the bar when they need to be or they have this new found freedom where they're not being drug tested every month and a half. so I think not having that kind of

rigid supervision and support network that they had previously can be a challenge for them.

2. WITH CODEBOOK BY YOU, HIGHLIGHT IMPORTANT CHUNKS AND COLOR CODE WITH CODEBOOK. ADD APPROPRIATE CODE NUMBER IN PARENTHESES AFTER CHUNK.

   Ali: What challenges might veterans face in order to fit in and observe rules and laws in the civilian community?

   P31: Just not for me but for veterans in general... I think for Joe the big issue is, you know, you are around people your own age and same job (6.1) essentially for a large part of your life and you're always kind of supporting each other and looking out for each other (5.15) and then finding yourself essentially without that supervision (6.2) if you want to call it that in the community, I think that results in maybe more run-ins with the law(7) and some things like that just because they don't have their buddy to, you know, pull them out of the bar(3.5) when they need to be or they have this new found freedom(6.2) where they're not being drug tested(3.5) every month and a half. so I think not having that kind of rigid supervision(6.1, 6.2) and support network(5.15) that they had previously can be a challenge for them.

   *FOR KJD, CODE BASED ON WHAT TOPIC AREA THEIR DESIGN SPEC WOULD ADDRESS.

   P#: Like a way to put in everything you did in the military, and the app spits out "okay, this is what you should do in the civilian world." (1.4)

3. COPY AND PASTE EXCERPTS INTO **YOUR** EXCEL FILE (CODER_YOURFIRSTNAME). YOUR EXCEL FILE CONTAINS **ALL** OF THE PARTICIPANTS YOU'VE ANALYZED. (YOU WILL UPLOAD THIS AT THE END OF THE SEMESTER). DO NOT PASTE EXCERPTS INTO GOOGLE SHEET "RECONCILED CODE" UNTIL **AFTER** MEETING WITH OTHER CODER.

4. MEET WITH OTHER CODER AND RECONCILE = AGREE WHERE YOU CAN.

    a. ADD AGREEMENTS TO GOOGLE SHEET “RECONCILED CODES”
    b. ADD DISAGREEMENTS TO JUDGE LIST (PARTICIPANT#_DISAGREEMENTS). MAKE A NEW EXCEL FILE FOR EACH PARTICIPANT (2 CODERS MAKE 1 EXCEL FILE TOGETHER). **UPLOAD.**

5. PLACE AGREEMENTS IN GOOGLE SHEET “RECONCILED CODES” BEFORE MEETING WITH JUDGE.

6. MEET WITH THE JUDGE AND GO OVER DISAGREEMENTS.

7. JUDGE IS “TIE BREAKER”. ADD FINAL AGREEMENTS TO GOOGLE SHEET “RECONCILED CODES”, SIGNIFY JUDGE DECISIONS WITH A “J”.

<u>A note about organization:</u>
It is VERY important to keep these excel files orderly. For the coder excel file and the “reconciled codes” google sheet which mimics the coder excel files, keep rows in order BY participant number (participant 5 is above participant 15) AND by line number (transcript line 5’s code is above transcript line 45’s code for a participant). Keep interview data above KJD data for a participant.

This order should be reflected in YOUR excel file (Coder_YourFirstName) and in the Google Sheet (reconciled codes).

<u>A note about agreements vs. disagreements:</u>

What defines an “agreement” between coders?

- Coder 1 and Coder 2 coded roughly the same chunk of words as the same x.x number.
- Coder 1 coded a chunk, coder 2 did not code that chunk, but agrees the code fits.
- Coder 1 and Coder 2 did not code a chunk the same way, but after discussing with each other, can agree that one of the codes is more fitting than the other.

<u>Anything that doesn’t fit in the above bullets is a disagreement!</u>

- Place it in the disagreements excel file for that participant and let the judge decide.
- Place data into category that reflects final coding decision determined by judge
- Place a “J” in the furthest right hand column of that row.

B.1.2 Codebook

1. **Employment + Education** Highlight Color Green
   - 1.1 Difficulty finding employment
   - 1.2 Not ideal employment (ex. not interesting, not fulfilling)
   - 1.3 Overqualified for job obtained
   - 1.4 No clear translation of skills to civilian world
   - 1.5 Need to avoid stressful or traumatic jobs
   - 1.6 Discrimination
   - 1.7 Favoritism/ease of finding employment
   - 1.8 GI Bill issues
   - 1.9 Rule bending/rule breaking/tardiness issues
   - 1.10 Civilian attitude towards school + job (ex.: lazy, apathy, partying, dog eat dog)
   - 1.11 School environment/culture issues
   - 1.12 Feeling "back at square one" when military employment ends
   - 1.13 Having an "all business" approach to college/getting a degree (get in, get out)

2. **Financial** Highlight Color Yellow
   - 2.1 Strain or difficulty
   - 2.2 Housing issues
   - 2.3 VA Disability-related monetary issues

3. **Physical Health** Highlight Color Blue
   - 3.1 Injury occurred + evident during service
   - 3.2 Delayed onset injury (manifests after discharge)
   - 3.3. Dietary/weight management/exercise
   - 3.4 Sleep issues
   - 3.5 Drug/Alcohol abuse by self or other vet

4. **Mental + Emotional Health** Highlight Color Pink
   - 4.1 Emotional difficulties connecting with loved ones
   - 4.2 Anxiety + PTSD + Traumatic experiences
   - 4.3 Issues with feeling like a valuable member of society
   - 4.4 Suicidal thoughts/attempts
   - 4.5 Anger with civilians or close relationships
   - 4.6 No desire to be in large crowds/bars/movie theaters; threat assessment
   - 4.7 Enjoyment of leisure time, "me time"
   - 4.8 Fulfillment through helping others/community and volunteer work

5. **Relationships** Highlight Color Red

   <u>CIVILIANS</u>
   - 5.1 Difficulty relating to or interacting with civilians (incl. age diff at school/work, feeling misunderstood)
   - 5.2 Disrespect or criticism by civilians
   - 5.3 "Have you ever killed anyone?"
   - 5.4 Civilians are materialistic/worried about trivial things
   - 5.5 Vet-phobia, stigma, and stereotypes
   - 5.6 Racism
   - 5.7 Praise or appreciation by civilians
   - 5.8 "We know things about the world that the average civilian doesn't", different world view, vets have a more holistic world view

FRIENDS AND FAMILY
5.9 Support from friends and family
5.10 Leisure time, spending time with friends and family
5.11 Issues/lack of support from friends and family
5.12 Drug/alcohol abuse by friends or family
5.13 Separation from spouse/kids (ex. divorce/cheating, missing kid's milestones)

GOD/CHURCH
5.14 Relationship with spiritual/religious figure

OTHER VETS + THEN VS. NOW
5.15 Support through interaction with other veterans
5.16 Lack of brotherhood/support after military
5.17 Ease or difficulty relating to older/Vietnam Vets

6. **Military and VA** Highlight Color Purple
   6.1 Discrepancy between regimented life and veteran/civilian life
   6.2 Difficulty transitioning to independent adulthood
   6.3 Military helped with autonomy/independence
   6.4 Lack of empathy from military
   6.5 Lack of empathy from VA
   6.6 Difficulty obtaining VA benefits
   6.7 VA accountability/competence and communication
   6.8 Anger with other vets who malinger/game the system
   6.9 Think highly of other vets (ex. vets are hardworking)
   6.10 Guilt for receiving more benefits than another "more deserving" vet
   6.11 The Reserves

B.1.3 Coder Meeting

CODER MEETING PROCESS

1. VIEW THE GOOGLE SHEET THAT HAS BEEN SHARED, “CODER ASSIGNMENTS”. NOTICE THERE ARE TWO TABS, “TRANSCRIBING” AND “CODING”. MAKE SURE YOU ARE ON THE “CODING TAB”

2. YOU WILL SEE PARTICIPANT 2 – PARTICIPANT 41. PARTICIPANTS WHO WERE IN A GROUP SETTING (COMPLETED THE SESSION TOGETHER) ARE ON THE SAME ROW BECAUSE THEY ARE ON THE SAME TRANSCRIPT. IF YOU LOOK IN THE COLUMNS, THERE IS A COLUMN FOR CODER 1, A COLUMN FOR CODER 2, AND A COLUMN FOR A JUDGE. YOU SIGN UP BY PLACING YOUR NAME IN THE APPROPRIATE CELL FOR THE SESSION AND THE ROLE YOU WANT TO TAKE. EVERYONE WILL CODE, AND EVERYONE WILL JUDGE.

3. NOTICE ON THE “CONTACT” TAB, THERE IS A LIST OF ALL CODERS’ NAMES AND EMAIL ADDESSES. WHEN YOU COMPLETE CODING FOR A SESSION, (BOTH THE INTERVIEW AND THE DESIGN PORTIONS), CONTACT THE OTHER CODER AND SET UP A CODER MEETING.

4. CONTACT ME OR RHONDA ABOUT RESERVING A ROOM. YOU MAY WANT A ROOM WITH PROJECTION CAPABILITIES TO MAKE IT EASIER TO VIEW BOTH SCREENS. YOU CAN ALSO USE 2 EXTERNAL MONITORS IN COGENT LAB SO YOU CAN VIEW CODING RESULTS SIDE BY SIDE.

5. MEET WITH THE OTHER CODER. DECIDE IF YOU WANT TO EXAMINE THE INTERVIEW OR DESIGN SESSION FIRST. OPEN YOUR RESPECTIVE CODING FOR THOSE SESSIONS.

6. LINE BY LINE, GO THROUGH YOUR TRANSCRIPTS AND CODES. IT IS OKAY IF A MEANING UNIT IS CODED BY BOTH OF YOU, BUT ONE OF YOU CODED A SLIGHTLY LONGER OR SHORTER FRAGMENT. PLACE THE LONGER FRAGMENT INTO THE RECONCILED CODES SHEET, TO RETAIN CONTEXT.

7. A NOTE ABOUT RECONCILED CODES: YOU’LL NOTICE ANOTHER GOOGLE SHEET HAS BEEN SHARED WITH YOU: RECONCILED CODES. NOTICE THE TABS ARE THE MACROS THEMES: EMPLOYMENT AND EDUCATION, FINANCIAL, PHYSICAL HEALTH, ETC. COLUMN A CONTAINS THE SUBTHEMES FOR EACH MACROTHEME. ENSURE YOU ARE PASTING MEANING UNITS INTO THE CORRECT CATEGORIZATION: MACROTHEME (CORRECT TAB), AND SUBTHEME (CORRECT ROW CHUNK IN EXCEL).

8. THERE WILL BE TIMES WHEN YOU AND THE OTHER CODER DISAGREE ON CODING. THIS IS FINE! PLEASE NOTE YOUR DISAGREEMENTS USING THE DISAGREEMENTS TEMPLATE, WHICH THE JUDGE WILL THEN DOWNLOAD FOR YOUR RECONCILIATION MEETING (AND YOU WILL DOWNLOAD FOR OTHER CODERS WHEN YOU ARE SERVING AS THEIR JUDGE).

9. WHAT DOES IT MEAN TO AGREE OR DISAGREE? GENERALLY SPEAKING:

Coder 1 Action	Coder 2 Action	Classification	Result
Coded meaning unit	Coded meaning unit with same macro- and sub-theme	Agreement	Meaning unit placed in reconciled corpus
Coded meaning unit	Coded meaning unit with same macro- but different sub-theme	Disagreement	Meaning unit placed in disagreements list
Coded meaning unit	Did not code meaning unit, but agrees it should be coded, and agrees with coder 1 categorization	Agreement	Meaning unit placed in reconciled corpus
Coded meaning unit	Did not code meaning unit, believes coder 1 meaning unit is irrelevant	Disagreement	Meaning unit placed in disagreements list
Coded meaning unit	Did not code meaning unit, but agrees it should be coded, but disagrees with coder 1 categorization	Disagreement	Meaning unit placed in disagreements list

NOTICE ANY AGREEMENTS AUTOMATICALLY GETS PLACED IN THE RECONCILED GOOGLE SHEET. I RECOMMEND DOING THIS IMMEDIATELY, ONCE AN AGREEMENT IS DISCOVERED. ANY DISAGREEMENT THAT IS RECOGNIZED SHOULD BE PLACED IN THE DISAGREEMENTS LIST IMMEDIATELY, WITH THE REASONING FOR WHY YOU DISAGREED (YOU MAY FORGET THIS BY THE TIME THE MEETING WITH THE JUDGE HAPPENS!)

10. IF YOU HAVE SOMETHING THAT STARTS OUT AS A DISAGREEMENT, BUT ARE ABLE TO COME TO AN AGREEMENT, THEN PLACE IT ON THE RECONCILED GOOGLE SHEET. NO NEED FOR THE JUDGE TO EXAMINE.

11. AFTER THE CODER MEETING

    a. CONTACT THE JUDGE, CC THE OTHER CODER, AND SCHEDULE A TIME TO HAVE YOUR RECONCILIATION MEETING.
    b. ATTACH THE DISAGREEMENT LIST TO THE JUDGE SO HE CAN REVIEW THE TRANSCRIPTS AND ISSUES BETWEEN CODERS BEFORE THE MEETING.

c. UPLOAD YOUR DISAGREEMENTS LIST TO THE APPROPRIATE FOLDER IN SCHOLAR.

B.1.4 Reconciliation Meeting

RECONCILIATION MEETING PROCESS

JUDGE: PRIOR TO THE MEETING, PLEASE DOWNLOAD THE DISAGREEMENTS LIST. FROM THE DATA PROVIDED THERE, YOU SHOULD BE ABLE TO DETERMINE WHICH FILES (FINAL TRANSCRIPTS) YOU SHOULD DOWNLOAD AND INSPECT. THE LINE NUMBER OF WHERE THE DISAGREEMENT OCCURS IN THE TRANSCRIPT IS ALSO AVAILABLE SO YOU MAY QUICKLY FIND THE ISSUE.

1. ARRIVE AT THE MEETING, PROJECT THE FINAL TRANSCRIPT SO ALL ATTENDEES MAY VIEW. ALSO PROJECT THE DISAGREEMENTS LIST, WHICH YOU SHOULD HAVE RECEIVED THROUGH EMAIL OR DOWNLOADED FROM SCHOLAR RESOURCES>PLACE ALL PARTICIPANT FILES HERE>DISAGREEMENTS>

2. READ THE PARTICIPANT STATEMENT BEFORE THE DISAGREEMENT. READ THE PARTICIPANT STATEMENT AFTER THE DISAGREEMENT. DISCUSS THE ESSENCE OF THE TOPIC, AND WHAT THE PARTICIPANT IS SAYING. THE JUDGE MAY PARTICIPATE IN THIS DISCUSSION.

3. THE CODERS WILL NOW PRESENT THEIR CASE FOR THEIR CODING SCHEME. THIS INCLUDES ITEMS THAT 1 CODER MAY DEEM IRRELEVANT AND NOT A MEANING UNIT. THE JUDGE WILL LISTEN WITHOUT COMMENTING ON THE VALIDITY OF THE CODERS' STATEMENTS.

4. IT IS OKAY TO DISCUSS WHY YOU THINK THE MEANING UNIT SHOULD NOT BE CODED THE WAY THE OTHER CODER HAS CODED IT.

5. THE JUDGE MAKES HIS RULING. THE MEANING UNIT WILL BE PASTED INTO THE RECONCILED GOOGLE SHEET INTO THE APPROPRIATE AREA.

6. A "J" IS PLACED IN THE RIGHT-HAND COLUMN TO INDICATE THE DECISION WAS MADE BY A JUDGE.

Note: Sometimes, participants answer questions or convey their ideas in only a few words. Sometimes, they are very wordy. You want to be sure that the code given to the meaning unit is the code that applies to THAT meaning unit. NOT by something that is inferred from reading the participant's sentence a few sentences after, as that is probably coded as well. You have to be careful in ensuring a code captures the essence of what is being said AT THAT MOMENT.

For example:

My wife has a lot of problems with alcohol. She sometimes disappears for days at a time, and I miss her and try to get in touch with her but...

Should ideally be coded:

My wife has a lot of problems with alcohol (5.12). *She sometimes disappears for days at a time, and I miss her* (5.13) *and try to get in touch with her but...*

Despite the fact that his wife is disappearing BECAUSE of her alcoholism, it is still necessary to code 5.13 “Separation from spouse/kids” to note that separation. Her alcoholism is accounted for at the beginning of his statement. Again, each meaning unit should be coded by what the participant is saying WITHIN THAT MEANING UNIT. This can be especially tricky to judge in Codebook “Relationship” items, as it is sometimes hard to deconstruct the inner workings of relationships. Don’t overthink it. Just code the meaning unit for what it is, stand alone.

B.2 Disagreement template (with example Participant 7 coder disagreements)

Participant #(s): 7	Coders: Kxxxx, Jxxxxx	Judge: Axxxxxx	OWN Pt#_Disagreements file. combine I + D sessions in 1 disagreements file.	Ex: P3P6_Disagreements.xlsx P31_Disagreements.xlsx	<---group <---individual
				(to be filled out by coders at 1st meeting)	(to be filled out by judge)
Disagreement #	Line Number	Coder 1 excerpt:	Coder 2 excerpt:	Notes:	Result:
1	309	Maybe being afraid to open up. Uh, (Pause) maybe scared that they might get looked down on, uh, fear of the unknown, fear of rejection	Maybe being afraid to open up. Uh, (Pause) maybe scared that they might get looked down on, uh, fear of the unknown, fear of rejection	Coder1: 5.1/ 4.1-------Coder2: 5.5	
2	533	I know guys that, if they were at a race and they were trying to watch a race and some drunk asshole next to them is getting loud and beers going everywhere or something like that...probably no way in hell they could put up with that, just because of the discipline and the lack of acceptance of stupidity that's beat in our heads.	I know guys that, if they were at a race and they were trying to watch a race and some drunk asshole next to them is getting loud and beers going everywhere or something like that...probably no way in hell they could put up with that, just because of the discipline and the lack of acceptance of stupidity that's beat in our heads.	Coder1: 6.1/ 5.1-------Coder2: 4.5	
3	617	ain't nobody going to stop us regardless of disabilities, if anything that just pisses us off and makes us want to do it even worse	of the guys that I've been around, we've always been very independent, very strong, no cares, we're going to do what we want to do, ain't nobody going to stop us regardless of disabilities, if anything that just pisses us off and makes us want to do it even worse.	Coder1: 4.5 ------- Coder2: 6.3	
4	623	sure there's guys that I know that don't really want to hang around anybody else, they'd rather hang around with their joes, and other vets.	Yeah, sure there's guys that I know that don't really want to hang around anybody else, they'd rather hang around with their joes, and other vets.	Coder1: 5.14----------Coder2: 4.6	
5	72	No, damn that. I just came out of hell, I'm a hard ass, I can put up with anything.	I just came out of hell, I'm a hard ass, I can put up with anything.	Coder1: 4.5---------Coder2: 5.1	
6	81	I'm STILL trying to figure out the VA system/at least some semblance of guidelines of the benefits available and how to go about submitting and getting those benefits that were earned	I'm STILL trying to figure out the VA system. And I know it would be a lot BUT figuring out some way to simplify the various processes, like what we do here at the MRC is help guys figure out their GI Bill benefits and everything	Coder1: 6.6 ----------Coder2: 1.8	
7	139	The name is too soft and there again, we're not damaged goods, we're not charity cases.(4.3) Okay if I got my legs blown off, I voluntarily went to do that, don't be babying me or nothing like that(5.5).	we're not damaged goods, we're not charity cases. Okay if I got my legs blown off, I voluntarily went to do that, don't be babying me or nothing like that.	Coder1: 4.3/5.5----------Coder2:5.1	

B.3 Fit Statistics

B.3.1 Shapiro-Wilk Test

B.3.1.1 Total Meaning Units

Descriptive Statistics

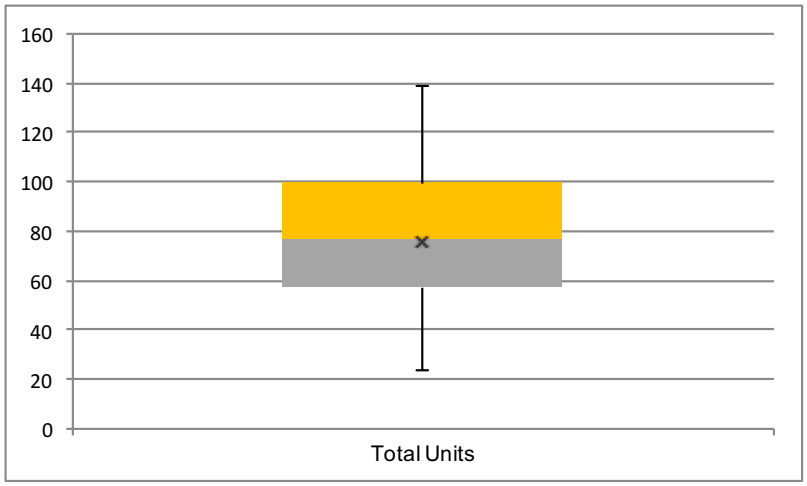
	Total Units
Mean	75.625
Standard Error	4.304245
Median	76.5
Mode	58
Standard Deviation	27.22243
Sample Variance	741.0609
Kurtosis	-0.54049
Skewness	0.075931
Range	115
Maximum	139
Minimum	24
Sum	3025
Count	40
Geometric Mean	70.24972
Harmonic Mean	64.24361
AAD	22.025
MAD	21.5
IQR	42.25

Box Plot

	Total Units
Min	24
Q1-Min	33.5
Med-Q1	19
Q3-Med	23.25
Max-Q3	39.25
Min	24
Q1	57.5
Median	76.5
Q3	99.75
Max	139
Mean	75.625
Grand Min	0

Shapiro-Wilk Test

	Total Units
W	0.98112
p-value	0.73094
alpha	0.05
normal	yes



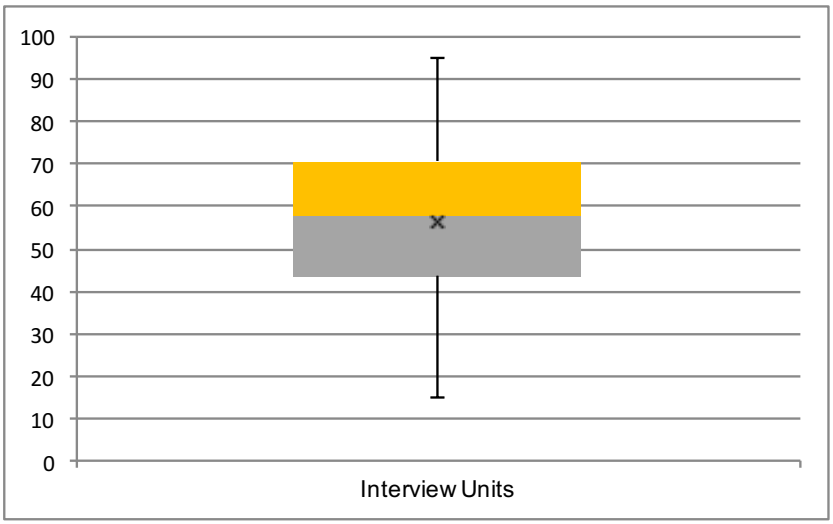
B.3.1.2 Interview Meaning Units

Descriptive Statistics

	Interview Units
Mean	56.205
Standard Error	3.3937
Median	58
Mode	48
Standard Deviation	21.194
Sample Variance	449.17
Kurtosis	-0.6626
Skewness	-0.0935
Range	80
Maximum	95
Minimum	15
Sum	2192
Count	39
Geometric Mean	51.529
Harmonic Mean	45.962
AAD	17.266
MAD	13
IQR	27

Box Plot

	Interview Units
Min	15
Q1-Min	28.5
Med-Q1	14.5
Q3-Med	12.5
Max-Q3	24.5
Min	15
Q1	43.5
Median	58
Q3	70.5
Max	95
Mean	56.205
Grand Min	0



Shapiro-Wilk Test

	Interview Units
W	0.9795
p-value	0.6841
alpha	0.05
normal	yes

B.3.1.3 Design Meaning Units

Descriptive Statistics

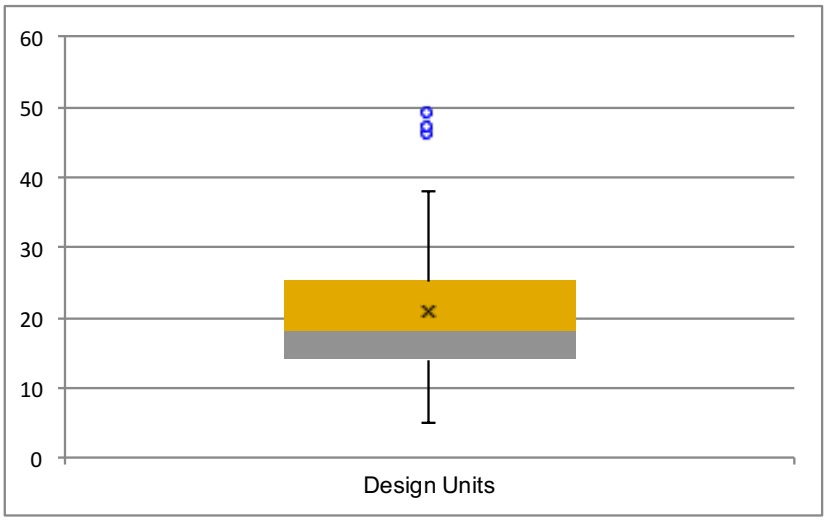
	Design Units
Mean	21.025
Standard Error	1.6971
Median	18
Mode	14
Standard Deviation	10.733
Sample Variance	115.2
Kurtosis	0.8102
Skewness	1.1336
Range	44
Maximum	49
Minimum	5
Sum	841
Count	40
Geometric Mean	18.665
Harmonic Mean	16.529
AAD	8.33
MAD	5.5
IQR	11.25

Box Plot

	Design Units
Min	5
Q1-Min	9
Med-Q1	4
Q3-Med	7.25
Max-Q3	12.75
Min	5
Q1	14
Median	18
Q3	25.25
Max	38
Mean	21.025
Grand Min	0

Shapiro-Wilk Test

	Design Units
W	0.8964
p-value	0.0015
alpha	0.05
normal	no



B.3.2 Anderson-Darling Test

B.3.2.1 Meaning Units

Test Hypotheses

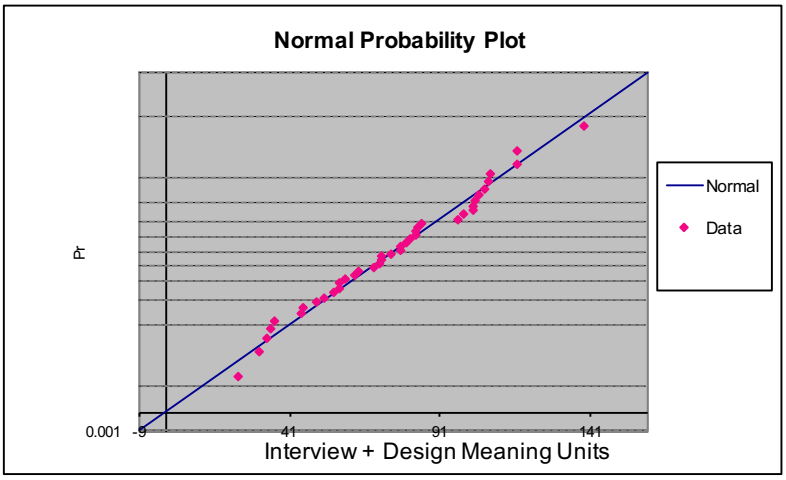
H_0: Data is sampled from a population that is normally distributed (no difference between the data and normal data).

H_A: Data is sampled from a population that is not normally distributed.

		Count OK?	Seems OK...
40	Number of data points	S	-1610.1313
75.625	Sample Mean		
27.222	Sample Sigma	p-value calculations	
		p1	0
0.2533	AD test statistic	p2	0
0.258388	AD* test statistic	p3	0.7168416
0.716842	P-value	p4	0

$$AD = -N - \frac{2i-1}{N}\left(\ln\left(F(Y_i)\right) + \ln\left(1 - F(Y_{N+1-i})\right)\right)$$

$$AD^* = AD\left(1 + \frac{0.75}{N} + \frac{2.25}{N^2}\right)$$



B.3.2.2 Interview Meaning Units

Test Hypotheses

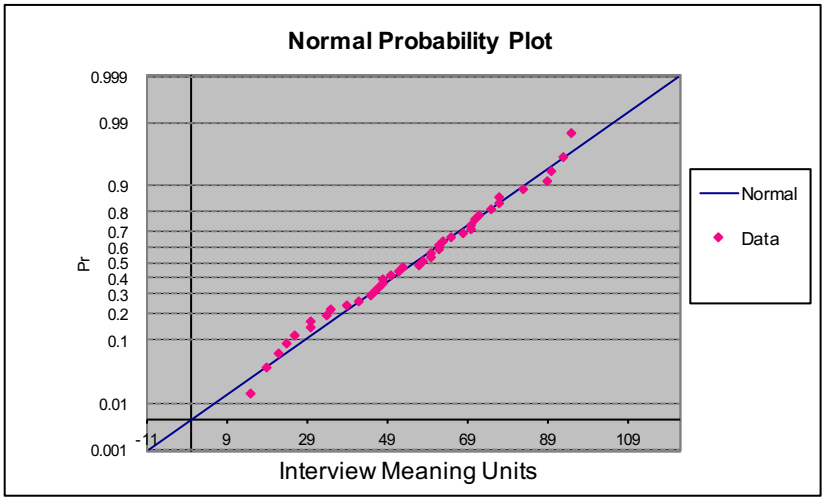
H_0: Data is sampled from a population that is normally distributed (no difference between the data and normal data).

H_A: Data is sampled from a population that is not normally distributed.

		Count OK?	Seems OK...
40	Number of data points	S	-1607.3652
55.550	Sample Mean		
21.326	Sample Sigma	p-value calculations	
		p1	0
0.1841	AD test statistic	p2	0
0.187842	AD* test statistic	p3	0
0.902888	P-value	p4	0.9028879

$$AD = -N - \frac{2i-1}{N}\left(\ln\left(F(Y_i)\right) + \ln\left(1 - F(Y_{N+1-i})\right)\right)$$

$$AD^* = AD\left(1 + \frac{0.75}{N} + \frac{2.25}{N^2}\right)$$



B.3.2.3 Design Meaning Units

Test Hypotheses

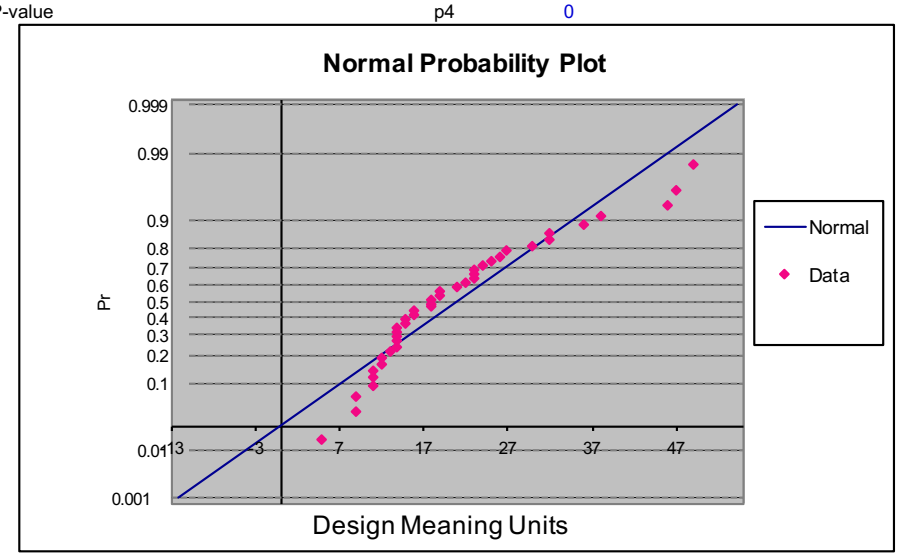
H_0 : Data is sampled from a population that is normally distributed (no difference between the data and normal data).

H_A : Data is sampled from a population that is not normally distributed.

		Count OK?	Seems OK...
40	Number of data points	S	-1655.2558
21.025	Sample Mean		
10.733	Sample Sigma	p-value calculations	
		p1	0.001213
1.3814	AD test statistic	p2	0
1.409238	AD* test statistic	p3	0
0.001213	P-value	p4	0

$$AD = -N - \frac{2i-1}{N}\left(\ln\left(F\left(Y_i\right)\right) + \ln\left(1 - F\left(Y_{N+1-i}\right)\right)\right)$$

$$AD^* = AD\left(1 + \frac{0.75}{N} + \frac{2.25}{N^2}\right)$$



B.4 Participant Descriptive + Inferential Statistics

B.4.1 Participant Age x Treatment Group: Kruskal-Wallis

	II-ID	GI-GD	ID-II	GD-GI	
median	32	27	32	31	
rank sum	249	106.5	228.5	236	
count	10	10	10	10	40
r^2/n	6200.1	1134.2	5221.2	5569.6	18125
H-stat					9.623
H-ties					9.7496
df					3
p-value					0.0208
alpha					0.05
sig					yes

B.4.2 Community Integration Measure

B.4.2.1 CIM: Mean + standard deviation by CIM question

Item Statistics

	Mean	Std. Deviation	N
CIM01 - I feel like part of my community, like I belong there.	3.55	1.260	40
CIM02 I know my way around the community.	4.35	.921	40
CIM03 I know the rules in the community and I can fit in with them.	4.18	1.010	40
CIM04 I feel that I am accepted in my community.	4.00	1.198	40
CIM05 I can be independent in this community.	4.38	.925	40
CIM06 I like where I live in my community.	4.08	1.207	40
CIM07 There are people I feel close to in my community.	3.78	1.097	40
CIM08 I know a number of people in my community well enough to say hello and have them say hello back.	3.98	1.143	40

CIM09 There are things that I can do in my community for fun in my free time.	4.05	1.197	40
CIM10 I have something to do in my community during the main part of my day that is useful and productive.	3.73	1.281	40

B.4.2.2 CIM: Correlation matrix of CIM questions

Inter-Item Correlation Matrix

	CIM01 - I feel like part of my community, like I belong there.	CIM02 I know my way around the community.	CIM03 I know the rules in the community and I can fit in with them.	CIM04 I feel that I am accepted in my community.
CIM01 - I feel like part of my community, like I belong there.	1.000	.515	.668	.849
CIM02 I know my way around the community.	.515	1.000	.539	.418
CIM03 I know the rules in the community and I can fit in with them.	.668	.539	1.000	.678
CIM04 I feel that I am accepted in my community.	.849	.418	.678	1.000
CIM05 I can be independent in this community.	.457	.564	.504	.509
CIM06 I like where I live in my community.	.596	.506	.536	.514
CIM07 There are people I feel close to in my community.	.463	.283	.638	.507
CIM08 I know a number of people in my community well enough to say hello and have them say hello back.	.419	.130	.470	.580
CIM09 There are things that I can do in my community for fun in my free time.	.355	.286	.374	.429

CIM10 I have something to do in my community during the main part of my day that is useful and productive.	.525	.344	.415	.585

Inter-Item Correlation Matrix

	CIM05 I can be independent in this community.	CIM06 I like where I live in my community.	CIM07 There are people I feel close to in my community.	CIM08 I know a number of people in my community well enough to say hello and have them say hello back.
CIM01 - I feel like part of my community, like I belong there.	.457	.596	.463	.419
CIM02 I know my way around the community.	.564	.506	.283	.130
CIM03 I know the rules in the community and I can fit in with them.	.504	.536	.638	.470
CIM04 I feel that I am accepted in my community.	.509	.514	.507	.580
CIM05 I can be independent in this community.	1.000	.411	.363	.494
CIM06 I like where I live in my community.	.411	1.000	.478	.410
CIM07 There are people I feel close to in my community.	.363	.478	1.000	.670
CIM08 I know a number of people in my community well enough to say hello and have them say hello back.	.494	.410	.670	1.000
CIM09 There are things that I can do in my community for fun in my free time.	.492	.299	.321	.432
CIM10 I have something to do in my community during the main part of my day that is useful and productive.	.500	.312	.356	.415

Inter-Item Correlation Matrix

	CIM09 There are things that I can do in my community for fun in my free time.	CIM10 I have something to do in my community during the main part of my day that is useful and productive.
CIM01 - I feel like part of my community, like I belong there.	.355	.525
CIM02 I know my way around the community.	.286	.344
CIM03 I know the rules in the community and I can fit in with them.	.374	.415
CIM04 I feel that I am accepted in my community.	.429	.585
CIM05 I can be independent in this community.	.492	.500
CIM06 I like where I live in my community.	.299	.312
CIM07 There are people I feel close to in my community.	.321	.356
CIM08 I know a number of people in my community well enough to say hello and have them say hello back.	.432	.415
CIM09 There are things that I can do in my community for fun in my free time.	1.000	.778
CIM10 I have something to do in my community during the main part of my day that is useful and productive.	.778	1.000

B.4.2.3 CIM: Reliability

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	4.005	3.550	4.375	.825	1.232	.070	10

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation
CIM01 - I feel like part of my community, like I belong there.	36.50	51.949	.748	.787
CIM02 I know my way around the community.	35.70	58.779	.531	.549
CIM03 I know the rules in the community and I can fit in with them.	35.88	55.035	.739	.657
CIM04 I feel that I am accepted in my community.	36.05	51.997	.792	.807
CIM05 I can be independent in this community.	35.68	57.199	.648	.551
CIM06 I like where I live in my community.	35.97	54.794	.609	.480
CIM07 There are people I feel close to in my community.	36.28	55.794	.618	.611
CIM08 I know a number of people in my community well enough to say hello and have them say hello back.	36.07	55.404	.612	.656
CIM09 There are things that I can do in my community for fun in my free time.	36.00	55.487	.572	.651
CIM10 I have something to do in my community during the main part of my day that is useful and productive.	36.32	53.353	.648	.703

Item-Total Statistics

	Cronbach's Alpha if Item Deleted
CIM01 - I feel like part of my community, like I belong there.	.882
CIM02 I know my way around the community.	.896
CIM03 I know the rules in the community and I can fit in with them.	.884
CIM04 I feel that I am accepted in my community.	.879
CIM05 I can be independent in this community.	.890
CIM06 I like where I live in my community.	.892
CIM07 There are people I feel close to in my community.	.891
CIM08 I know a number of people in my community well enough to say hello and have them say hello back.	.892
CIM09 There are things that I can do in my community for fun in my free time.	.895
CIM10 I have something to do in my community during the main part of my day that is useful and productive.	.890

B.4.2.4 CIM: CIM score comparisons by treatment group, by diagnosis

Case Processing Summary

	Cases					
	Included		Excluded		Total	
	N	Percent	N	Percent	N	Percent
V01 Community Integration Measure (CIM) (Total of CIM01-CIM10) * 01 Treatment Group	40	100.0%	0	0.0%	40	100.0%
V01 Community Integration Measure (CIM) (Total of CIM01-CIM10) * 03 PTSD	40	100.0%	0	0.0%	40	100.0%

V01 Community Integration Measure (CIM) (Total of CIM01-CIM10) * 01 Treatment Group

V01 Community Integration Measure (CIM) (Total of CIM01-CIM10)

01 Treatment Group	Mean	Std. Deviation
1 II-ID	36.7000	11.47025
2 GI-GD	41.1000	3.95671
3 ID-II	37.0000	9.00617
4 GD-GI	45.4000	2.59058
Total	40.0500	8.19302

V01 Community Integration Measure (CIM) (Total of CIM01-CIM10) * 03 PTSD

V01 Community Integration Measure (CIM) (Total of CIM01-CIM10)

03 PTSD	Mean	Std. Deviation
No	41.0000	6.91375
Yes	39.0000	9.49269
Total	40.0500	8.19302

Report

V01 Community Integration Measure (CIM) (Total of CIM01-CIM10)

01 Treatment Group	03 PTSD	Mean	Std. Deviation
	No	35.8000	12.39758
1 II-ID	Yes	37.6000	11.84483
	Total	36.7000	11.47025
	No	41.6000	3.97492
2 GI-GD	Yes	40.6000	4.33590
	Total	41.1000	3.95671
	No	41.8000	4.08656
3 ID-II	Yes	32.2000	10.40192
	Total	37.0000	9.00617
	No	44.1667	1.47196
4 GD-GI	Yes	47.2500	2.98608
	Total	45.4000	2.59058
	No	41.0000	6.91375
Total	Yes	39.0000	9.49269
	Total	40.0500	8.19302

B.4.3 Importance and Difficulty of Community Integration Themes

B.4.3.1 Comparison of Ranking of Importance and Difficulty of Integration vs. Diagnosis of PTSD

Theme	Mann-Whitney *U*	*p*
Difficulty of Acceptance	199.5	1.000
Difficulty of Close Relationships	196.5	.934
Difficulty of Conformity	157.5	.250
Difficulty of Diffuse Relationships	174.5	.493
Difficulty of Independence	165.5	.352
Difficulty of Leisure	183.0	.651
Difficulty of Living Situation	187.5	.743
Difficulty of Orientation	177.5	.541
Difficulty of Productivity	178.0	.554
Importance of Acceptance	199.0	.989
Importance of Close Relationships	175.5	.499
Importance of Conformity	171.0	.431
Importance of Diffuse Relationships	180.0	.590
Importance of Independence	148.0	.158
Importance of Leisure	197.0	.945
Importance of Living Situation	198.0	.967
Importance of Orientation	142.5	.111
Importance of Productivity	192.5	.847

B.4.3.2 ANOVA: Median ranks of importance and difficulty by treatment group

Tests of Between-Subjects Effects

Dependent Variable: V01 Community Integration Measure (CIM) (Total of CIM01-CIM10)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	502.500[a]	3	167.500	2.851	.051
Intercept	64160.100	1	64160.100	1,091.880	.000
TreatmentGroup	502.500	3	167.500	2.851	.051
Error	2115.400	36	58.761		
Total	66778.000	40			
Corrected Total	2617.900	39			

a. R Squared = .192 (Adjusted R Squared = .125)

B.4.3.3 Kruskal-Wallis: Comparison of Median Ranking of Importance and Difficulty of Integration vs. Treatment Groups

Theme	Kruskal-Wallis H	*p*
Difficulty of Acceptance	0.438	.932
Difficulty of Close Relationships	2.811	.422
Difficulty of Conformity	9.575	.053
Difficulty of Diffuse Relationships	4.513	.211
Difficulty of Independence	0.780	.854
Difficulty of Leisure	2.976	.395
Difficulty of Living Situation	1.731	.630
Difficulty of Orientation	0.307	.959
Difficulty of Productivity	1.610	.657
Importance of Acceptance	5.368	.147
Importance of Close Relationships	.214	.975
Importance of Conformity	2.675	.444
Importance of Diffuse Relationships	3.638	.303
Importance of Independence	5.736	.125
Importance of Leisure	1.228	.746
Importance of Living Situation	5.267	.153
Importance of Orientation	2.723	.436
Importance of Productivity	1.185	.757

B.5 Meaning Units Analysis

B.5.1 Total Meaning Units

B.5.1.1 Total Meaning Units: ANOVA

Anova: Two-Factor With Replication

SUMMARY	Interview First	Design First	Total
Individual			
Count	10	10	20
Sum	971	765	1736
Average	97.1	76.5	86.8
Variance	478.7666667	431.16667	542.695
Group			
Count	10	10	20
Sum	872	417	1289
Average	87.2	41.7	64.45
Variance	226.8444444	133.56667	715.524
Total			
Count	20	20	
Sum	1843	1182	
Average	92.15	59.1	
Variance	360.0289474	586.2	

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Sample	4995.225	1	4995.23	15.7287	0.0003329	4.11317
Columns	10923.025	1	10923	34.3939	1.054E-06	4.11317
Interaction	1550.025	1	1550.03	4.88064	0.0336085	4.11317
Within	11433.1	36	317.586			
Total	28901.375	39				

B.5.1.2 Total Meaning Units: Fisher LSD

Fisher LSD

LSD = tα/2,df within*sqrt(MS within * (1/n1 + 1/n2))

where tα/2,df within = 2.0281

LSD 16.163

If differences of means of two groups is ≥ LSD, then they are significantly different

Means	
II-ID	97.1
GI-GD	87.2
ID-II	76.5
GD-GI	41.7

	GI-GD	ID-II	GD-GI
II-ID	9.9	20.6	55.4
GI-GD		10.7	45.5
ID-II			34.8

B.5.2 Interview Meaning Units

B.5.2.1 Interview Meaning Units: ANOVA

Anova: Two-Factor With Replication

SUMMARY	Interview First	Design First	Total
Individual			
Count	10	10	20
Sum	733	559	1292
Average	73.3	55.9	64.6
Variance	156.9	131.43333	216.253
Group			
Count	10	10	20
Sum	653	277	930
Average	65.3	27.7	46.5
Variance	298.9	66.011111	544.895
Total			
Count	20	20	
Sum	1386	836	
Average	69.3	41.8	
Variance	232.7473684	302.8	

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Sample	3276.1	1	3276.1	20.0605	7.294E-05	4.11317
Columns	7562.5	1	7562.5	46.3073	5.926E-08	4.11317
Interaction	1020.1	1	1020.1	6.24636	0.0171437	4.11317
Within	5879.2	36	163.311			
Total	17737.9	39				

B.5.2.2 Interview Meaning Units: Fisher LSD

Fisher LSD

LSD tα/2,df within*sqrt(MS within * (1/n1 + 1/n2))

tα/2,df within = 2.0281

LSD 11.591

if differences of means of two groups is ≥ LSD, then they are significantly different

Means	
II-ID	73.3
GI-GD	65.3
ID-II	55.9
GD-GI	27.7

	GI-GD	ID-II	GD-GI
II-ID	8	17.4	45.6
GI-GD		9.4	37.6
ID-II			28.2

B.5.3 Design Meaning Units

B.5.3.1 Design Meaning Units: Kruskal-Wallis Test

	II-ID	GI-GD	ID-II	GD-GI	
median	22.5	20	16.5	11.5	
rank sum	250	246.5	210.5	113	
count	10	10	10	10	40
r^2/n	6250	6076.2	4431	1276.9	18034
H-stat					8.9572
H-ties					8.99
df					3
p-value					0.0294
alpha					0.05
sig					yes

B.5.3.2 Design Meaning Units: Pairwise comparisons of treatment groups, Mann-Whitney tests

	ID-II	GI-GD
count	10	10
median	22.5	20
rank sum	107	103
U	48	52

	one tail	two tail
alpha	0.05	
U	48	
mean	50	
std dev	13.184	ties
z-score	0.1517	
effect r	0.0339	
U-crit	28.314	24.16
p-value	0.4397	0.8794
sig (norm)	no	no
U-crit	27	23
sig (table)	no	no
p-value	0.4559	0.9118
sig (exact)	no	no

	II-ID	ID-II
count	10	10
median	22.5	16.5
rank sum	115	95
U	40	60

	one tail	two tail
alpha	0.05	
U	40	
mean	50	
std dev	13.204	ties
z-score	0.7574	
effect r	0.1693	
U-crit	28.282	24.121
p-value	0.2244	0.4488
sig (norm)	no	no
U-crit	27	23
sig (table)	no	no
p-value	0.2406	0.4813
sig (exact)	no	no

	II-ID	GD-GI
count	10	10
median	22.5	11.5
rank sum	138	72
U	17	83

	one tail	two tail
alpha	0.05	
U	17	
mean	50	
std dev	13.204	ties
z-score	2.4993	
effect r	0.5589	
U-crit	28.282	24.121
p-value	0.0062	0.0124
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	yes

	GI-GD	ID-II
count	10	10
median	20	16.5
rank sum	116	94
U	39	61

	one tail	two tail
alpha	0.05	
U	39	
mean	50	
std dev	13.179	ties
z-score	0.8347	
effect r	0.1866	
U-crit	28.323	24.17
p-value	0.202	0.4039
sig (norm)	no	no
U-crit	27	23
sig (table)	no	no

	GI-GD	GD-GI
count	10	10
median	20	11.5
rank sum	137.5	72.5
U	17.5	82.5

	one tail	two tail
alpha	0.05	
U	17.5	
mean	50	
std dev	13.199	ties
z-score	2.4623	
effect r	0.5506	
U-crit	28.29	24.131
p-value	0.0069	0.0138
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	yes

	ID-II	GD-GI
count	10	10
median	16.5	11.5
rank sum	131.5	78.5
U	23.5	76.5

	one tail	two tail
alpha	0.05	
U	23.5	
mean	50	
std dev	13.179	ties
z-score	2.0108	
effect r	0.4496	
U-crit	28.323	24.17
p-value	0.0222	0.0443
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	no

APPENDIX C. SECOND-CYCLE CODING MATERIALS + ANALYSES

C.1 Coding Instructions

C.1.1 Coder Assignments

ISE 4994: Meaning Units to Design Space Coder Assignments

CALCULATING A REASONABLE WORKLOAD

I translated 60 meaning units into design space criteria between 9:30 – 2 at a very leisurely pace with a lunch break. So to be conservative, I'll assume it takes 5 hours to code 60 units.

So the expected coder rate = 12 meaning units per hour. Of course this will vary depending on the complexity of the meaning unit.

If you are taking 3 credit hours of ISE 4994, you're committed to spending 9 hours per week doing this research.

12 units/hour * 9 hours/week = 108 meaning units coded per week.

SCHEDULE

WEEK	DATES	GOAL	TOTAL
1	M29-A4	130 per pair	520
2	A5-A11	100 per coder	800
3	A12-A18	100 per coder	800
4	A19-semester end	100 per coder	800

*for week 1, you will work in pairs, and then work individually weeks 2-4.

ASSIGNMENTS

*since google sheet row #s will change as rows are inserted to accommodate meaning units with multiple design space criteria, you can find your assignment start and end points by subtheme and participant number. If there are multiples of a subtheme and participant number, I've put the first few words of the meaning unit so you know which one to start/stop on.

*Halfway through the week, I expect about half of your coding assignment for that week to be done. Yes, I will be checking!

WEEK 1 March 29th – April 4th (Halfway Check: April 2nd) 130 units/pair

Pair	Subtheme	Participant	Through	Subtheme	Participant
1	101	5	-	104	32
2	104	33	-	110	9
3	110	9(so I)	-	113	20

4	113	26	-	202	3

WEEK 2 April 5th – April 11th (Halfway Check: April 8th) 100 units/coder

Coder	Subtheme	Participant	Through	Subtheme	Participant
A	202	7	-	203	30
H	203	32	-	401	7
K	401	10	-	402	22 (their first)
J	402	22 (yeah)-		404	36
C	405	3	-	407	13 (a shared)
Jr	407	13 (comm)-		408	21 (helping)
B	408	21	-	501	10 (I don't)
L	501	11(they)-		501	34 (not many)

WEEK 3 April 12th – April 18th (Halfway Check: April 15th)100 units/coder

Coder	Subtheme	Participant	Through	Subtheme	Participant
A	501	34	-	503	16
H	503	17	-	506	3
K	506	3	-	508	17
J	508	19	-	510	2
C	510	4	-	511	39 (and)
Jr	511	39	-	515	8 (so we)
B	515	8	-	515	29 (you could)
L	515	29	-	516	17 (there's)

"WEEK" 4 April 19th – May 3rd (Halfway Check: April 26th)100 units/coder

Coder	Subtheme	Participant	Through	Subtheme	Participant
A	516	17	-	601	20 (yeah)
H	601	20	-	601	36 (you go)
K	601	36	-	602	20 (you)
J	602	21	-	603	7 (you)
C	603	7	-	604	21 (what)
Jr	604	24	-	606	23 (and)
B	606	23	-	607	18 (I don't)
L	607	19	-	611	29

C.1.2 Grammar Rules

ISE 4994: Translating Meaning Units into Design Space Criteria

Overview

The Reconciled Codes Excel Sheet

Pros:

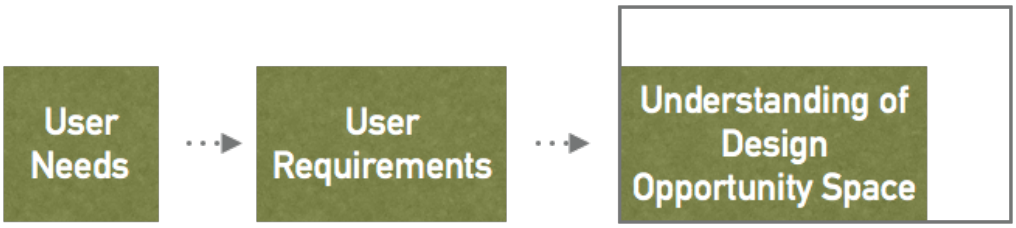
- 30 interview transcripts + 30 KJ/Design transcripts reduced into meaning units by participant.
- Meaning units categorized into themes and subthemes using codebook.
- Over 3000 meaning units! Great job ☺

Cons:

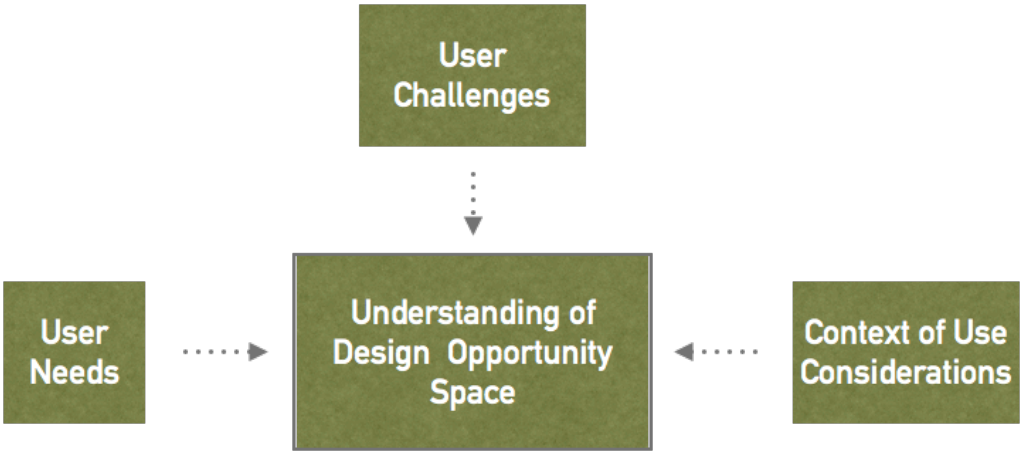
- Data unconsolidated, no consistent language as it is verbatim from participant.
- Many "opposites" placed into same category, no way to tell if participant is describing a goal or a challenge unless each meaning unit is examined.

Conceptual Model

Traditional design approach



Our design approach :



Definitions

User Need: A requirement that is desirable to, or is a goal of, or is an "in an ideal world" requirement of the user. Also covers technology requirements the participant specified for design in the KJ session or prototype and persona discussions.

User Obstacle: A barrier that is undesirable to, or a situation that is having a negative impact on the user, but exists in their world or the world in general of their user group.

Context of Use Considerations: Culture (economics, religion, etiquette, law, social structures), environment (sound, light, space, privacy, distractions, other people, work and home), and activity (walking, going to appointments, driving, eating, waiting, attending class, meeting) considerations that influence or impact the user, and/or their use of the technology.

Process Overview

- ❖ Working in pairs (this means you agree on classification, not that you split up the work).

1.) Take a look at the meaning unit. Insert rows if it is lengthy with lots of chunks.
2.) Classify each meaning unit chunk as an instance where the participant is describing a **User Need (N)**, a **User Challenge (C)**, or a **Context of Use (X) Consideration**. You may have to refer back to transcripts to make this determination.
3.) After classification as a Need, Challenge, or Context of Use Consideration, review each meaning unit you have been assigned.
4.) Reduce the meaning unit using the grammar rules (described below) for the classification. It is possible that a meaning unit can be reduced into SEVERAL needs/challenges/context of use considerations.
5.) Reclassify User Needs (delete the N) into: **Functional Needs (F)**, **Non-Functional Needs (NF).**
6.) Pause to ensure the final chunk(s) capture(s) the essence of participant statement.
7.) As stated in #3 above, it is expected that long or complex participant statements are split into multiple items. Some multi-sentence meaning units could contain information about a need, a challenge, and a context consideration!

Definitions + Grammar Rules

❖ User Needs

Functional Need Definition (F) – Describes "the WHAT": What the user or app/technology needs to do. A functional need should fill in the blank:

- The user will/needs to/can _____
- The app will/needs to/can _____

Functional Need Format

- [active verb] + [object]
  - **"Schedule appointments"**
  - **"Review veteran employers"**
  - **"View local job postings"**
  - **"See kids"**
  - **"Prevent suicide"**
  - **"Watch Netflix"**
  - **"Be outdoors"**

Non-Functional Need Definition (NF) – describes the functional need – "the HOW". A broader specification. Level of accuracy and completeness to satisfy goals; Resources used to achieve goals.

- [active verb] + [object] + [prepositional phrase]
  - **"Review veteran employers *in my area*"**
  - **"View local job postings *for veterans*"**
- [active verb] + [object] + [adverb]
  - **"Review veteran employers *quickly*"**

Tip: A functional need is the "bare bones" specification of WHAT a goal or need of a user is. It is in a Do-What form. A non-functional need is a Do-What-How, Do-What-For what, Do-What-in what, etc. form.

❖ User Obstacles

User Obstacles Definition – What the user has or experiences that is undesirable, or a roadblock. These can be split into nouns (barriers), and actions (challenges experienced)

Barriers (B)

- [object]
  - **"sleep apnea"**
  - **"vision issues"**
  - **"knee pain"**
  - **"knee injury"**

- **“back injury”**
- **“low income”**
- **“financial problem”**
- **“college cost”**
- **suicide attempt”**
- **“civilian priorities”**
- **“alcohol consumption”**
- **“trust issues”**
- **“bad memories”**
- **“anger issues”**
- **“isolation issues”**

Challenges experienced (C)

- [object] + [verb] + [object]
  - **“VA denies disability claim”**
  - **“VA cancels appointments”**
  - **“VA ignores physical problems”**
  - **“Landlord evicts us from home”**
  - **“Employer offers part time work”**
  - **“VA hospital requires travel”**
  - **“Wife avoids me”**
  - **“Reserves ignores me”**

❖ **Context of Use Considerations – In what context the functional need occurs**

Context of Use Definition (U) – activity, physical, social, spatial, physical, technological contexts, the environment and influencers around the participant.

- Activity scope: distractions, competing tasks
- Physical scope: climate conditions, light, noise
- Social scope: organization, who is around (children, family, etc.)
- Spatial scope: architecture, location, transportation, classrooms
- Technological scope: devices involved

- [object] + [adjective]
  - **“VA appointment unavailable”**
  - **“Job search urgency”**
  - **“Land navigation easy”**
- [gerund] + [prepositional phrase] *or*
  [gerund] + [object] + [prepositional phrase]
  - **“Living in a homeless shelter”**

        - **“Living at home full time”**
        - **“Working with civilians”**
        - **“Attending class with younger people”**
        - **“Discussing service with friends”**
    - [gerund] + [adjective]
        - **“Living alone”**
        - **“Feeling anxious”**

    - Note: It may seem like there is some overlap, especially with challenges/barriers and context. Please separate them into different items (rows). “Anxiety” is a barrier. “Feeling anxious” is a context consideration. They can easily arise out of the same meaning unit.

Approach

- You may see several meaning units that **could be framed in multiple ways. “View local job postings”** and **“View local job postings for veterans”** could emerge from the same meaning unit. **The object is to create as many new items as you can from each excerpt, while utilizing word bank items when you can.**

    - It may be best to “start small” and make the statement (need/ challenge/ context consideration) as concise as possible, and then expand it as much as possible.
        - For example, if there is a need in a meaning unit, try to frame it as a functional need first, then into as many nonfunctional needs as you can.
    - Just insert a new row as you create more needs/challenges/context of use from the same excerpt. Be sure to C+P all information. The only difference for items from the same meaning unit should be in the Need, Challenge, or Context of Use column.

Consolidation and Consistency

1.) As soon as you create a Need, Challenge/Barrier, or Context of Use consideration, paste it in the appropriate tab. This will populate a word bank for the other coders to use.
    - For example, **“back issues”** and **“back problems”** are general enough to be consolidated into the term **“back issues”**. I would

argue that **"back pain"** is different from **"back issues"** because it specifies an ailment not necessary implied from "issues" in general.

- Use identical wording for instances where participants are discussing basically the same things when appropriate, such that we can do frequency counts on user needs, challenges, and context of use considerations across participants later. This will also help with clustering to create our personas. We want to be able to see where different participants are experiencing the same need, challenge/barrier, and context.
- **Forbidden words: can't, won't, shouldn't, isn't, don't, couldn't, doesn't**

2.) When you are done extracting all the data you can from a meaning unit, please highlight that meaning unit's rows.

Description of Google Sheet Columns

This sheet should look somewhat familiar, it is a consolidation of the reconciled codes tabs into one sheet.

TAB 1

- Column A: Theme
- Column B: Subtheme (translated to hundreds)
- Column C: P#
- Column D: Place a F (functional), NF (nonfunctional), C (challenge experienced), B (barrier), or X (context of use) for type.
- Column E: Your actual need, challenge/barrier, or context consideration, formatted using grammar rules.

TAB 2

- Paste your generated needs, challenges/barriers/context considerations if they are new.

C.2 Design Space Criteria

C.2.1 Functional Needs

Access affordable health insurance
Access healthy living coach
Access internet
Access job fairs
Access medical file
Access psychiatrist
Access shared interest group
Access sign up bonus
Access suicide hotline
Access transition assistance programs
Access VA hotline
Access vacations
Access webinars
Access weight loss program
Acquire appropriate business attire
Acquire home furnishings
Acquire job
Acquire service dog
Acquire VA benefits
Acquire VA information
Assign VA caseworker
Attend class
Balance work and family
Blend in
Block users
Budget money
Build guns
Calculate benefits
Centralize information
Choose continued education
Compare loans
Compare medical benefits
Complete assignments

Complete interview
Connect local veterans
Connect veteran
Consolidate debt
Contact correct VA employee
Contact doctor
Contact nurse
Control emotions
Create a plan
Delay TAP
Diagnose medical conditions
Discuss military experiences
Do yoga
Educate vet's children
Establish routine
Establish support system
Experience fulfillment
Experience new things
Feel productive
File complaints
Find a hobby
Find church
Find community activities
Find community outreach programs
Find companions
Find daycare options
Find disabled housing
Find financial aid information
Find GI Bill sponsored education programs
Find GI Bill sponsored training programs
Find housing
Find lawyer
Find leisure activities
Find local schools
Find local veteran groups
Find military-friendly college

Find outdoor activities
Find passionate veteran advocate
Find purpose
Find realtor
Find roommate
Find scholarship opportunities
Find spouse support group
Find support group
Find vet-friendly company
Find vet-friendly financial institution
Find vet-friendly stores
Find veteran resources
Find veteran roommate
Find veteran-owned stores
Finish degree
Fix dental issues
Gain independence
Get exercise
Get recommendations
Go fish
Go hiking
Go hunt
Go outdoors
Go running
Help junior military organizations
Help people and community
Identify case manager
Identify predatory education programs
Identify predatory retailers
Improve mental health
Improve military financial classes
Inspire civilians
Install disability accommodations
Itemize costs
Know GI Bill amount
Know GI Bill related deadlines

Know GI Bill transfer eligibility
Know hazard exposures
Know rules
Know triggers
Know VA deadlines
Learn de-escalating techniques
Learn life skills
List insurance quotes
List local attractions
Live alone
Live near family
Live near workplace
Locate VA Hospital
Maintain GPA
Maintain memory calendar
Make a difference
Make friends
Make job profile
Make reliable friends
Make VA profile
Manage energy levels
Manage stress
Obey Laws
Organize social event
Pay bills
Post question
Prevent suicide
Prioritize VA patient needs
Promote veteran-taught education
Provide direct line to VA
Provide job placement programs
Provide loan information
Provide online copy of VA policies
Provide peer counseling
Provide space for community events
Provide veteran-specific job application

Rank education programs
Read veteran success stories
Receive a financial advisor
Receive addiction counseling
Receive advice
Receive appointment help
Receive assistance
Receive certification
Receive decision support
Receive disability accomodation
Receive discharge documentation
Receive education
Receive education information
Receive equal treatment
Receive family counseling
Receive financial aid
Receive financial guidance
Receive GI Bill benefits
Receive health insurance
Receive help
Receive housing advice
Receive information
Receive interview help
Receive job advice
Receive job assistance
Receive job offers
Receive Linkedin help
Receive loan
Receive medical assistance
Receive medical information
Receive medication
Receive military equivalent pay
Receive parenting guidance
Receive proper treatment
Receive recognition
Receive resume writing help

Receive scam alerts
Receive stress relief
Receive therapy
Receive transportation help
Receive VA care
Receive VA home loan assistance
Receive vet mentor/sponsor
Receive veteran discounts
Receive work schedule
Record VA phone calls
Record VA visit summary
Relate military experience
Release emotions
Remember alive date
Remove stigma
Request different doctor
Research medical conditions
Resolve problems
Retake ACAP course
Ride bike
Schedule appointments
Search job postings
Search part time job postings
See friends
See son
Send LinkedIn profile
Send resume
Separate identity
Set goals
Share skills
Shoot guns
Socialize with people
Stabilize finances
Start a veteran activity group
Start business
Start organization

Stay busy
Support other veterans
Support veteran-owned business
Text therapist
Track disability claims
Transfer GI Bill benefits
Translate military skills
Treat injuries
Understand retirement benefits
Understand VA benefits
Understand VA claims process
Understand yellow ribbon program
Use business websites
Use filters
Use Groupon
Use professional verbiage
Use social networking
Use VA helpline
Use VA locator
Use vacation days
Verify military service
View classified ads
View community calendar
View day labor job postings
View employee reviews
View frequently asked questions
View hospital specialty
View housing listings
View job postings
View local events
View local VA events
View military humor pages
View part time job postings
View pay
View trending posts
View vet-interest newsfeed

View veteran benefits
View veteran blogs
View veteran discounts
View veteran preferred grants
View veteran research opportunities
View veteran reviews
View volunteer opportunities
Watch movies

C.2.2 Nonfunctional Needs

Access job fairs for veterans
Access vacations with other veterans
Acquire job for spouse
Acquire job in human aid
Acquire job in private security
Acquire job locally
Acquire job of interest
Acquire job quickly
Acquire job with good benefits
Acquire job within qualifications
Acquire job without traumatic aspects
Acquire VA information about benefits
Acquire VA information about office locations
Ask employees about company
Assist veterans in need
Be recognized for honorable actions
Choose vet-friendly continued education
Complete interview before moving
Connect veteran to civilians
Connect veteran to other veterans
Connect veteran to others at church
Connect veteran to proper programs/benefits
Connect veteran to vet organizations
Connect veteran to veterans in similar job situations
Connect veteran with local sport teams
Connect veteran with school vet organizations
Connect veteran with veterans of same branch
Connect veterans from same deployment
Connect veterans to prevent suicide
Contact doctor directly
Contact nurse directly
Discuss military experiences with other veterans
Establish routine in the workplace
Feel productive again

Feel productive by being a parent
Feel productive through school
File complaints about VA benefits abuse by organization
Find job postings for veterans
Find lawyer for military issues
Find local schools for children
Find local schools with vocational training
Find local veteran groups to use veteran discounts
Find realtor who gives vet discounts
Find support group only for veterans
Find vet-friendly area to live
Find vet-friendly company
Find vet-friendly company with availability
Find veteran roommate
Finish degree quickly
Get recommendations from veterans
Hangout with veteran friends
Help people and veteran community
Know rules about weapons
Make a difference in people's lives
Make VA profile to avoid repeated paperwork
Organize social event to network with veterans
Pay bills on time
Post question anonymously
Receive advice from other veterans
Receive assistance after military
Receive assistance from organizations
Receive assistance with GI Bill
Receive assistance with health insurance
Receive assistance with temporary housing
Receive assistance with VA benefits
Receive certification for civilian counterpart
Receive disability accommodation for parking
Receive GI Bill benefits prior to semester start
Receive health insurance after separation

Receive information on general resources
Receive information on VA
Receive information on veteran benefits
Receive information on veteran programs
Receive loan before GI Bill distributions begin
Receive medical information on current research
Receive medication quickly
Receive military equivalent pay in civilian job
Receive therapy discreetly
Receive therapy online
Receive VA care before service end
Receive veteran discounts without awkwardness
Relate military experience to civilian interviewer
Resolve problems at lowest level
Search job postings at vet-friendly company
Search job postings in any city
Send LinkedIn profile to employer
Send resume to employer
Separate identity from military
Set goals to improve health
Share skills with employers
Support other veterans in transition
Tag job post with GPS location
Take VA benefits without guilt
Transfer GI Bill benefits to children
Transfer GI Bill benefits to spouse
Translate military skills to civilian job
Translate military skills to college credits
Use Groupon for veterans
Use social networking for job posting
Use vacation days without guilt
View employee reviews of community involvement
View employee reviews of family time
View employee reviews of veteran support
View housing listings by area
View housing listings from veterans

View job posting before moving
View job postings by region
View job postings for veterans
View job postings in community
View jobs back home before leaving military
View local events for honoring veterans
View local events for leisure
View local events for veterans
View pay by employer
View pay by employer and position
View pay by position
View veteran benefits by state
View veteran benefits easily
View veteran benefits for disabilities
View veteran benefits online
View veteran research opportunities by location
View veteran reviews of realtors
View veteran reviews of stores with discounts
View volunteer opportunities for veteran organizations
View volunteer opportunities for veterans
View volunteer opportunities part-time
View volunteer opportunities with kids
Watch movies as therapy
Watch movies to block pain
Watch movies with combat scenes

C.2.3 Barriers

Addiction
Age gap
Alcohol issues
Amputation
Anger issues
Anxiety
Authority issues
Avoidance
Back injury
Back issues
Back pain
Bad VA employees
Benefit delay
Blindness
Brain injury
Business competition
Cancer
Certification expense
Chip on shoulder
Civilian closed-mindedness
Civilian cluelessness
Civilian employer
Civilian indifference
Civilian opinions
Civilian questions
College debt
Combat trauma
Complicated veteran programs
Confederate flags
Conspiracy theories
Credit transfer issues
Crowded places
Culture shock
Custody issues

Dark humor
DD214 issues
Decompressing issues
Depersonalization
Depression
Derealization
Different life experiences
Disability
Disassociation
Discharge status
Dishonest employer
Dismissive girlfriend
Disrespectful civilians
Divorce
Drug issues
DUI conviction
Dysfunctional family
Education disparity
Ego
Emotional issues
Energy level
Familial alcoholism
Family location
Family responsibility
Financial burden
Financial ignorance
Flashbacks
Foul language
Freedom overload
Frequent deployments
Gender bias
GI Bill "price"
GI Bill misinformation
GI Bill payment delay
Gun Laws
Health insurance expense

Health issues
Heavy metal poisoning
High rank
High school diploma
Hip issues
Homelessness
Homework procrastination
Housing costs
Housing location
Hypervigilance
Independence issues
Interview inexperience
Invasive memories
Job complacency
Job frustration
Job monotony
Job pay bait and switch
Job relocation
Job stress
Job uncertainty
Knee injury
Knee issues
Knee pain
Language barrier
Large groups
Late students
Laziness
Lazy civilians
Legal trouble
Life changing experience
Limited housing options
Lingering military mentality
Little stressors accumulation
Long deployments
Loud noise
Low income

Low income upbringing
Low rank
Low spousal support
Lung damage
Malingerer vets
Marital issues
Materialistic family
Maturity gap
Media influence
Medical ailments
Medical discharge
Medication side effects
Mental health issues
Military lingo
Military politics
Mood swings
Motivation issues
Muscle aches
Nasal issues
Neck stiffness
Negativity
Nightmares
Office drama
Overconfidence
Painful memories
Paranoia
Physical pain
Physical violence
Poor customer service
Poor job market
Poor living situation
Post-deployment decompression
Poverty
Privacy issues
Procrastination issues
Psychiatry appointment wait time

PTSD
Racial discrimination
Rehabilitation
Reserves demands
Resume inexperience
ROTC commitments
Sedentary lifestyle
Self-esteem issues
Service-related injuries
Severe medical issues
Sexual assault
Sleep apnea
Sleep issues
Social anxiety
Son/Daughter separation
Spine damage
Spousal alcohol addiction
Spousal dishonesty
Spousal drug use
Spousal family issues
Spousal infidelity
Spousal stress
Stigma
Stomach issues
Student loans
Suicide attempts
Surgery
Survivor's guilt
Time constraints
Time management issues
Transportation issues
Trust issues
Unclear work rules
Unemployment
Unexpected noise
Uranium exposure

VA Benefits process
VA communication issues
VA corruption
VA location
Veteran overreaction
Veteran stereotype
Veterans overreaction
Vietnam-era civilian/vet relationship
Violent upbringing
Warped sense of masculinity
Weight gain
Writing difficulties

C.2.4 Challenges

ACAP course protects military
Adjustment to military life harder than adjusting back for some
Alcohol heightens emotions
Alcohol hinders adjustment
Amputation causes emotional and physical problems
Benefits depend on post-service plans
Benefits differ by state
Chemicals strip out sinuses
Child lives far away
Church disrespects veteran experiences
Civilian appreciation triggers survivor's guilt
Civilian asks about killing
Civilian brotherhood lacks depth
Civilian job interview distresses veteran
Civilian jobs can lack higher purpose
Civilian lacks empathy for combat veteran
Civilian lacks understanding
Civilian life harder than military
Civilian life lacks structure
Civilian misplaces blame for war on veteran
Civilian offends veteran
Civilian opposes war
Civilian wants free college
Civilian workforce differs from military
Civilian world micromanages veteran
Civilians anger veteran
Civilians assume all veterans are Republicans
Civilians believe they are always safe
Civilians belittle veteran
Civilians fear guns
Civilians feel superior
Civilians follow news in their bubble
Civilians have a distorted perception of military service
Civilians ignore chain of command

Civilians indifferent to veteran's service
Civilians lack awareness of young veteran population
Civilians lack discipline
Civilians lack leadership skills
Civilians lack respect for authority
Civilians lack understanding
Civilians lack urgency
Civilians make sweeping generalizations
Civilians make sweeping generalizations about Muslims
Civilians misunderstand veteran
Civilians pity veterans
Civilians prioritize pop culture over world events
Civilians stare at servicemen in uniform
Civilians stare at veteran
Civilians take advantage of veterans
Civilians take things for granted
Civilians unaware of veteran benefits
civilians undermine veteran medics
Civilians use racism to support their agenda
Civilians view veterans as damaged goods
Civilians waste time
Civilians worry about trivial things
College lacks GI Bill knowledge
College lacks hands on training
College orientation tailored for 18 year olds
College policy prevents display of medals
College professor mistreats disabled veteran
College removes veteran from classes
College violates HIPAA
Combat veterans are perceived as better than other veterans
Community lacks veteran-friendly businesses
Coworkers anger veteran
CPAP mask affects sleep
Debt leads to erratic behavior
Degree seems insignificant
Deployment changes perception of mistakes

Deployments became harder over time
Disability prevents certain tasks
Drug use interferes with work
Emotional episodes occur while sleeping
Employer calls veteran lazy
Employer delays promotion
Employer discriminates national guard serviceman
Employer dismisses military achievements
Employer fires veteran
Employer punishes veteran for following their orders
Employer unsupportive of military
Employers dismiss young veteran's experience
Employers undermine vet abilities
Family adapts to life without veteran
Family consumes leisure time
Family dissolved during service
Family has trouble with VA over death benefits
Family lacks effort to visit veteran
Family lacks understanding of PTSD
Family lives far away
Family misunderstands veteran
Family needs military benefits
Family of veteran lack support
Family prevents therapeutic talk
Female nurses mistreat male nurses
Finances deplete while waiting for claims
Friend asks invasive questions
Friends live far away
Frustration hinders job search
Frustration leads to suicide
GI Bill lacks coverage for certification
GI Bill depletes
GI Bill sponsored programs lack up to date information
GI Bill steps lack clarity
Girlfriend dismisses military accomplishments
Girlfriend unsupportive of military

Hazard exposures lead to diseases
Health insurance lacks explanation
High school diploma impedes job search
Identity connected to deployments
Inappropriate emotional response hurts family
Income stops with medical discharge
Infantry takes physical toll on body
Injuries hinder activities with child
Injury affects memory
Injury impacts gym use
Injury impedes orientation
Injury limits abilities
Injury makes movements painful
Injury occurs before schooling opportunities
Injury prevents physical activities
Integration issues cause suicide
Integration takes time
isolation leads to suicide
Job causes stress
Job consumes leisure time
Job fair claims to hire veterans
Job requires training
Job search requires connections
Landlord prohibits gun ownership
Language barrier prevents communication
Large projects overwhelm veteran
Length of service affects transition out
Lifestyle change cut out exercise
Loved one unable to help upset veteran
Lower enlisted soldiers receive less education
Military ages veteran
Military allows jerks to enlist
Military alters way veterans perceive world
Military angers veteran
Military brainwashes veteran
Military changes loving-life mindset

Military chapters out veteran
Military consumes young adulthood
Military discharges incorrectly
Military discriminates by rank
Military disregards watt exposure
Military doctors provide lacking treatment
Military equipment wears down body
Military experience provides different perspective
Military experience strains relationships
Military experiences are irrelevant
Military experiences are unrelatable
Military experiences hinder leisure time
Military experiences impact personality
Military fails to teach life skills
Military finds reasons to discharge
Military has cruel working conditions
Military has regulations
Military health care does bare minimum
Military health care lacks second opinion
Military helps with details while enlisted
Military hides crimes
Military hides information
Military ignores mental health issues
Military ignores physical rehabilitation needs
Military injuries cause financial problems
Military keeps veterans busy while enlisted
Military lacks empathy
Military lacks medical benefits carry over
Military lacks post service rehabilitation
Military lacks transition help
Military lacks warrior transition units
Military moves slowly
Military owns issued items
Military paychecks stop once home
Military pays for everything while in
Military promises job

Military provides job satisfaction
Military provides purpose
Military pushes veterans
Military recruiter uses bait and switch
Military school enforces punctuality
Military screws up paperwork
Military status scares employers
Military takes all who qualify
Military takes care of basic needs
Military time investment hinders relationships
Military treats people like equipment
Military unhelpful to homeless veterans
Military unhelpful with transitioning into civilian life
Military violence stresses family
Officers pay for own food
Other veterans receive better treatment
Outdated job posts hinder job search
Parent angers veteran
Parent disagrees with enlistment
Parent of civilian pays expenses
Parents of veteran lack support
Parents unable to understand veteran after deployment
PCP diagnoses veteran with PTSD
People say veteran is a soldier for life
Personal Issues affect schoolwork
Physical injury leads to suicide
Physical problems caused by sitting
Productivity barriers hinder acceptance
Professor asks insensitive questions
Professor lacks understanding
PTSD prevents approaching new people
Race inhibits job availability
Racism encouraged in military
Rank impacts the amount and type of job assistance needed
Rehabilitation hinders studies
Relationships change after military

Reserves deploy during semester
Scams target veterans
School consumes leisure time
Schools have cliques
Sedentary lifestyle causes weight gain
Service causes dental issues
Service causes marital issues
Service changes person
Sleep apnea causes nightmares
Sleep schedule differs from parents'
Small business lacks support for Reserves
Social events more rewarding than video games
Some college kids lack cleanliness
Son/Daughter resents veteran
Spouse alcoholism reduces leisure activities
Spouse destroys home life
Spouse provokes violent behavior
Spouse struggles from veteran deployment
Spouse unwilling to relocate for job
Spouse wastes finances
Store provides confusing discounts
Stress causes suicide
Students try to relate to military service
Surgeries hinders grades
Time in service causes career delay
Time in service hinders children's social skills
Transition Assistance Program (TAP) fails veterans
TriCare requires large copay
Trust changes after military
Unfamiliar area hinders leisure time
Union perpetuates bad employees
VA appointments interrupt work life
VA avoids giving benefits
VA benefits limits medical care
VA benefits process difficult
VA benefits process long

VA coverage requires documentation of injury
VA deducts from past compensation
VA denies benefits
VA denies claim
VA denies professional diagnosis
VA disregards serious conditions
VA doctors do bare minimum
VA follows chain of command
VA forgets to file claim
VA forgets to submit paperwork
VA gives false information
VA has bad reputation
VA incompetency results in veteran death
VA lacks accountability
VA lacks doctors
VA lacks empathy
VA limits medical help
VA misdiagnoses veteran
VA mishandles paperwork
VA overcharges veterans
VA problems interrupt regular life
VA process takes time
VA refuses proper treatment
VA requires unnecessary paperwork
VA spends frivolously
Vaccine could have unknown side effects
Veteran avoids other veterans
Veteran barely passed high school
Veteran cares differ from civilian cares
Veteran connects only with his children
Veteran denied firearm rights
Veteran desires acceptance
Veteran disagrees with professors
Veteran discusses military too often
Veteran dislikes coworkers
Veteran dislikes degree

Veteran dislikes explaining his PTSD
Veteran dislikes sympathy for injury
Veteran distrusts VA
Veteran experiences change of pace
Veteran experiences suicidal tendencies
Veteran expresses emotions inappropriately
Veteran feels exposed
Veteran feels judged
Veteran feels objectified
Veteran feels unwanted
Veteran files bankruptcy
Veteran forges signatures
Veteran grew up in military
Veteran grew up with absent father
Veteran has to re-associate with American ways
Veteran has too much free time
Veteran hates himself
Veteran internalizes emotions
Veteran is easily startled
Veteran is indifferent to achieve acceptance
Veteran is irresponsible
Veteran is more qualified than civilian boss
Veteran isolates himself
Veteran lacks ability to discuss combat experience
Veteran lacks emotional control
Veteran lacks mobility
Veteran lacks multitasking skills
Veteran lacks support group
Veteran lacks time for VA process
Veteran lacks understanding
Veteran loses home life
Veteran misses military brotherhood
Veteran must change career field
Veteran only relates to veterans with similar experience
Veteran organizations choosy about membership
Veteran outcast from society

Veteran perceives social barrier
Veteran searching for ideal job
Veteran severs close relationships
Veteran status affects perceptions
Veteran struggles in school
Veteran struggles with close relationships
Veteran takes less challenging job
Veteran unable to collect benefits
Veteran unsure of himself
Veteran unsure of how to react
Veteran unsure of which jobs have vet-preference
Veteran unwilling to interact with VA
Veteran used to being in charge
Veteran wants isolation
Veteran withholds information from family
Veteran witnesses drug use
Veteran's family struggles to build relationships
Veteran's world revolves around military
Veterans distrust VA
Veterans have strong opinions
Veterans lack knowledge about benefits
Veterans scare civilians
Veterans unfairly begrudge civilians
Veterans wary of research participation
VFW consists of geriatric veterans
Wife lacks understanding
Wife must mitigate interaction with civilians
Wife needs to work
Young veterans lack life skills

C.2.5 Context of Use Considerations

ACAP course useless
Accepting laws
Acknowledging civilians praise
Adjusting to civilian life
Adjusting to civilian life after years of service
Adjusting to lack of adrenaline
Adjusting to new place
Adjusting to no income
Adjusting to reserves
Affording college
Affording leisure activities through job
American Legion unhelpful
Applying for internships
Appreciating military benefits
Appreciating VT's recognition of service
Assaulting civilians
Assimilating to schools culture
Associates degree worthless
Attending class during rehabilitation
Attending class with younger people
Attending physical therapy for injuries
Attending social activities hosted by VA
Avoiding benefits application because of more deserving veterans
Avoiding relationships while in the military
Avoiding student organizations
Balancing benefits
Balancing home life as a student
Becoming a civilian again
Becoming drunk on power
Being a student again
Being alone with thoughts
Being denied earned combat decorations
Being disappointed in reality of living in America
Being homeless in the military

Being honest
Being impatient
Being institutionalized
Being made to feel bad for asking for what was promised
Being more comfortable outside
Being near VA clinic
Being overqualified for job
Being prepared for transition
Being prompt
Being pulled over for being black
Being racially profiled when wearing plainclothes
Being self-driven
Being sent back to warzone
Being told what to do
Being transparent
Being treated the same as civilians
Being used to making decisions
Blaming military for health issues
Breaking gun laws
Building confidence through military
Caring for pets
Carrying gun for safety
Carrying weapons everywhere
Censoring vocabulary around civilians
Changing jobs after short time periods
Changing majors
Choosing job with good benefits
Civilian medical care expensive
Civilian transition easy
Civilians being supportive
Civilians late
Civilians overreact
Civilians unpatriotic
Coaching basketball
Coddling in military
Collecting unemployment benefits

Community involvement difficult
Comparing benefits to military benefits
Comparing career to friends' careers
Computer unaffordable
Conforming to military life peacefully
Coordinating with the school
Creating close relationships from professional ones
Creating deeper friendship through military service
Criticizing ROTC
Cursing out management
Dealing with roommate in military
Dealing with the mundane
Dealing with unexpected visitors
Deciding between school and work
Deciding where to live
Declining appreciation of veterans
Declining job offer from pity
Depending on significant other
Developing a sense of responsibility young
Differing military experience between veterans
Disability claims difficult
Disability website navigation difficult
Disagreeing with school officials
Disassociating as defense tactic
Discussing problems with civilians
Discussing service with friends
Disliking civilian work ethic
Disliking praise from civilians
Disliking someone else preparing food
Disliking talking about self
Disregarding time
Distributing alcohol to minors
Distrusting media
Doing activities with other veterans
Doing things on own
Drinking after school

Drinking alcohol
Drinking alcohol to readjust
Drinking as leisure activity
Drinking with people of trust
Driving around to explore area
Eating healthy
Enjoying a cigar
Enjoying alone time
Enjoying festivals
Enjoying hobbies
Enjoying hobbies with people
Enjoying hobbies with spouse
Enjoying leisure time
Enjoying living situation
Enjoying outdoors
Enjoying outdoors with son
Exercising for physical therapy
Exercising for stress relief
Experiencing comradery in times of strife in military
Exploring surroundings
Familiarizing self with area
Family important
Family understanding after deployment
Favoring veterans over civilians
Fearing rejection from civilians
Fearing unknown
Feeling a sense of brotherhood with other veterans
Feeling a void after military
Feeling acceptance
Feeling acceptance in a southern town
Feeling alone
Feeling bored
Feeling community peace from past as a local student
Feeling confident
Feeling defeated
Feeling entitled

Feeling expendable
Feeling freedom in workplace
Feeling frustrated
Feeling happy
Feeling incomplete
Feeling incomplete without gun
Feeling independent
Feeling isolated
Feeling jaded
Feeling judged
Feeling military is indifferent towards veterans
Feeling more freedom in military workplace
Feeling numb
Feeling pride
Feeling productive from church
Feeling productive from helping people
Feeling respected by professors
Feeling safe in military
Feeling separated
Feeling skill-less
Feeling supported by college
Feeling supported by community
Feeling supported by family
Feeling supported by friends
Feeling supported by military
Feeling that the military uses, abuses, and discards veterans
Feeling threatened in small groups
Feeling too busy
Feeling too busy for community service
Feeling unable to return home after deployment
Feeling unhappy around parents
feeling unsupported
Feeling useless due to disability
Fighting people after drinking
Fighting the VA for benefits
Fighting the VA for proper care

Fighting to change discharge status
Figuring things out in military
Filing claim for service related injury
Finding comfort around other military families
Finding employment difficult
Finding niche in job
Finding niche in society
Finding people boring
Finding people with similar values hard
Finding purpose through family
Finding support interacting with other veterans
Finding the source of stress
Fitting in with students
Fixing things for fun
Focusing on important things in life
Forgetting interests
Forgetting what veteran previously learned
Forms confusing
Friend group big
Friends and family nearby
Fulfilling role as father
Funding graduate school through military
Gaining financial independence via military experience
Gaining identity through military
Gaining respect for being an older student
Gaining skills to be successful from military
Getting away from military look
Getting help for child custody
Getting involved in military organization
Getting out of comfort zone
Getting own place
Getting used to feeding self
GI Bill payout insufficient
Giving advice fulfilling
Giving up fight for benefits
Going back into military

Going out to eat in excess
Going somewhere else for the veteran discount
Going to chiropractor for injuries
Going to church
Going to class
Going to college as a parent
Going to concerts
Going to the gym
Going with the flow
Government job search easy
Government websites difficult to use
Gravitating towards other veterans
Growing up fast
Hardening self to civilian questions
Hating pain scale for rating pain
Having a holistic view of world events
Having a reason for not conforming to military life
Having a sense of power
Having an education
Having better access to information on post
Having close relationships with only veterans
Having community
Having different skill set
Having disability accommodations in class
Having family programs on post
Having HR perks
Having job security
Having low morale in warrior transition units
Having meals with friends
Having more opportunities after high military position
Having more world experience
Having new standard of living
Having privacy concerns
Having self-discipline
Having similar issues before and after military
Having small group of good friends

Having someone to vent to
Having to conform in military
Having to rely on others for money
Having too many options
Having wrong type of experience
Health solution inadequate
Hearing from employers through LinkedIn
Helping neighbors
Helping people for leisure
Hiding civilian job from military
High school friends unrelatable
Hiring veterans at VA
Homeless benefits unclear
Humbling self
Ideal job unavailable
Ideal job unrealistic
Identifying uncomfortable situations
Ignoring financial advice and celebrating life
Improving communication skills
Inactive ready Reserve commitment easy
Independence limited
Interacting with other veterans through video games
Interacting with people easy
Interacting with veterans different than with civilians
Isolation easy
Job offers unavailable
Job pay insufficient
Job search difficult
Job search easy
Job search urgent
Job unsatisfying
Joining a fraternity
Joining for financial reasons
Joining right after high school
Joining to get an education
Joking about civilian worries

Keeping an open mind
Keeping bad habits developed in military
Keeping distance from everyone
Keeping in touch with people veteran served with
Knowing alcohol limits
Knowing veterans who committed suicide
Lacking acceptance in the workplace
Lacking appearance regulations
Lacking common interests
Lacking connection with spouse after deployment
Lacking financial guidance
Lacking supervision in civilian world
Lacking worries
Land navigation easy
Lashing out defensively
Laughing to hide discomfort
Leadership roles easy
Learning irrelevant material to get degree
Learning to drive again
Leaving a proud profession
Leaving military in debt
Leaving the military due to PTSD
Leisure activities expensive
Leisure time important
Leisure time therapeutic
Liking lack of micromanagement
Limiting interaction to immediate family
Limiting self to familiar places
Listening to a lot of music
Living abroad
Living around military communities
Living as an adult for the first time
Living close to veteran friend
Living in a liberal town
Living in barracks
Living in boring rural areas

Living in city
Living off base
Living off disability benefits
Living on friend's couch
Living on post
Living out of the barracks
Living somewhere beautiful
Living where veteran grew up
Living with girlfriend
Living with other people
Living with parents
Living with parents who are hoarders
Living with parents who neglect house
Looking forward to community events
Looking out for each other
Losing emotional control with unrelated situations
Losing friends in combat
Loving community service
Loving guns
Loving travel for job
Maintaining finances
Maturing via military service
Medical benefits unreliable
Meeting for veteran group activities
Military certification worthless
Military disciplined
Military experience desirable
Military family oriented
Military helpful with job preparation
Military job unsatisfying
Military leaders qualified
Military life regimented
Military pay insufficient
Military skills valuable
Military spending wasteful
Military untrustworthy

Missing child's milestones
Missing identification for returning to USA
Missing military life
Missing military lifestyle
Missing military structure
Missing saluting
Missing walking around in gear
Mistreating VA employees
Movement difficult
Moving close to friends
Moving past veteran status
Moving someplace new
Multitasking difficult
Needing to cry
Neglecting family relationships
Networking through the reserves
Obtaining raise after boss learns of veteran status
Obtaining VA benefits difficult
Offending family unintentionally
Older veterans unhealthy
Online education unsatisfying
Outdoor activities enjoyable
Outperforming co-workers
Overeating
Overcoming adversity
Parents helpful
Passing the time
Patient advocates ineffective
Paying for education by military
Paying for something and expecting perfection
Performing community service
Picking out what to wear to work
Playing a lot of video games
Politics upsetting
Preparing for violence
Prioritizing parenting

Promoting kids' relationships with other family members
Providing for children
Providing for spouse
Proving self to others
PTSD disability payments unstandardized
Pursuing career in nursing
Putting family safety above laws
Questioning combat decisions now
Realizing mistakes aren't life or death
Realizing what is missed
Rebuilding credit
Receiving appreciation from civilians
Receiving attitude for life improvement suggestions
Receiving benefits on a state-by-state basis
Receiving how-to questions because of military experience
Receiving low benefits
Receiving lump sum when wounded
Receiving more respect after boss learns of veteran status
Receiving paycheck after medical retirement
Reconnecting with high school friends
Refusing to use VA
Reintegration anxiety common
Reintegration easy
Relating to coworkers
Relating to law enforcement
Relating to older non veteran students easier
Relating to other medical personnel
Relating to other veterans easier
Relating to others through common interests
Relating to others through parenthood
Relaxation difficult
Relaxation enjoyable
Reliability important
Relying on friends and family for support
Relying on military family support group
Repaying college loans

Resenting people
Respecting other veterans
Retiring due to disability
Returning home after deployment
Returning home for a woman
Riding ATVs with friends
Riding motorcycle
Running possible
Saving money
Screening for PTSD
Seeing angry veterans at the VA
Seeing veterans stereotyped on TV shows
Seeking civilian medical care easier
Seeking medical care inconvenient
Selecting late classes
Serving on non-profits
Settling for first job offered
Sharing experiences with other veterans
Sharing veteran stories with interested civilians
Shifting from military to academics
Shooting firearms for work
Shooting therapeutic
Showing up to jobs
Signing up for VA care
Skipping class
Skyping during deployment only virtual reality
Sleeping for fun
Sleeping in late
Sleeping with a gun
Small talk difficult
Smoking marijuana
Solving problems independently
Speaking at events
Spending deployment money immediately
Spending deployment money on video games
Spending time with best friend

Spending time with colleagues
Spending time with family
Spending time with family after deployments
Spending time with friends
Spending time with friends with kids
Spending time with girlfriend
Spending time with kids
Spending time with wife
Spending too much money
Standing out for being in military
Starting education at community college
Starting over
Staying with military
Struggling to build relationships
Struggling to voice emotions after deployment
Submitting applications on the internet
Suicide rate high
Suing college over GI Bill issues
Suing college over veteran rights
Supporting veteran-owned businesses
Taking care of parents a priority
Taking corporate etiquette classes
Taking out VA loan
Taking pharmaceuticals to stop feeling
Taking pride in service
Taking responsibility for own decisions
Taking sedatives to help sleep
Talking about problems with civilians
Talking to friends who are still in military
Talking to veteran's office about money problems
Talking to veterans for support
Technology helpful
Transferring schools
Transition Assistance Program (TAP) mandatory
Transition difficult
Transition difficult for family

Transitioning to a stay at home dad
Transitioning to civilian life classes
Travel expensive
Traveling with family
Treating school like a job
Treating service injuries by military
Treating veterans differently in other countries
Trying to be tough
Trying to get As
Trying to understand civilian
Understanding deployment difficult for people who weren't there
Understanding girlfriend
Understanding the difficulties of being a military spouse
Understanding VA benefits
Unwilling to socialize
USAA trustworthy
Using benefits for education
Using civilian doctor as second opinion
Using guys veteran served with as support group
using LinkedIN for job placement
Using Military as last resort
Utilizing GI bill
VA appointment times unfavorable
VA benefits process difficult
VA benefits process long
VA community close
VA confusing
VA disrespectful
VA doctors overpaid
VA doctors unprofessional
VA documentation helpful for government claims
VA frustrating
VA health care stingy
VA important to community integration
VA incompetent
VA ineffective

VA overfunded
VA suicide hotline unavailable
VA time consuming
VA unorganized
VA unpleasant
VA unresponsive
VA website difficult to use
Vacationing with parents
Valuing military prep for college
Valuing trust in friendships
Vet-friendly employers abundant
Veteran drive misunderstood
Veteran experience useful
Veteran nervous about transition
Veteran programs hardworking
Veteran stubborn
Veterans hardworking
Veterans reluctant to seek help
Veterans unhired
Video games enjoyable
Video games relaxing
Virginia Tech veteran website confusing
Walking for exercise
Wanting a job with vet-preference
Wanting friends to better themselves
Wanting isolation after amputation
Wanting less responsibilities
Wanting to accomplish a task effectively
Wanting to be respected
Wanting to be with wife
Wanting to become unaffiliated with military
Wanting to serve after the military
Wasting money on stuff I already know
Wasting time on job search
Watching Netflix
Wearing military uniform commands respect

Wife holding everything together
Wife understanding
Witnessing veteran suicide
Work environment friendly
Working diligently
Working for beneficial community change
Working for veteran supporting company
Working hard at school
Working in traumatic environment
Working long hours
Working on cars
Working part time job
Working towards acceptance
Working while in school
Working with military resource center
Working with other veterans
Worrying about deployments impact on family
Writing off large demographics of civilians

C.3 RQ2 Inferential Statistics

C.3.1 All Needs

C.3.1.1 All Needs: ANOVA

Anova: Two-Factor With Replication

SUMMARY	Interview First	Design First	Total
Individual			
Count	10	10	20
Sum	590	536	1126
Average	59	53.6	56.3
Variance	399.5555556	271.8222	325.6947
Group			
Count	10	10	20
Sum	563	394	957
Average	56.3	39.4	47.85
Variance	121.1222222	248.0444	250.0289
Total			
Count	20	20	
Sum	1153	930	
Average	57.65	46.5	
Variance	248.5552632	299.3158	

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Sample	714.025	1	714.025	2.744813	0.106262	4.113165
Columns	1243.225	1	1243.225	4.779133	0.035391	4.113165
Interaction	330.625	1	330.625	1.270969	0.267043	4.113165
Within	9364.9	36	260.1361			
Total	11652.775	39				

C.3.1.2 All Needs: Fisher LSD

Fisher LSD

LSD = tα/2,df within*sqrt(MS within * (1/n1 + 1/n2))

where tα/2,df within = 2.028094

LSD 14.62862

If differences of means of two groups is ≥ LSD, then they are significantly different

Means	
II-ID	59
GI-GD	56.3
ID-II	53.6
GD-GI	39.4

	GI-GD	ID-II	GD-GI
II-ID	2.7	5.4	19.6
GI-GD		2.7	16.9
ID-II			14.2

C.3.2 Functional Needs

C.3.2.1 Functional Needs: ANOVA

Anova: Two-Factor With Replication

SUMMARY	Interview First	Design First	Total
Individual			
Count	10	10	20
Sum	439	407	846
Average	43.9	40.7	42.3
Variance	216.9888889	183.5667	192.4316
Group			
Count	10	10	20
Sum	406	286	692
Average	40.6	28.6	34.6
Variance	46.93333333	121.3778	117.6211
Total			
Count	20	20	
Sum	845	693	
Average	42.25	34.65	
Variance	127.8815789	182.9763	

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Sample	592.9	1	592.9	4.168991	0.04855	4.113165
Columns	577.6	1	577.6	4.061409	0.051387	4.113165
Interaction	193.6	1	193.6	1.361303	0.250983	4.113165
Within	5119.8	36	142.2167			
Total	6483.9	39				

C.3.2.2 Functional Needs: Fisher LSD

Fisher LSD

LSD = $t_{\alpha/2,df\ within}$*sqrt(MS within * (1/n1 + 1/n2))

where $t_{\alpha/2,df\ within}$ = 2.028094

LSD 10.81629

If differences of means of two groups is ≥ LSD, then they are significantly different

Means	
II-ID	43.9
GI-GD	40.6
ID-II	40.7
GD-GI	28.6

	GI-GD	ID-II	GD-GI
II-ID	3.3	3.2	15.3
GI-GD		-0.1	12
ID-II			12.1

C.3.3 Nonfunctional Needs

C.3.3.1 Nonfunctional Needs: ANOVA

Anova: Two-Factor With Replication

SUMMARY	Interview First	Design First	Total
Individual			
Count	10	10	20
Sum	151	129	280
Average	15.1	12.9	14
Variance	41.21111111	21.87778	31.15789
Group			
Count	10	10	20
Sum	157	108	265
Average	15.7	10.8	13.25
Variance	58.67777778	39.95556	53.03947
Total			
Count	20	20	
Sum	308	237	
Average	15.4	11.85	
Variance	47.41052632	30.45	

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Sample	5.625	1	5.625	0.139127	0.711337	4.113165
Columns	126.025	1	126.025	3.117073	0.085957	4.113165
Interaction	18.225	1	18.225	0.450773	0.506254	4.113165
Within	1455.5	36	40.43056			
Total	1605.375	39				

C.3.4 Obstacles

C.3.4.1 Obstacles: ANOVA

Anova: Two-Factor With Replication

SUMMARY	Interview First	Design First	Total
Individual			
Count	10	10	20
Sum	756	630	1386
Average	75.6	63	69.3
Variance	587.3777778	406.8889	512.7474
Group			
Count	10	10	20
Sum	717	286	1003
Average	71.7	28.6	50.15
Variance	1336.9	114.2667	1176.239
Total			
Count	20	20	
Sum	1473	916	
Average	73.65	45.8	
Variance	915.5026316	558.2737	

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Sample	3667.225	1	3667.225	5.998487	0.019317	4.113165
Columns	7756.225	1	7756.225	12.68687	0.001059	4.113165
Interaction	2325.625	1	2325.625	3.804029	0.058949	4.113165
Within	22008.9	36	611.3583			
Total	35757.975	39				

C.3.4.2 Obstacles: Fisher LSD

Fisher LSD

LSD = $t_{\alpha/2,df\ within} * sqrt(MS\ within * (1/n1 + 1/n2))$

where $t_{\alpha/2,df\ within}$ = 2.028094

LSD 22.42596

If differences of means of two groups is ≥ LSD, then they are significantly different

Means	
II-ID	75.6
GI-GD	71.7
ID-II	63
GD-GI	28.6

	GI-GD	ID-II	GD-GI
II-ID	3.9	12.6	47
GI-GD		8.7	43.1
ID-II			34.4

C.3.5 Barriers

C.3.5.1 Barriers: Kruskal-Wallis Test

Kruskal-Wallis Test

	II-ID	GI-GD	ID-II	GD-GI	
median	34	39	36	14	
rank sum	269.5	252.5	224.5	73.5	
count	10	10	10	10	40
r^2/n	7263.025	6375.625	5040.025	540.225	19218.9
H-stat					17.62609756
H-ties					17.65093471
df					3
p-value					0.000519113
alpha					0.05
sig					yes

C.3.5.2 Barriers: Pairwise comparisons of treatment groups, Mann-Whitney tests

Mann-Whitney Test for Two Independent Samples

	II-ID	GI-GD
count	10	10
median	34	39
rank sum	109	101
U	46	54

	one tail	two tail
alpha	0.05	
U	46	
mean	50	
std dev	13.21383	ties
z-score	0.302713	
effect r	0.067689	
U-crit	28.26519	24.10137
p-value	0.381054	0.762108
sig (norm)	no	no
U-crit	27	23
sig (table)	no	no
p-value	0.397968	0.795936
sig (exact)	no	no

Mann-Whitney Test for Two Independent Samples

	II-ID	ID-II
count	10	10
median	34	36
rank sum	115.5	94.5
U	39.5	60.5

	one tail	two tail
alpha	0.05	
U	39.5	
mean	50	
std dev	13.21881	ties
z-score	0.794323	
effect r	0.177616	
U-crit	28.257	24.09162
p-value	0.213504	0.427008
sig (norm)	no	no
U-crit	27	23
sig (table)	no	no
p-value	0.217936	0.435872
sig (exact)	no	no

Mann-Whitney Test for Two Independent Samples

	II-ID	GD-GI
count	10	10
median	34	14
rank sum	155	55
U	0	100

	one tail	two tail
alpha	0.05	
U	0	
mean	50	
std dev	13.20885	ties
z-score	3.785341	
effect r	0.846428	
U-crit	28.27338	24.11113
p-value	7.67E-05	0.000153
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	yes
p-value	5.41E-06	1.08E-05
sig (exact)	yes	yes

Mann-Whitney Test for Two Independent Samples

	GI-GD	ID-II
count	10	10
median	39	36
rank sum	113.5	96.5
U	41.5	58.5

	one tail	two tail
alpha	0.05	
U	41.5	
mean	50	
std dev	13.19888	ties
z-score	0.643994	
effect r	0.144001	
U-crit	28.28977	24.13066
p-value	0.25979	0.519579
sig (norm)	no	no
U-crit	27	23
sig (table)	no	no
p-value	0.264424	0.528849
sig (exact)	no	no

Mann-Whitney Test for Two Independent Samples

	GI-GD	GD-GI
count	10	10
median	39	14
rank sum	148	62
U	7	93

	one tail	two tail
alpha	0.05	
U	7	
mean	50	
std dev	13.18891	ties
z-score	3.260315	
effect r	0.729029	
U-crit	28.30617	24.15021
p-value	0.000556	0.001113
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	yes
p-value	0.000244	0.000487
sig (exact)	yes	yes

Mann-Whitney Test for Two Independent Samples

	ID-II	GD-GI
count	10	10
median	36	14
rank sum	143.5	66.5
U	11.5	88.5

	one tail	two tail
alpha	0.05	
U	11.5	
mean	50	
std dev	13.20885	ties
z-score	2.914713	
effect r	0.65175	
U-crit	28.27338	24.11113
p-value	0.00178	0.00356
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	yes
p-value	0.001045	0.002089
sig (exact)	yes	yes

C.3.6 Challenges

C.3.6.1 Challenges: ANOVA

Anova: Two-Factor With Replication

SUMMARY	Interview First	Design First	Total
Individual			
Count	10	10	20
Sum	359	298	657
Average	35.9	29.8	32.85
Variance	181.8777778	77.95556	132.8711
Group			
Count	10	10	20
Sum	311	139	450
Average	31.1	13.9	22.5
Variance	239.6555556	50.32222	215.2105
Total			
Count	20	20	
Sum	670	437	
Average	33.5	21.85	
Variance	205.7368421	127.2921	

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Sample	1071.225	1	1071.225	7.793404	0.00834	4.113165
Columns	1357.225	1	1357.225	9.874118	0.003347	4.113165
Interaction	308.025	1	308.025	2.240951	0.143115	4.113165
Within	4948.3	36	137.4528			
Total	7684.775	39				

C.3.6.2 Challenges: Fisher LSD

Fisher LSD

LSD = $t_{\alpha/2,df\ within}$*sqrt(MS within * (1/n1 + 1/n2))

where $t_{\alpha/2,df\ within}$ = 2.028094

LSD 10.63359

If differences of means of two groups is ≥ LSD, then they are significantly different

Means	
II-ID	35.9
GI-GD	31.1
ID-II	29.8
GD-GI	13.9

	GI-GD	ID-II	GD-GI
II-ID	4.8	6.1	22
GI-GD		1.3	17.2
ID-II			15.9

C.3.7 Context of Use Considerations

C.3.7.1 Context of Use Considerations: ANOVA

Anova: Two-Factor With Replication

SUMMARY	Interview First	Design First	Total
Individual			
Count	10	10	20
Sum	581	464	1045
Average	58.1	46.4	52.25
Variance	427.8777778	253.1556	358.6184
Group			
Count	10	10	20
Sum	495	255	750
Average	49.5	25.5	37.5
Variance	105.6111111	44.94444	222.8947
Total			
Count	20	20	
Sum	1076	719	
Average	53.8	35.95	
Variance	272.1684211	256.1553	

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Sample	2175.625	1	2175.625	10.46491	0.002609	4.113165
Columns	3186.225	1	3186.225	15.32596	0.000386	4.113165
Interaction	378.225	1	378.225	1.819288	0.185822	4.113165
Within	7484.3	36	207.8972			
Total	13224.375	39				

C.3.7.2 Context of Use Considerations: Fisher LSD

Fisher LSD

LSD = $t_{\alpha/2,df\ within}$*sqrt(MS within * (1/n1 + 1/n2))

where $t_{\alpha/2,df\ within}$ = 2.028094

LSD 13.07758

If differences of means of two groups is ≥ LSD, then they are significantly different

Means	
II-ID	58.1
GI-GD	49.5
ID-II	46.4
GD-GI	25.5

	GI-GD	ID-II	GD-GI
II-ID	8.6	11.7	32.6
GI-GD		3.1	24
ID-II			20.9

C.3.8 Design Space Total

C.3.8.1 Design Space Total: ANOVA

Anova: Two-Factor With Replication

SUMMARY	Interview First	Design First	Total
Individual			
Count	10	10	20
Sum	1927	1630	3557
Average	192.7	163	177.85
Variance	2411.566667	1911.333	2279.818
Group			
Count	10	10	20
Sum	1775	935	2710
Average	177.5	93.5	135.5
Variance	2071.166667	670.9444	3155.737
Total			
Count	20	20	
Sum	3702	2565	
Average	185.1	128.25	
Variance	2184.2	2494.303	

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Sample	17935.225	1	17935.23	10.15439	0.002973	4.113165
Columns	32319.225	1	32319.23	18.29819	0.000133	4.113165
Interaction	7371.225	1	7371.225	4.173369	0.048438	4.113165
Within	63585.1	36	1766.253			
Total	121210.775	39				

C.3.8.2 Design Space Total: Fisher LSD

Fisher LSD

LSD = $t_{\alpha/2,df\ within} * sqrt(MS\ within * (1/n1 + 1/n2))$

where $t_{\alpha/2,df\ within}$ = 2.028094

LSD 38.11795

If differences of means of two groups is ≥ LSD, then they are significantly different

Means	
II-ID	192.7
GI-GD	177.5
ID-II	163
GD-GI	93.5

	GI-GD	ID-II	GD-GI
II-ID	15.2	29.7	99.2
GI-GD		14.5	84
ID-II			69.5

C.3.9 Distinct Functional Needs

C.3.9.1 Distinct Functional Needs: ANOVA

Anova: Two-Factor With Replication

SUMMARY	Interview First	Design First	Total
Individual			
Count	10	10	20
Sum	290	295	585
Average	29	29.5	29.25
Variance	74.22222222	67.16667	67.03947
Group			
Count	10	10	20
Sum	275	204	479
Average	27.5	20.4	23.95
Variance	24.72222222	45.6	46.57632
Total			
Count	20	20	
Sum	565	499	
Average	28.25	24.95	
Variance	47.46052632	75.20789	

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Sample	280.9	1	280.9	5.307232	0.02712	4.113165
Columns	108.9	1	108.9	2.057521	0.160087	4.113165
Interaction	144.4	1	144.4	2.728246	0.107285	4.113165
Within	1905.4	36	52.92778			
Total	2439.6	39				

C.3.9.2 Distinct Functional Needs: Fisher LSD

Fisher LSD

LSD = $t_{\alpha/2,df\ within}$*sqrt(MS within * (1/n1 + 1/n2))

where $t_{\alpha/2,df\ within}$ = 2.028094

LSD 6.598495

If differences of means of two groups is ≥ LSD, then they are significantly different

Means	
II-ID	29
GI-GD	27.5
ID-II	29.5
GD-GI	20.4

	GI-GD	ID-II	GD-GI
II-ID	1.5	-0.5	8.6
GI-GD		-2	7.1
ID-II			9.1

C.3.10 Distinct Nonfunctional Needs

C.3.10.1 Distinct Nonfunctional Needs: ANOVA

Anova: Two-Factor With Replication

SUMMARY	Interview First	Design First	Total
Individual			
Count	10	10	20
Sum	111	97	208
Average	11.1	9.7	10.4
Variance	23.65555556	16.45556	19.51579
Group			
Count	10	10	20
Sum	98	66	164
Average	9.8	6.6	8.2
Variance	16.4	10.93333	15.64211
Total			
Count	20	20	
Sum	209	163	
Average	10.45	8.15	
Variance	19.41842105	15.50263	

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Sample	48.4	1	48.4	2.870511	0.098852	4.113165
Columns	52.9	1	52.9	3.137397	0.084982	4.113165
Interaction	8.1	1	8.1	0.480395	0.492691	4.113165
Within	607	36	16.86111			
Total	716.4	39				

C.3.11 Distinct Barriers

C.3.11.1 Distinct Barriers: ANOVA

Anova: Two-Factor With Replication

SUMMARY	Interview First	Design First	Total
Individual			
Count	10	10	20
Sum	248	218	466
Average	24.8	21.8	23.3
Variance	33.73333333	40.4	37.48421
Group			
Count	10	10	20
Sum	249	111	360
Average	24.9	11.1	18
Variance	118.7666667	12.1	112.1053
Total			
Count	20	20	
Sum	497	329	
Average	24.85	16.45	
Variance	72.23947368	54.99737	

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Sample	280.9	1	280.9	5.480976	0.02488	4.113165
Columns	705.6	1	705.6	13.7678	0.000695	4.113165
Interaction	291.6	1	291.6	5.689756	0.02245	4.113165
Within	1845	36	51.25			
Total	3123.1	39				

C.3.11.2 Distinct Barriers: Fisher LSD

Fisher LSD

LSD = $t_{\alpha/2,df\ within}$*sqrt(MS within * (1/n1 + 1/n2))

where $t_{\alpha/2,df\ within}$ = 2.028094

LSD 6.493069

If differences of means of two groups is ≥ LSD, then they are significantly different

Means	
II-ID	24.8
GI-GD	24.9
ID-II	21.8
GD-GI	11.1

	GI-GD	ID-II	GD-GI
II-ID	-0.1	3	13.7
GI-GD		3.1	13.8
ID-II			10.7

C.3.12 Distinct Challenges

C.3.12.1 Distinct Challenges: ANOVA

Anova: Two-Factor With Replication

SUMMARY	Interview First	Design First	Total
Individual			
Count	10	10	20
Sum	254	232	486
Average	25.4	23.2	24.3
Variance	64.93333333	37.95556	50.01053
Group			
Count	10	10	20
Sum	253	116	369
Average	25.3	11.6	18.45
Variance	148.9	27.82222	133.1026
Total			
Count	20	20	
Sum	507	348	
Average	25.35	17.4	
Variance	101.2921053	66.56842	

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Sample	342.225	1	342.225	4.895728	0.033352	4.113165
Columns	632.025	1	632.025	9.041486	0.00479	4.113165
Interaction	330.625	1	330.625	4.729783	0.036295	4.113165
Within	2516.5	36	69.90278			
Total	3821.375	39				

C.3.12.2 Distinct Challenges: Fisher LSD

Fisher LSD

LSD = tα/2,df within*sqrt(MS within * (1/n1 + 1/n2))

where tα/2,df within = 2.028094

LSD 7.583161

If differences of means of two groups is ≥ LSD, then they are significantly different

Means	
II-ID	25.4
GI-GD	25.3
ID-II	23.2
GD-GI	11.6

	GI-GD	ID-II	GD-GI
II-ID	0.1	2.2	13.8
GI-GD		2.1	13.7
ID-II			11.6

C.3.13 Distinct Context of Use Considerations

C.3.13.1 Distinct Context of Use Considerations: ANOVA

Anova: Two-Factor With Replication

SUMMARY	Interview First	Design First	Total
Individual			
Count	10	10	20
Sum	425	381	806
Average	42.5	38.1	40.3
Variance	113.6111111	144.5444	127.3789
Group			
Count	10	10	20
Sum	416	215	631
Average	41.6	21.5	31.55
Variance	84.71111111	23.16667	157.4184
Total			
Count	20	20	
Sum	841	596	
Average	42.05	29.8	
Variance	94.15526316	151.9579	

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Sample	765.625	1	765.625	8.366724	0.006447	4.113165
Columns	1500.625	1	1500.625	16.39878	0.000261	4.113165
Interaction	616.225	1	616.225	6.734086	0.0136	4.113165
Within	3294.3	36	91.50833			
Total	6176.775	39				

C.3.13.2 Distinct Context of Use Considerations: Fisher LSD

Fisher LSD

LSD = $t_{\alpha/2,df\ within}$*sqrt(MS within * (1/n1 + 1/n2))

where $t_{\alpha/2,df\ within}$ = 2.028094

LSD 8.676277

If differences of means of two groups is ≥ LSD, then they are significantly different

Means	
II-ID	42.5
GI-GD	41.6
ID-II	38.1
GD-GI	21.5

	GI-GD	ID-II	GD-GI
II-ID	0.9	4.4	21
GI-GD		3.5	20.1
ID-II			16.6

C.3.14 Distinct Design Space Criteria

C.3.14.1 Distinct Design Space Criteria: ANOVA

Anova: Two-Factor With Replication

SUMMARY	Interview First	Design First	Total
Individual			
Count	10	10	20
Sum	1328	1223	2551
Average	132.8	122.3	127.55
Variance	505.5111111	927.5667	707.8395
Group			
Count	10	10	20
Sum	1291	712	2003
Average	129.1	71.2	100.15
Variance	1047.433333	278.6222	1510.345
Total			
Count	20	20	
Sum	2619	1935	
Average	130.95	96.75	
Variance	739.2078947	1258.513	

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Sample	7507.6	1	7507.6	10.884	0.002192	4.113165
Columns	11696.4	1	11696.4	16.95663	0.000213	4.113165
Interaction	5616.9	1	5616.9	8.142992	0.007124	4.113165
Within	24832.2	36	689.7833			
Total	49653.1	39				

C.3.14.2 Distinct Design Space Criteria: Fisher LSD

Fisher LSD

LSD = $t_{\alpha/2,df\ within}$*sqrt(MS within * (1/n1 + 1/n2))

where $t_{\alpha/2,df\ within}$ = 2.028094

LSD 23.82097

If differences of means of two groups is ≥ LSD, then they are significantly different

Means	
II-ID	132.8
GI-GD	129.1
ID-II	122.3
GD-GI	71.2

	GI-GD	ID-II	GD-GI
II-ID	3.7	10.5	61.6
GI-GD		6.8	57.9
ID-II			51.1

C.4 RQ3a Inferential Statistics – see section C.3 RQ2 Inferential Statistics

C.5 RQ3b Inferential Statistics

C.5.1 All Needs

C.5.1.1 All Needs: ANOVA

Anova: Two-Factor With Replication

SUMMARY	Primed	Unprimed	Total
Individual			
Count	10	10	20
Sum	346	299	645
Average	34.6	29.9	32.25
Variance	270.0444444	221.4333333	238.6184211
Group			
Count	10	10	20
Sum	358	275	633
Average	35.8	27.5	31.65
Variance	51.28888889	199.8333333	137.0815789
Total			
Count	20	20	
Sum	704	574	
Average	35.2	28.7	
Variance	152.5894737	201.0631579	

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Sample	3.6	1	3.6	0.019391328	0.890026548	4.113165277
Columns	422.5	1	422.5	2.275787773	0.140135376	4.113165277
Interaction	32.4	1	32.4	0.17452195	0.678605167	4.113165277
Within	6683.4	36	185.65			
Total	7141.9	39				

C.5.2 Functional Needs

C.5.2.1 Functional Needs: ANOVA

Anova: Two-Factor With Replication

SUMMARY	Primed	Unprimed	Total
Individual			
Count	10	10	20
Sum	250	222	472
Average	25	22.2	23.6
Variance	146.6666667	135.2888889	135.6210526
Group			
Count	10	10	20
Sum	254	190	444
Average	25.4	19	22.2
Variance	31.37777778	88	67.32631579
Total			
Count	20	20	
Sum	504	412	
Average	25.2	20.6	
Variance	84.37894737	108.4631579	

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Sample	19.6	1	19.6	0.195348837	0.661145457	4.113165277
Columns	211.6	1	211.6	2.1089701	0.155098433	4.113165277
Interaction	32.4	1	32.4	0.322923588	0.573383751	4.113165277
Within	3612	36	100.3333333			
Total	3875.6	39				

C.5.3 Nonfunctional Needs

C.5.3.1 Nonfunctional Needs: ANOVA

Anova: Two-Factor With Replication

SUMMARY	Interview First	Design First	Total
Individual			
Count	10	10	20
Sum	96	77	173
Average	9.6	7.7	8.65
Variance	23.82222222	15.12222222	19.39736842
Group			
Count	10	10	20
Sum	104	85	189
Average	10.4	8.5	9.45
Variance	18.93333333	29.83333333	24.05
Total			
Count	20	20	
Sum	200	162	
Average	10	8.1	
Variance	20.42105263	21.46315789	

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Sample	6.4	1	6.4	0.291867241	0.592353238	4.11316
Columns	36.1	1	36.1	1.646313656	0.207660457	4.11316
Interaction	-1.13687E-13	1	-1.13687E-13	-5.1846E-15	0.781234247	4.11316
Within	789.4	36	21.92777778			
Total	831.9	39				

C.5.4 Obstacles

C.5.4.1 Obstacles: Kruskal-Wallis Test

Kruskal-Wallis Test

	I-Pr	G-Pr	I-UPr	G-Upr	
median	9	2.5	6.5	2.5	
rank sum	253	144	266	157	
count	10	10	10	10	40
r^2/n	6400.9	2073.6	7075.6	2464.9	18015
H-stat					8.817073171
H-ties					8.904784462
df					3
p-value					0.030583985
alpha					0.05
sig					yes

C.5.4.2 Obstacles: Pairwise comparisons of treatment groups, Mann-Whitney tests

Mann-Whitney Test for Two Independent Samples

	I-Pr	G-Pr
count	10	10
median	9	2.5
rank sum	129	81
U	26	74

	one tail	two tail
alpha	0.05	
U	26	
mean	50	
std dev	13.15394678	ties
z-score	1.824547446	
effect r	0.407981212	
U-crit	28.36368294	24.21873806
p-value	0.034034675	0.06806935
sig (norm)	yes	no
U-crit	27	23
sig (table)	yes	no
p-value	0.037628007	0.075256013
sig (exact)	yes	no

Mann-Whitney Test for Two Independent Samples

	I-Pr	I-Upr
count	10	10
median	9	6.5
rank sum	106.5	103.5
U	48.5	51.5

	one tail	two tail
alpha	0.05	
U	48.5	
mean	50	
std dev	13.17893055	ties
z-score	0.113818037	
effect r	0.025450487	
U-crit	28.32258828	24.16977076
p-value	0.45469102	0.90938204
sig (norm)	no	no
U-crit	27	23
sig (table)	no	no
p-value	0.48525623	0.97051246
sig (exact)	no	no

Mann-Whitney Test for Two Independent Samples

	I-Pr	G-UPr
count	10	10
median	9	2.5
rank sum	127.5	82.5
U	27.5	72.5

	one tail	two tail
alpha	0.05	
U	27.5	
mean	50	
std dev	13.13392554	ties
z-score	1.713120722	
effect r	0.383065439	
U-crit	28.39661495	24.25797897
p-value	0.043345166	0.086690332
sig (norm)	yes	no
U-crit	27	23
sig (table)	no	no
p-value	0.044604776	0.089209552
sig (exact)	yes	no

Mann-Whitney Test for Two Independent Samples

	G-Pr	I-UPr
count	10	10
median	2.5	6.5
rank sum	72.5	137.5
U	82.5	17.5

	one tail	two tail
alpha	0.05	
U	17.5	
mean	50	
std dev	13.17393759	ties
z-score	2.466992103	
effect r	0.551636204	
U-crit	28.33080098	24.17955679
p-value	0.006812668	0.013625336
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	yes
p-value	0.005748122	0.011496244
sig (exact)	yes	yes

Mann-Whitney Test for Two Independent Samples

	G-Pr	G-UPr
count	10	10
median	2.5	2.5
rank sum	100.5	109.5
U	54.5	45.5

	one tail	two tail
alpha	0.05	
U	45.5	
mean	50	
std dev	13.01820588	ties
z-score	0.345669752	
effect r	0.077294106	
U-crit	28.58695685	24.48478534
p-value	0.364795459	0.729590919
sig (norm)	no	no
U-crit	27	23
sig (table)	no	no
p-value	0.369682175	0.739364351
sig (exact)	no	no

Mann-Whitney Test for Two Independent Samples

	I-UPr	G-UPr
count	10	10
median	6.5	2.5
rank sum	135	75
U	20	80

	one tail	two tail
alpha	0.05	
U	20	
mean	50	
std dev	13.09881473	ties
z-score	2.290283557	
effect r	0.512122972	
U-crit	28.45436708	24.32679489
p-value	0.011002442	0.022004884
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	yes
p-value	0.01161532	0.023230639
sig (exact)	yes	yes

C.5.5 Barriers

C.5.5.1 Barriers: Kruskal-Wallis Test

Kruskal-Wallis Test

	I-Pr	G-Pr	I-UPr	G-UPr	
median	5.5	2	3	1	
rank sum	261	194.5	213.5	151	
count	10	10	10	10	40
r^2/n	6812.1	3783.025	4558.225	2280.1	17433.45
H-stat					4.561829268
H-ties					4.648164787
df					3
p-value					0.199448992
alpha					0.05
sig					no

C.5.6 Challenges

C.5.6.1 Challenges: Kruskal-Wallis Test

Kruskal-Wallis Test

	I-Pr	G-Pr	I-UPr	G-UPr	
median	2	2.5	4	0.5	
rank sum	211	197.5	277.5	134	
count	10	10	10	10	40
r^2/n	4452.1	3900.625	7700.625	1795.6	17848.95
H-stat					7.602073171
H-ties					7.789129181
df					3
p-value					0.050576852
alpha					0.05
sig					no

C.5.7 Context of Use Considerations

C.5.7.1 Context of Use Considerations: Kruskal-Wallis Test

Kruskal-Wallis Test

	I-Pr	G-Pr	I-UPr	G-UPr	
median	6	4.5	5	2.5	
rank sum	239	210	221.5	149.5	
count	10	10	10	10	40
r^2/n	5712.1	4410	4906.225	2235.025	17263.35
H-stat					3.317195122
H-ties					3.355280387
df					3
p-value					0.340022456
alpha					0.05
sig					no

C.5.8 Design Space Total

C.5.8.1 Design Space Total: Kruskal-Wallis Test

Kruskal-Wallis Test

	I-Pr	G-Pr	I-UPr	G-UPr	
median	42.5	45	34.5	26.5	
rank sum	234.5	243.5	208.5	133.5	
count	10	10	10	10	40
r^2/n	5499.025	5929.225	4347.225	1782.225	17557.7
H-stat					5.47097561
H-ties					5.475084491
df					3
p-value					0.140136459
alpha					0.05
sig					no

C.5.9 Distinct Functional Needs

C.5.9.1 Distinct Functional Needs: ANOVA

Anova: Two-Factor With Replication

SUMMARY	Primed	Unprimed	Total
Individual			
Count	10	10	20
Sum	179	176	355
Average	17.9	17.6	17.75
Variance	57.87777778	69.6	60.40789474
Group			
Count	10	10	20
Sum	183	143	326
Average	18.3	14.3	16.3
Variance	33.56666667	39.56666667	38.85263158
Total			
Count	20	20	
Sum	362	319	
Average	18.1	15.95	
Variance	43.35789474	54.57631579	

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Sample	21.025	1	21.025	0.419219053	0.521434805	4.113165277
Columns	46.225	1	46.225	0.921683744	0.343437274	4.113165277
Interaction	34.225	1	34.225	0.682414844	0.414197847	4.113165277
Within	1805.5	36	50.15277778			
Total	1906.975	39				

C.5.10 Distinct Nonfunctional Needs

C.5.10.1 Distinct Nonfunctional Needs: ANOVA

Anova: Two-Factor With Replication

SUMMARY	Primed	Unprimed	Total
Individual			
Count	10	10	20
Sum	73	60	133
Average	7.3	6	6.65
Variance	10.67777778	8.888888889	9.713157895
Group			
Count	10	10	20
Sum	70	58	128
Average	7	5.8	6.4
Variance	6	12.17777778	8.989473684
Total			
Count	20	20	
Sum	143	118	
Average	7.15	5.9	
Variance	7.923684211	9.989473684	

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Sample	0.625	1	0.625	0.066234913	0.798365157	4.113165277
Columns	15.625	1	15.625	1.655872829	0.206374752	4.113165277
Interaction	0.025	1	0.025	0.002649397	0.959233733	4.113165277
Within	339.7	36	9.436111111			
Total	355.975	39				

C.5.11 Distinct Barriers

C.5.11.1 Distinct Barriers: Kruskal-Wallis Test

Kruskal-Wallis Test

	I-Pr	G-Pr	I-UPr	G-UPr	
median	4.5	2	3	1	
rank sum	246.5	201.5	213.5	158.5	
count	10	10	10	10	40
r^2/n	6076.225	4060.225	4558.225	2512.225	17206.9
H-stat					2.904146341
H-ties					2.969611511
df					3
p-value					0.396334253
alpha					0.05
sig					no

C.5.12 Distinct Challenges

C.5.12.1 Distinct Challenges: Kruskal-Wallis Test

Kruskal-Wallis Test

	I-Pr	G-Pr	I-UPr	G-UPr	
median	2	2.5	3	0.5	
rank sum	210.5	203.5	269.5	136.5	
count	10	10	10	10	40
r^2/n	4431.025	4141.225	7263.025	1863.225	17698.5
H-stat					6.501219512
H-ties					6.680451128
df					3
p-value					0.082811256
alpha					0.05
sig					no

C.5.13 Distinct Context of Use Considerations

C.5.13.1 Distinct Context of Use Considerations: Kruskal-Wallis Test

Kruskal-Wallis Test

	I-Pr	G-Pr	I-UPr	G-UPr	
median	5.5	3.5	5	2.5	
rank sum	228.5	208	228	155.5	
count	10	10	10	10	40
r^2/n	5221.225	4326.4	5198.4	2418.025	17164.05
H-stat					2.590609756
H-ties					2.629334476
df					3
p-value					0.452370028
alpha					0.05
sig					no

C.5.14 Distinct Design Space Criteria

C.5.14.1 Distinct Design Space Criteria: Kruskal-Wallis Test

Kruskal-Wallis Test

	I-Pr	G-Pr	I-UPr	G-UPr	
median	33.5	34	29.5	22.5	
rank sum	234	224.5	218	143.5	
count	10	10	10	10	40
r^2/n	5475.6	5040.025	4752.4	2059.225	17327.25
H-stat					3.784756098
H-ties					3.792226713
df					3
p-value					0.28479159
alpha					0.05
sig					no

C.6 RQ3c Inferential Statistics

C.6.1 All Needs

C.6.1.1 All Needs: ANOVA

Anova: Two-Factor With Replication

SUMMARY	Phenomenological	Traditional	Total
Individual			
Count	10	10	20
Sum	590	299	889
Average	59	29.9	44.45
Variance	399.5555556	221.4333333	516.9973684
Group			
Count	10	10	20
Sum	563	275	838
Average	56.3	27.5	41.9
Variance	121.1222222	199.8333333	370.3052632
Total			
Count	20	20	
Sum	1153	574	
Average	57.65	28.7	
Variance	248.5552632	201.0631579	

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Sample	65.025	1	65.025	0.276130935	0.602470333	4.113165277
Columns	8381.025	1	8381.025	35.59031554	7.72133E-07	4.113165277
Interaction	0.225	1	0.225	0.00095547	0.975511508	4.113165277
Within	8477.5	36	235.4861111			
Total	16923.775	39				

C.6.1.2 All Needs: Fisher LSD

Fisher LSD

LSD = tα/2,df within*sqrt(MS within * (1/n1 + 1/n2))

where tα/2,df within = 2.028094001

LSD 13.91828506

If differences of means of two groups is ≥ LSD, then they are significantly different

Means	
II-ID	59
GI-GD	56.3
ID-II	29.9
GD-GI	27.5

	GI-GD	ID-II	GD-GI
II-ID	2.7	29.1	31.5
GI-GD		26.4	28.8
ID-II			2.4

C.6.2 Functional Needs

C.6.2.1 Functional Needs: ANOVA

Anova: Two-Factor With Replication

SUMMARY	Phenomenological	Traditional	Total
Individual			
Count	10	10	20
Sum	439	222	661
Average	43.9	22.2	33.05
Variance	216.9888889	135.2888889	290.7868421
Group			
Count	10	10	20
Sum	406	190	596
Average	40.6	19	29.8
Variance	46.93333333	88	186.6947368
Total			
Count	20	20	
Sum	845	412	
Average	42.25	20.6	
Variance	127.8815789	108.4631579	

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Sample	105.625	1	105.625	0.867180551	0.357940295	4.113165277
Columns	4687.225	1	4687.225	38.48208625	3.72006E-07	4.113165277
Interaction	0.025	1	0.025	0.00020525	0.988648568	4.113165277
Within	4384.9	36	121.8027778			
Total	9177.775	39				

C.6.2.2 Functional Needs: Fisher LSD

Fisher LSD

LSD = tα/2,df within*sqrt(MS within * (1/n1 + 1/n2))

where tα/2,df within = 2.028094001

LSD 10.00994462

If differences of means of two groups is ≥ LSD, then they are significantly different

Means	
II-ID	43.9
GI-GD	40.6
ID-II	22.2
GD-GI	19

	GI-GD	ID-II	GD-GI
II-ID	3.3	21.7	24.9
GI-GD		18.4	21.6
ID-II			3.2

C.6.3 Nonfunctional Needs

C.6.3.1 Nonfunctional Needs: Kruskal-Wallis Test

Kruskal-Wallis Test

	II-ID	GI-GD	ID-II	GD-GI	
median	13	14	6.5	9.5	
rank sum	264	276	128.5	151.5	
count	10	10	10	10	40
r^2/n	6969.6	7617.6	1651.225	2295.225	18533.65
H-stat					12.61207317
H-ties					12.66196082
df					3
p-value					0.0054277
alpha					0.05
sig					yes

C.6.3.2 Nonfunctional Needs: Pairwise comparisons of treatment groups, Mann-Whitney tests

Mann-Whitney Test for Two Independent Samples

	II-ID	GI-GD
count	10	10
median	13	14
rank sum	100.5	109.5
U	54.5	45.5

	one tail	two tail
alpha	0.05	
U	45.5	
mean	50	
std dev	13.17393759	ties
z-score	0.341583522	
effect r	0.076380398	
U-crit	28.33080098	24.17955679
p-value	0.36633217	0.73266434
sig (norm)	no	no
U-crit	27	23
sig (table)	no	no
p-value	0.369682175	0.739364351
sig (exact)	no	no

Mann-Whitney Test for Two Independent Samples

	II-ID	ID-II
count	10	10
median	13	6.5
rank sum	140	70
U	15	85

	one tail	two tail
alpha	0.05	
U	15	
mean	50	
std dev	13.16394598	ties
z-score	2.658777244	
effect r	0.594520665	
U-crit	28.34723571	24.19913999
p-value	0.00392124	0.00784248
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	yes
p-value	0.003420728	0.006841456
sig (exact)	yes	yes

Mann-Whitney Test for Two Independent Samples

	II-ID	GD-GI
count	10	10
median	13	9.5
rank sum	133.5	76.5
U	21.5	78.5

	one tail	two tail
alpha	0.05	
U	21.5	
mean	50	
std dev	13.17893055	ties
z-score	2.162542695	
effect r	0.483559247	
U-crit	28.32258828	24.16977076
p-value	0.015288185	0.03057637
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	yes
p-value	0.01440278	0.02880556
sig (exact)	yes	yes

Mann-Whitney Test for Two Independent Samp

	GI-GD	ID-II
count	*10*	*10*
median	14	6.5
rank sum	140.5	69.5
U	14.5	85.5

	one tail	two tail
alpha	*0.05*	
U	14.5	
mean	50	
std dev	13.19389811	ties
z-score	2.690637725	
effect r	*0.60164489*	
U-crit	28.29796884	24.14043489
p-value	0.00356578	0.007131559
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	yes
p-value	0.003420728	0.006841456
sig (exact)	yes	yes

Mann-Whitney Test for Two Independent Samp

	GI-GD	GD-GI
count	10	10
median	14	9.5
rank sum	136	74
U	19	81

	one tail	two tail
alpha	0.05	
U	19	
mean	50	
std dev	13.18891081	ties
z-score	2.350459446	
effect r	*0.52557871*	
U-crit	28.30617221	24.15020981
p-value	0.009375125	0.018750251
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	yes
p-value	0.009271688	0.018543376
sig (exact)	yes	yes

Mann-Whitney Test for Two Independent Samples

	ID-II	GD-GI
count	10	10
median	6.5	9.5
rank sum	99	111
U	56	44

	one tail	two tail
alpha	0.05	
U	44	
mean	50	
std dev	13.15394678	ties
z-score	0.456136862	
effect r	0.101995303	
U-crit	28.36368294	24.21873806
p-value	0.324145782	0.648291565
sig (norm)	no	no
U-crit	27	23
sig (table)	no	no
p-value	0.342105263	0.684210526
sig (exact)	no	no

C.6.4 Obstacles

C.6.4.1 Obstacles: Kruskal-Wallis Test

Kruskal-Wallis Test

	II-ID	GI-GD	ID from ID-II	GD from GD-GI	
median	71	68	6.5	2.5	
rank sum	312.5	297.5	135	75	
count	10	10	10	10	40
r^2/n	9765.625	8850.625	1822.5	562.5	21001.25
H-stat					30.66768293
H-ties					30.74844808
df					3
p-value					9.60291E-07
alpha					0.05
sig					yes

C.6.4.2 Obstacles: Pairwise comparisons of treatment groups, Mann-Whitney tests

Mann-Whitney Test for Two Independent Samples

	II-ID	GI-GD
count	10	10
median	71	68
rank sum	112.5	97.5
U	42.5	57.5

	one tail	two tail
alpha	0.05	
U	42.5	
mean	50	
std dev	13.21880638	ties
z-score	0.567373467	
effect r	0.126868564	
U-crit	28.25699838	24.09161558
p-value	0.285230236	0.570460473
sig (norm)	no	no
U-crit	27	23
sig (table)	no	no
p-value	0.315264457	0.630528914
sig (exact)	no	no

Mann-Whitney Test for Two Independent Samples

	II-ID	ID-II
count	10	10
median	71	6.5
rank sum	155	55
U	0	100

	one tail	two tail
alpha	0.05	
U	0	
mean	50	
std dev	13.21880638	ties
z-score	3.782489777	
effect r	0.845790427	
U-crit	28.25699838	24.09161558
p-value	7.76337E-05	0.000155267
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	yes
p-value	5.41254E-06	1.08251E-05
sig (exact)	yes	yes

Mann-Whitney Test for Two Independent Samples

	II-ID	GD-GI
count	10	10
median	71	2.5
rank sum	155	55
U	0	100

	one tail	two tail
alpha	0.05	
U	0	
mean	50	
std dev	13.18392163	ties
z-score	3.792498273	
effect r	0.848028394	
U-crit	28.31437869	24.15998844
p-value	7.45696E-05	0.000149139
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	yes
p-value	5.41254E-06	1.08251E-05
sig (exact)	yes	yes

Mann-Whitney Test for Two Independent Samp

	GI-GD	ID-II
count	10	10
median	68	6.5
rank sum	155	55
U	0	100

	one tail	two tail
alpha	0.05	
U	0	
mean	50	
std dev	13.21382848	ties
z-score	3.783914712	
effect r	0.846109052	
U-crit	28.2651863	24.10137208
p-value	7.71904E-05	0.000154381
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	yes
p-value	5.41254E-06	1.08251E-05
sig (exact)	yes	yes

Mann-Whitney Test for Two Independent Samples

	GI-GD	GD-GI
count	10	10
median	68	2.5
rank sum	155	55
U	0	100

	one tail	two tail
alpha	0.05	
U	0	
mean	50	
std dev	13.17893055	ties
z-score	3.793934553	
effect r	0.848349556	
U-crit	28.32258828	24.16977076
p-value	7.41394E-05	0.000148279
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	yes
p-value	5.41254E-06	1.08251E-05
sig (exact)	yes	yes

Mann-Whitney Test for Two Independent Samples

	ID-II	GD-GI
count	10	10
median	6.5	2.5
rank sum	135	75
U	20	80

	one tail	two tail
alpha	0.05	
U	20	
mean	50	
std dev	13.09881473	ties
z-score	2.290283557	
effect r	0.512122972	
U-crit	28.45436708	24.32679489
p-value	0.011002442	0.022004884
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	yes
p-value	0.01161532	0.023230639
sig (exact)	yes	yes

C.6.5 Barriers

C.6.5.1 Barriers: Kruskal-Wallis Test

Kruskal-Wallis Test

	II-ID	GI-GD	ID-II	GD-GI	
median	34	39	3	1	
rank sum	309	301	122.5	87.5	
count	10	10	10	10	40
r^2/n	9548.1	9060.1	1500.625	765.625	20874.45
H-stat					29.73987805
H-ties					29.89129738
df					3
p-value					1.45466E-06
alpha					0.05
sig					yes

C.6.5.2 Barriers: Pairwise comparisons of treatment groups, Mann-Whitney tests

Mann-Whitney Test for Two Independent Samples

	II-ID	GI-GD
count	10	10
median	34	39
rank sum	109	101
U	46	54

	one tail	two tail
alpha	0.05	
U	46	
mean	50	
std dev	13.21382848	ties
z-score	0.302713177	
effect r	0.067688724	
U-crit	28.2651863	24.10137208
p-value	0.381054227	0.762108455
sig (norm)	no	no
U-crit	27	23
sig (table)	no	no
p-value	0.397968131	0.795936262
sig (exact)	no	no

Mann-Whitney Test for Two Independent Samples

	II-ID	ID-II
count	10	10
median	34	3
rank sum	155	55
U	0	100

	one tail	two tail
alpha	0.05	
U	0	
mean	50	
std dev	13.16394598	ties
z-score	3.798253205	
effect r	0.849315236	
U-crit	28.34723571	24.19913999
p-value	7.28597E-05	0.000145719
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	yes
p-value	5.41254E-06	1.08251E-05
sig (exact)	yes	yes

Mann-Whitney Test for Two Independent Samples

	II-ID	GD-GI
count	10	10
median	34	1
rank sum	155	55
U	0	100

	one tail	two tail
alpha	0.05	
U	0	
mean	50	
std dev	13.16894273	ties
z-score	3.796812016	
effect r	0.848992977	
U-crit	28.33901679	24.18934653
p-value	7.32844E-05	0.000146569
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	yes
p-value	5.41254E-06	1.08251E-05
sig (exact)	yes	yes

Mann-Whitney Test for Two Independent Samples

	GI-GD	ID-II
count	10	10
median	39	3
rank sum	155	55
U	0	100

	one tail	two tail
alpha	0.05	
U	0	
mean	50	
std dev	13.15894733	ties
z-score	3.799696036	
effect r	0.849637863	
U-crit	28.35545776	24.20893717
p-value	7.24368E-05	0.000144874
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	yes
p-value	5.41254E-06	1.08251E-05
sig (exact)	yes	yes

Mann-Whitney Test for Two Independent Samp

	GI-GD	GD-GI
count	10	10
median	39	1
rank sum	155	55
U	0	100

	one tail	two tail
alpha	0.05	
U	0	
mean	50	
std dev	13.16394598	ties
z-score	3.798253205	
effect r	0.849315236	
U-crit	28.34723571	24.19913999
p-value	7.28597E-05	0.000145719
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	yes
p-value	5.41254E-06	1.08251E-05
sig (exact)	yes	yes

Mann-Whitney Test for Two Independent Samples

	ID-II	GD-GI
count	10	10
median	3	1
rank sum	122.5	87.5
U	32.5	67.5

	one tail	two tail
alpha	0.05	
U	32.5	
mean	50	
std dev	12.97264328	ties
z-score	1.348992616	
effect r	0.301643919	
U-crit	28.66190065	24.57408639
p-value	0.088669669	0.177339338
sig (norm)	no	no
U-crit	27	23
sig (table)	no	no
p-value	0.108781312	0.217562623
sig (exact)	no	no

C.6.6 Challenges

C.6.6.1 Challenges: Kruskal-Wallis Test

Kruskal-Wallis Test

	II-ID	GI-GD	ID-II	GD-GI	
median	37	27.5	4	0.5	
rank sum	316	294	141	69	
count	10	10	10	10	40
r^2/n	9985.6	8643.6	1988.1	476.1	21093.4
H-stat					31.34195122
H-ties					31.45407645
df					3
p-value					6.82047E-07
alpha					0.05
sig					yes

C.6.6.2 Challenges: Pairwise comparisons of treatment groups, Mann-Whitney tests

Mann-Whitney Test for Two Independent Samples

	II-ID	GI-GD
count	10	10
median	37	27.5
rank sum	116	94
U	39	61

	one tail	two tail
alpha	0.05	
U	39	
mean	50	
std dev	13.19389811	ties
z-score	0.833718732	
effect r	0.186425176	
U-crit	28.29796884	24.14043489
p-value	0.20221975	0.4044395
sig (norm)	no	no
U-crit	27	23
sig (table)	no	no
p-value	0.217936089	0.435872177
sig (exact)	no	no

Mann-Whitney Test for Two Independent Samples

	II-ID	ID-II
count	10	10
median	37	4
rank sum	155	55
U	0	100

	one tail	two tail
alpha	0.05	
U	0	
mean	50	
std dev	13.20884871	ties
z-score	3.785341259	
effect r	0.846428037	
U-crit	28.27337729	24.11113225
p-value	7.67489E-05	0.000153498
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	yes
p-value	5.41254E-06	1.08251E-05
sig (exact)	yes	yes

Mann-Whitney Test for Two Independent Samples

	II-ID	GD-GI
count	10	10
median	37	0.5
rank sum	155	55
U	0	100

	one tail	two tail
alpha	0.05	
U	0	
mean	50	
std dev	13.11387373	ties
z-score	3.812755943	
effect r	0.852558147	
U-crit	28.42959723	24.29727979
p-value	6.87129E-05	0.000137426
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	yes
p-value	5.41254E-06	1.08251E-05
sig (exact)	yes	yes

Mann-Whitney Test for Two Independent Samples

	GI-GD	ID-II
count	10	10
median	27.5	4
rank sum	155	55
U	0	100

	one tail	two tail
alpha	0.05	
U	0	
mean	50	
std dev	13.21880638	ties
z-score	3.782489777	
effect r	0.845790427	
U-crit	28.25699838	24.09161558
p-value	7.76337E-05	0.000155267
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	yes
p-value	5.41254E-06	1.08251E-05
sig (exact)	yes	yes

Mann-Whitney Test for Two Independent Samp

	GI-GD	GD-GI
count	10	10
median	27.5	0.5
rank sum	155	55
U	0	100

	one tail	two tail
alpha	0.05	
U	0	
mean	50	
std dev	13.12390346	ties
z-score	3.809842105	
effect r	0.851906593	
U-crit	28.41309979	24.27762188
p-value	6.95278E-05	0.000139056
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	yes
p-value	5.41254E-06	1.08251E-05
sig (exact)	yes	yes

Mann-Whitney Test for Two Independent Samples

	ID-II	GD-GI
count	10	10
median	4	0.5
rank sum	141	69
U	14	86

	one tail	two tail
alpha	0.05	
U	14	
mean	50	
std dev	13.07367785	ties
z-score	2.753624527	
effect r	0.615729163	
U-crit	28.49571356	24.37606226
p-value	0.002946967	0.005893934
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	yes
p-value	0.002598021	0.005196042
sig (exact)	yes	yes

C.6.7 Context of Use Considerations

C.6.7.1 Context of Use Considerations: Kruskal-Wallis Test

Kruskal-Wallis Test

	II-ID	GI-GD	ID-II	GD-GI	
median	51	48	5	2.5	
rank sum	314	296	123.5	86.5	
count	10	10	10	10	40
r^2/n	9859.6	8761.6	1525.225	748.225	20894.65
H-stat					29.88768293
H-ties					29.94104877
df					3
p-value					1.42003E-06
alpha					0.05
sig					yes

C.6.7.2 Context of Use Considerations: Pairwise comparisons of treatment groups, Mann-Whitney tests

Mann-Whitney Test for Two Independent Samples

	II-ID	GI-GD
count	10	10
median	51	48
rank sum	114	96
U	41	59

	one tail	two tail
alpha	0.05	
U	41	
mean	50	
std dev	13.21382848	ties
z-score	0.681104648	
effect r	0.152299629	
U-crit	28.2651863	24.10137208
p-value	0.247902638	0.495805276
sig (norm)	no	no
U-crit	27	23
sig (table)	no	no
p-value	0.26442443	0.52884886
sig (exact)	no	no

Mann-Whitney Test for Two Independent Samples

	II-ID	ID-II
count	10	10
median	51	5
rank sum	155	55
U	0	100

	one tail	two tail
alpha	0.05	
U	0	
mean	50	
std dev	13.2237824	ties
z-score	3.781066451	
effect r	0.845472161	
U-crit	28.24881355	24.08186275
p-value	7.8079E-05	0.000156158
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	yes
p-value	5.41254E-06	1.08251E-05
sig (exact)	yes	yes

Mann-Whitney Test for Two Independent Samples

	II-ID	GD-GI
count	10	10
median	51	2.5
rank sum	155	55
U	0	100

	one tail	two tail
alpha	0.05	
U	0	
mean	50	
std dev	13.20884871	ties
z-score	3.785341259	
effect r	0.846428037	
U-crit	28.27337729	24.11113225
p-value	7.67489E-05	0.000153498
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	yes
p-value	5.41254E-06	1.08251E-05
sig (exact)	yes	yes

Mann-Whitney Test for Two Independent Samples

	GI-GD	ID-II
count	10	10
median	48	5
rank sum	155	55
U	0	100

	one tail	two tail
alpha	0.05	
U	0	
mean	50	
std dev	13.21880638	ties
z-score	3.782489777	
effect r	0.845790427	
U-crit	28.25699838	24.09161558
p-value	7.76337E-05	0.000155267
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	yes
p-value	5.41254E-06	1.08251E-05
sig (exact)	yes	yes

Mann-Whitney Test for Two Independent Samples

	GI-GD	GD-GI
count	10	10
median	48	2.5
rank sum	155	55
U	0	100

	one tail	two tail
alpha	0.05	
U	0	
mean	50	
std dev	13.20386706	ties
z-score	3.78676942	
effect r	0.846747384	
U-crit	28.28157138	24.12089611
p-value	7.63093E-05	0.000152619
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	yes
p-value	5.41254E-06	1.08251E-05
sig (exact)	yes	yes

Mann-Whitney Test for Two Independent Samples

	ID-II	GD-GI
count	10	10
median	5	2.5
rank sum	123.5	86.5
U	31.5	68.5

	one tail	two tail
alpha	0.05	
U	31.5	
mean	50	
std dev	13.14894432	ties
z-score	1.406957056	
effect r	0.314605162	
U-crit	28.37191124	24.22854269
p-value	0.079720062	0.159440123
sig (norm)	no	no
U-crit	27	23
sig (table)	no	no
p-value	0.082746974	0.165493949
sig (exact)	no	no

C.6.8 Total Design Space Criteria

C.6.8.1 Total Design Space Criteria: Kruskal-Wallis Test

Kruskal-Wallis Test

	II-ID	GI-GD	ID-II	GD-GI	
median	166	170.25	34.5	26.5	
rank sum	445	419	183	129	
count	12	12	12	12	48
r^2/n	16502.08333	14630.08333	2790.75	1386.75	35309.66667
H-stat					33.15136054
H-ties					33.1567595
df					3
p-value					2.98455E-07
alpha					0.05
sig					yes

C.6.8.2 Total Design Space Criteria: Pairwise comparisons of treatment groups, Mann-Whitney tests

Mann-Whitney Test for Two Independent Samples

	II-ID	GI-GD
count	10	10
median	166	172
rank sum	116	94
U	39	61

	one tail	two tail
alpha	0.05	
U	39	
mean	50	
std dev	13.22875656	ties
z-score	0.831521841	
effect r	0.185933936	
U-crit	28.2406318	24.07211359
p-value	0.202839448	0.405678895
sig (norm)	no	no
U-crit	27	23
sig (table)	no	no
p-value	0.217936089	0.435872177
sig (exact)	no	no

Mann-Whitney Test for Two Independent Samples

	II-ID	ID-II
count	10	10
median	166	34.5
rank sum	155	55
U	0	100

	one tail	two tail
alpha	0.05	
U	0	
mean	50	
std dev	13.2237824	ties
z-score	3.781066451	
effect r	0.845472161	
U-crit	28.24881355	24.08186275
p-value	7.8079E-05	0.000156158
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	yes
p-value	5.41254E-06	1.08251E-05
sig (exact)	yes	yes

Mann-Whitney Test for Two Independent Samples

	II-ID	GD-GI
count	10	10
median	166	26.5
rank sum	155	55
U	0	100

	one tail	two tail
alpha	0.05	
U	0	
mean	50	
std dev	13.21880638	ties
z-score	3.782489777	
effect r	0.845790427	
U-crit	28.25699838	24.09161558
p-value	7.76337E-05	0.000155267
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	yes
p-value	5.41254E-06	1.08251E-05
sig (exact)	yes	yes

Mann-Whitney Test for Two Independent Samples

	GI-GD	ID-II
count	10	10
median	172	34.5
rank sum	155	55
U	0	100

	one tail	two tail
alpha	0.05	
U	0	
mean	50	
std dev	13.2237824	ties
z-score	3.781066451	
effect r	0.845472161	
U-crit	28.24881355	24.08186275
p-value	7.8079E-05	0.000156158
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	yes
p-value	5.41254E-06	1.08251E-05
sig (exact)	yes	yes

Mann-Whitney Test for Two Independent Samples

	GI-GD	GD-GI
count	*10*	*10*
median	172	26.5
rank sum	155	55
U	0	100

	one tail	two tail
alpha	*0.05*	
U	0	
mean	50	
std dev	13.21880638	ties
z-score	3.782489777	
effect r	*0.845790427*	
U-crit	28.25699838	24.09161558
p-value	7.76337E-05	0.000155267
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	yes
p-value	5.41254E-06	1.08251E-05
sig (exact)	yes	yes

Mann-Whitney Test for Two Independent Samples

	ID-II	GD-GI
count	10	10
median	34.5	26.5
rank sum	127	83
U	28	72

	one tail	two tail
alpha	*0.05*	
U	28	
mean	50	
std dev	13.21382848	ties
z-score	1.664922473	
effect r	*0.37228798*	
U-crit	28.2651863	24.10137208
p-value	0.047964112	0.095928224
sig (norm)	yes	no
U-crit	27	23
sig (table)	no	no
p-value	0.052561216	0.105122432
sig (exact)	no	no

C.6.9 Distinct Functional Needs

C.6.9.1 Distinct Functional Needs: Kruskal-Wallis Test

Kruskal-Wallis Test

	II-ID	GI-GD	ID-II	GD-GI	
median	27.5	26.5	14	14	
rank sum	283.5	284.5	146	106	
count	10	10	10	10	40
r^2/n	8037.225	8094.025	2131.6	1123.6	19386.45
H-stat					18.85207317
H-ties					18.91061447
df					3
p-value					0.000285283
alpha					0.05
sig					yes

C.6.9.2 Distinct Functional Needs: Pairwise comparisons of treatment groups, Mann-Whitney tests

Mann-Whitney Test for Two Independent Samples

	II-ID	GI-GD
count	10	10
median	27.5	26.5
rank sum	104.5	105.5
U	50.5	49.5

	one tail	two tail
alpha	0.05	
U	49.5	
mean	50	
std dev	13.11387373	ties
z-score	0.038127559	
effect r	0.008525581	
U-crit	28.42959723	24.29727979
p-value	0.484792989	0.969585978
sig (norm)	no	no
U-crit	27	23
sig (table)	no	no
p-value	0.48525623	0.97051246
sig (exact)	no	no

Mann-Whitney Test for Two Independent Samples

	II-ID	ID-II
count	10	10
median	27.5	14
rank sum	141	69
U	14	86

	one tail	two tail
alpha	0.05	
U	14	
mean	50	
std dev	13.20884871	ties
z-score	2.725445706	
effect r	0.609428187	
U-crit	28.27337729	24.11113225
p-value	0.003210737	0.006421474
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	yes
p-value	0.002598021	0.005196042
sig (exact)	yes	yes

Mann-Whitney Test for Two Independent Samples

	II-ID	GD-GI
count	10	10
median	27.5	14
rank sum	148	62
U	7	93

	one tail	two tail
alpha	0.05	
U	7	
mean	50	
std dev	13.21880638	ties
z-score	3.252941209	
effect r	0.727379767	
U-crit	28.25699838	24.09161558
p-value	0.000571086	0.001142171
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	yes
p-value	0.000243564	0.000487129
sig (exact)	yes	yes

Mann-Whitney Test for Two Independent Samples

	GI-GD	ID-II
count	10	10
median	26.5	14
rank sum	137	73
U	18	82

	one tail	two tail
alpha	0.05	
U	18	
mean	50	
std dev	13.14894432	ties
z-score	2.433655449	
effect r	0.544181902	
U-crit	28.37191124	24.22854269
p-value	0.007473608	0.014947216
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	yes
p-value	0.007344822	0.014689645
sig (exact)	yes	yes

Mann-Whitney Test for Two Independent Samples

	GI-GD	GD-GI
count	10	10
median	26.5	14
rank sum	152	58
U	3	97

	one tail	two tail
alpha	0.05	
U	3	
mean	50	
std dev	13.16894273	ties
z-score	3.569003295	
effect r	0.798053398	
U-crit	28.33901679	24.18934653
p-value	0.000179171	0.000358342
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	yes
p-value	3.78878E-05	7.57756E-05
sig (exact)	yes	yes

Mann-Whitney Test for Two Independent Samples

	ID-II	GD-GI
count	10	10
median	14	14
rank sum	114	96
U	41	59

	one tail	two tail
alpha	0.05	
U	41	
mean	50	
std dev	13.18891081	ties
z-score	0.682391452	
effect r	0.152587367	
U-crit	28.30617221	24.15020981
p-value	0.24749573	0.494991459
sig (norm)	no	no
U-crit	27	23
sig (table)	no	no
p-value	0.26442443	0.52884886
sig (exact)	no	no

C.6.10 Distinct Nonfunctional Needs

C.6.10.1 Distinct Nonfunctional Needs: Kruskal-Wallis Test

Kruskal-Wallis Test

	II-ID	GI-GD	ID-II	GD-GI	
median	10	8.5	5.5	5.5	
rank sum	285	248.5	142	144.5	
count	10	10	10	10	40
r^2/n	8122.5	6175.225	2016.4	2088.025	18402.15
H-stat					11.64987805
H-ties					11.72909898
df					3
p-value					0.008371181
alpha					0.05
sig					yes

C.6.10.2 Distinct Nonfunctional Needs: Pairwise comparisons of treatment groups, Mann-Whitney tests

Mann-Whitney Test for Two Independent Samples

	II-ID	GI-GD
count	10	10
median	10	8.5
rank sum	116.5	93.5
U	38.5	61.5

	one tail	two tail
alpha	0.05	
U	38.5	
mean	50	
std dev	13.12891546	ties
z-score	0.875929169	
effect r	0.195863716	
U-crit	28.40485579	24.26779855
p-value	0.190534271	0.381068541
sig (norm)	no	no
U-crit	27	23
sig (table)	no	no
p-value	0.217936089	0.435872177
sig (exact)	no	no

Mann-Whitney Test for Two Independent Samples

	II-ID	ID-II
count	10	10
median	10	5.5
rank sum	140	70
U	15	85

	one tail	two tail
alpha	0.05	
U	15	
mean	50	
std dev	13.17393759	ties
z-score	2.656760727	
effect r	0.594069758	
U-crit	28.33080098	24.17955679
p-value	0.003944771	0.007889542
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	yes
p-value	0.003420728	0.006841456
sig (exact)	yes	yes

Mann-Whitney Test for Two Independent Samples

	II-ID	GD-GI
count	10	10
median	10	5.5
rank sum	138.5	71.5
U	16.5	83.5

	one tail	two tail
alpha	0.05	
U	16.5	
mean	50	
std dev	13.15894733	ties
z-score	2.545796344	
effect r	0.569257368	
U-crit	28.35545776	24.20893717
p-value	0.005451439	0.010902878
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	yes
p-value	0.005748122	0.011496244
sig (exact)	yes	yes

Mann-Whitney Test for Two Independent Samples

	GI-GD	ID-II
count	10	10
median	8.5	5.5
rank sum	134.5	75.5
U	20.5	79.5

	one tail	two tail
alpha	0.05	
U	20.5	
mean	50	
std dev	13.15894733	ties
z-score	2.241820662	
effect r	0.501286339	
U-crit	28.35545776	24.20893717
p-value	0.012486483	0.024972965
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	yes
p-value	0.01440278	0.02880556
sig (exact)	yes	yes

Mann-Whitney Test for Two Independent Samples

	GI-GD	GD-GI
count	10	10
median	8.5	5.5
rank sum	130.5	79.5
U	24.5	75.5

	one tail	two tail
alpha	0.05	
U	24.5	
mean	50	
std dev	13.17393759	ties
z-score	1.935639958	
effect r	0.432822253	
U-crit	28.33080098	24.17955679
p-value	0.026455906	0.052911813
sig (norm)	yes	no
U-crit	27	23
sig (table)	yes	no
p-value	0.031506419	0.063012839
sig (exact)	yes	no

Mann-Whitney Test for Two Independent Samples

	ID-II	GD-GI
count	10	10
median	5.5	5.5
rank sum	106.5	103.5
U	48.5	51.5

	one tail	two tail
alpha	0.05	
U	48.5	
mean	50	
std dev	13.14393997	ties
z-score	0.114121032	
effect r	0.025518239	
U-crit	28.38014267	24.23835105
p-value	0.454570925	0.90914185
sig (norm)	no	no
U-crit	27	23
sig (table)	no	no
p-value	0.48525623	0.97051246
sig (exact)	no	no

C.6.11 Distinct Barriers

C.6.11.1 Distinct Barriers: Kruskal-Wallis Test

Kruskal-Wallis Test

	II-ID	GI-GD	ID-II	GD-GI	
median	24.5	23	3	1	
rank sum	309.5	299.5	121.5	89.5	
count	10	10	10	10	40
r^2/n	9579.025	8970.025	1476.225	801.025	20826.3
H-stat					29.38756098
H-ties					29.53161765
df					3
p-value					1.7314E-06
alpha					0.05
sig					yes

C.6.11.2 Barriers: Pairwise comparisons of treatment groups, Mann-Whitney tests

Mann-Whitney Test for Two Independent Samples

	II-ID	GI-GD
count	10	10
median	24.5	23
rank sum	109.5	100.5
U	45.5	54.5

	one tail	two tail
alpha	0.05	
U	45.5	
mean	50	
std dev	13.19389811	ties
z-score	0.341066754	
effect r	0.076264845	
U-crit	28.29796884	24.14043489
p-value	0.366526664	0.733053329
sig (norm)	no	no
U-crit	27	23
sig (table)	no	no
p-value	0.369682175	0.739364351
sig (exact)	no	no

Mann-Whitney Test for Two Independent Samples

	II-ID	ID-II
count	10	10
median	24.5	3
rank sum	155	55
U	0	100

	one tail	two tail
alpha	0.05	
U	0	
mean	50	
std dev	13.18891081	ties
z-score	3.791063622	
effect r	0.847707597	
U-crit	28.30617221	24.15020981
p-value	7.50018E-05	0.000150004
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	yes
p-value	5.41254E-06	1.08251E-05
sig (exact)	yes	yes

Mann-Whitney Test for Two Independent Samples

	II-ID	GD-GI
count	10	10
median	24.5	1
rank sum	155	55
U	0	100

	one tail	two tail
alpha	0.05	
U	0	
mean	50	
std dev	13.17393759	ties
z-score	3.795372467	
effect r	0.848671084	
U-crit	28.33080098	24.17955679
p-value	7.3711E-05	0.000147422
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	yes
p-value	5.41254E-06	1.08251E-05
sig (exact)	yes	yes

Mann-Whitney Test for Two Independent Samples

	GI-GD	ID-II
count	10	10
median	23	3
rank sum	154	56
U	1	99

	one tail	two tail
alpha	0.05	
U	1	
mean	50	
std dev	13.18392163	ties
z-score	3.716648307	
effect r	0.831067826	
U-crit	28.31437869	24.15998844
p-value	0.000100942	0.000201883
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	yes
p-value	1.08251E-05	2.16502E-05
sig (exact)	yes	yes

Mann-Whitney Test for Two Independent Samples

	GI-GD	GD-GI
count	10	10
median	23	1
rank sum	155	55
U	0	100

	one tail	two tail
alpha	0.05	
U	0	
mean	50	
std dev	13.16894273	ties
z-score	3.796812016	
effect r	0.848992977	
U-crit	28.33901679	24.18934653
p-value	7.32844E-05	0.000146569
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	yes
p-value	5.41254E-06	1.08251E-05
sig (exact)	yes	yes

Mann-Whitney Test for Two Independent Samples

	ID-II	GD-GI
count	10	10
median	3	1
rank sum	120.5	89.5
U	34.5	65.5

	one tail	two tail
alpha	0.05	
U	34.5	
mean	50	
std dev	13.00303608	ties
z-score	1.1920293	
effect r	0.266545855	
U-crit	28.61190894	24.51451759
p-value	0.116624878	0.233249757
sig (norm)	no	no
U-crit	27	23
sig (table)	no	no
p-value	0.139930503	0.279861006
sig (exact)	no	no

C.6.12 Distinct Challenges

C.6.12.1 Distinct Challenges: Kruskal-Wallis Test

Kruskal-Wallis Test

	II-ID	GI-GD	ID-II	GD-GI	
median	25	22.5	3	0.5	
rank sum	309.5	300.5	138.5	71.5	
count	10	10	10	10	40
r^2/n	9579.025	9030.025	1918.225	511.225	21038.5
H-stat					30.9402439
H-ties					31.07140838
df					3
p-value					8.21122E-07
alpha					0.05
sig					yes

C.6.12.2 Distinct Challenges: Pairwise comparisons of treatment groups, Mann-Whitney tests

Mann-Whitney Test for Two Independent Samples

	II-ID	GI-GD
count	10	10
median	25	22.5
rank sum	109.5	100.5
U	45.5	54.5

	one tail	two tail
alpha	0.05	
U	45.5	
mean	50	
std dev	13.19888353	ties
z-score	0.340937928	
effect r	0.076236038	
U-crit	28.28976856	24.13066365
p-value	0.366575156	0.733150311
sig (norm)	no	no
U-crit	27	23
sig (table)	no	no
p-value	0.369682175	0.739364351
sig (exact)	no	no

Mann-Whitney Test for Two Independent Samples

	II-ID	ID-II
count	10	10
median	25	3
rank sum	155	55
U	0	100

	one tail	two tail
alpha	0.05	
U	0	
mean	50	
std dev	13.18891081	ties
z-score	3.791063622	
effect r	0.847707597	
U-crit	28.30617221	24.15020981
p-value	7.50018E-05	0.000150004
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	yes
p-value	5.41254E-06	1.08251E-05
sig (exact)	yes	yes

Mann-Whitney Test for Two Independent Samples

	II-ID	GD-GI
count	10	10
median	25	0.5
rank sum	155	55
U	0	100

	one tail	two tail
alpha	0.05	
U	0	
mean	50	
std dev	13.11387373	ties
z-score	3.812755943	
effect r	0.852558147	
U-crit	28.42959723	24.29727979
p-value	6.87129E-05	0.000137426
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	yes
p-value	5.41254E-06	1.08251E-05
sig (exact)	yes	yes

Mann-Whitney Test for Two Independent Samples

	GI-GD	ID-II
count	10	10
median	22.5	3
rank sum	155	55
U	0	100

	one tail	two tail
alpha	0.05	
U	0	
mean	50	
std dev	13.19888353	ties
z-score	3.788199199	
effect r	0.847067092	
U-crit	28.28976856	24.13066365
p-value	7.58716E-05	0.000151743
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	yes
p-value	5.41254E-06	1.08251E-05
sig (exact)	yes	yes

Mann-Whitney Test for Two Independent Samples

	GI-GD	GD-GI
count	10	10
median	22.5	0.5
rank sum	155	55
U	0	100

	one tail	two tail
alpha	0.05	
U	0	
mean	50	
std dev	13.12390346	ties
z-score	3.809842105	
effect r	0.851906593	
U-crit	28.41309979	24.27762188
p-value	6.95278E-05	0.000139056
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	yes
p-value	5.41254E-06	1.08251E-05
sig (exact)	yes	yes

Mann-Whitney Test for Two Independent Samples

	ID-II	GD-GI
count	10	10
median	3	0.5
rank sum	138.5	71.5
U	16.5	83.5

	one tail	two tail
alpha	0.05	
U	16.5	
mean	50	
std dev	13.03335801	ties
z-score	2.570327614	
effect r	0.574742727	
U-crit	28.5620338	24.4550877
p-value	0.005080119	0.010160238
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	yes
p-value	0.005748122	0.011496244
sig (exact)	yes	yes

C.6.13 Distinct Context of use Considerations

C.6.13.1 Distinct Context of Use Considerations: Kruskal-Wallis Test

Kruskal-Wallis Test

	II-ID	GI-GD	ID-II	GD-GI
median	40.5	42	5	2.5
rank sum	305	305	123.5	86.5
count	10	10	10	10
r^2/n	9302.5	9302.5	1525.225	748.225

H-stat	40
H-ties	20878.45
df	29.76914634
p-value	29.84754515
alpha	3
sig	1.48581E-06
	0.05
	yes

C.6.13.2 Distinct Context of Use Considerations: Pairwise comparisons of treatment groups, Mann-Whitney tests

Mann-Whitney Test for Two Independent Samples

	II-ID	GI-GD
count	10	10
median	40.5	42
rank sum	105	105
U	50	50

	one tail	two tail
alpha	0.05	
U	50	
mean	50	
std dev	13.16894273	ties
z-score	0	
effect r	0	
U-crit	28.33901679	24.18934653
p-value	0.5	1
sig (norm)	no	no
U-crit	27	23
sig (table)	no	no
p-value	0.48525623	0.97051246
sig (exact)	no	no

Mann-Whitney Test for Two Independent Samples

	II-ID	ID-II
count	10	10
median	40.5	5
rank sum	155	55
U	0	100

	one tail	two tail
alpha	0.05	
U	0	
mean	50	
std dev	13.21880638	ties
z-score	3.782489777	
effect r	0.845790427	
U-crit	28.25699838	24.09161558
p-value	7.76337E-05	0.000155267
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	yes
p-value	5.41254E-06	1.08251E-05
sig (exact)	yes	yes

Mann-Whitney Test for Two Independent Samples

	II-ID	GD-GI
count	10	10
median	40.5	2.5
rank sum	155	55
U	0	100

	one tail	two tail
alpha	0.05	
U	0	
mean	50	
std dev	13.20386706	ties
z-score	3.78676942	
effect r	0.846747384	
U-crit	28.28157138	24.12089611
p-value	7.63093E-05	0.000152619
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	yes
p-value	5.41254E-06	1.08251E-05
sig (exact)	yes	yes

Mann-Whitney Test for Two Independent Samples

	GI-GD	ID-II
count	10	10
median	42	5
rank sum	155	55
U	0	100

	one tail	two tail
alpha	0.05	
U	0	
mean	50	
std dev	13.21880638	ties
z-score	3.782489777	
effect r	0.845790427	
U-crit	28.25699838	24.09161558
p-value	7.76337E-05	0.000155267
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	yes
p-value	5.41254E-06	1.08251E-05
sig (exact)	yes	yes

Mann-Whitney Test for Two Independent Samples

	GI-GD	GD-GI
count	10	10
median	42	2.5
rank sum	155	55
U	0	100

	one tail	two tail
alpha	0.05	
U	0	
mean	50	
std dev	13.20386706	ties
z-score	3.78676942	
effect r	0.846747384	
U-crit	28.28157138	24.12089611
p-value	7.63093E-05	0.000152619
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	yes
p-value	5.41254E-06	1.08251E-05
sig (exact)	yes	yes

Mann-Whitney Test for Two Independent Samples

	ID-II	GD-GI
count	10	10
median	5	2.5
rank sum	123.5	86.5
U	31.5	68.5

	one tail	two tail
alpha	0.05	
U	31.5	
mean	50	
std dev	13.14894432	ties
z-score	1.406957056	
effect r	0.314605162	
U-crit	28.37191124	24.22854269
p-value	0.079720062	0.159440123
sig (norm)	no	no
U-crit	27	23
sig (table)	no	no
p-value	0.082746974	0.165493949
sig (exact)	no	no

C.6.14 Distinct Design Space Criteria

C.6.14.1 Distinct Design Space Criteria: Kruskal-Wallis Test

Kruskal-Wallis Test

	II-ID	GI-GD	ID-II	GD-GI	
median	128.5	131.5	29.5	22.5	
rank sum	315	295	124	86	
count	10	10	10	10	40
r^2/n	9922.5	8702.5	1537.6	739.6	20902.2
H-stat					29.94292683
H-ties					29.95416667
df					3
p-value					1.41104E-06
alpha					0.05
sig					yes

C.6.14.2 Distinct Design Space Criteria: Pairwise comparisons of treatment groups, Mann-Whitney tests

Mann-Whitney Test for Two Independent Samples

	II-ID	GI-GD
count	10	10
median	128.5	131.5
rank sum	115	95
U	40	60

	one tail	two tail
alpha	0.05	
U	40	
mean	50	
std dev	13.2237824	ties
z-score	0.75621329	
effect r	0.169094432	
U-crit	28.24881355	24.08186275
p-value	0.224760663	0.449521326
sig (norm)	no	no
U-crit	27	23
sig (table)	no	no
p-value	0.240625474	0.481250947
sig (exact)	no	no

Mann-Whitney Test for Two Independent Samples

	II-ID	ID-II
count	10	10
median	128.5	29.5
rank sum	155	55
U	0	100

	one tail	two tail
alpha	0.05	
U	0	
mean	50	
std dev	13.21880638	ties
z-score	3.782489777	
effect r	0.845790427	
U-crit	28.25699838	24.09161558
p-value	7.76337E-05	0.000155267
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	yes
p-value	5.41254E-06	1.08251E-05
sig (exact)	yes	yes

Mann-Whitney Test for Two Independent Samples

	II-ID	GD-GI
count	10	10
median	128.5	22.5
rank sum	155	55
U	0	100

	one tail	two tail
alpha	0.05	
U	0	
mean	50	
std dev	13.2237824	ties
z-score	3.781066451	
effect r	0.845472161	
U-crit	28.24881355	24.08186275
p-value	7.8079E-05	0.000156158
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	yes
p-value	5.41254E-06	1.08251E-05
sig (exact)	yes	yes

Mann-Whitney Test for Two Independent Samples

	GI-GD	ID-II
count	10	10
median	131.5	29.5
rank sum	155	55
U	0	100

	one tail	two tail
alpha	0.05	
U	0	
mean	50	
std dev	13.2237824	ties
z-score	3.781066451	
effect r	0.845472161	
U-crit	28.24881355	24.08186275
p-value	7.8079E-05	0.000156158
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	yes
p-value	5.41254E-06	1.08251E-05
sig (exact)	yes	yes

Mann-Whitney Test for Two Independent Samples

	GI-GD	GD-GI
count	10	10
median	131.5	22.5
rank sum	155	55
U	0	100

	one tail	two tail
alpha	0.05	
U	0	
mean	50	
std dev	13.22875656	ties
z-score	3.77964473	
effect r	0.845154255	
U-crit	28.2406318	24.07211359
p-value	7.85261E-05	0.000157052
sig (norm)	yes	yes
U-crit	27	23
sig (table)	yes	yes
p-value	5.41254E-06	1.08251E-05
sig (exact)	yes	yes

Mann-Whitney Test for Two Independent Samples

	ID-II	*GD-GI*
count	10	10
median	29.5	22.5
rank sum	124	86
U	31	69

	one tail	*two tail*
alpha	0.05	
U	31	
mean	50	
std dev	13.21382848	ties
z-score	*1.43788759*	
effect r	0.32152144	
U-crit	28.2651863	24.10137208
p-value	0.075232976	0.150465951
sig (norm)	no	no
U-crit	27	23
sig (table)	no	no
p-value	0.082746974	0.165493949
sig (exact)	no	no

APPENDIX D. PERSONAS

D.1 Situated Data Mining Algorithm Output

P List	P Quantity	Criteria Quantity	Design Space Criteria
[6, 3]	2	44	['Prevent suicide', 'Finances deplete while waiting for claims', 'Knee pain', 'Financial burden', 'Weight gain', 'Connect veteran to other veterans', 'Malingerer vets', 'Sleep issues', 'Access weight loss program', 'Know triggers', 'Sleep apnea', 'Veteran has to reassociate with American ways', 'Connect veteran', 'Military lacks empathy', 'Fighting the VA for benefits', 'Being honest', 'Hypervigilance', 'Wife understanding', 'Returning home after deployment', 'Motivation issues', 'Disability', 'Drinking with people of trust', 'VA disregards serious conditions', 'Find vet-friendly company', 'Receive proper treatment', 'Civilians unpatriotic', 'Military treats people like equipment', 'Watch movies', 'VA benefits process long', 'VA benefits process difficult', 'VA lacks empathy', 'Nasal issues', 'Service-related injuries', 'Veteran isolates himself', 'Physical pain', 'Surgery', 'Fighting the VA for proper care', 'Shoot guns', 'Civilian cluelessness', 'Alcohol issues', 'PTSD', 'Access suicide hotline', 'Back issues', 'Feeling supported by family']

[11, 10]	2	43	['Freedom overload', 'Living with parents', 'Different life experiences', 'Age gap', 'Financial burden', 'Credit transfer issues', 'Make VA profile to avoid repeated paperwork', 'Civilians worry about trivial things', 'Make VA profile', 'Connect veteran', 'Veteran outcast from society', 'Anger issues', 'Friends live far away', 'Spending time with girlfriend', 'Find housing', 'Housing costs', 'Civilian workforce differs from military', 'Benefit delay', 'Maturity gap', 'Adjusting to civilian life', 'Acquire job', 'Receive GI Bill benefits', 'Feeling supported by friends', 'Translate military skills', 'Adjusting to no income', 'Veteran stereotype', 'Veteran isolates himself', 'Civilian indifference', 'Civilian life lacks structure', 'Receive certification', 'Translate military skills to civilian job', 'College lacks GI Bill knowledge', 'Translate military skills to college credits', 'GI Bill payment delay', 'Coordinating with the school', 'Civilian cluelessness', 'College removes veteran from classes', 'Alcohol issues', 'Disrespectful civilians', 'Feeling supported by family', 'High School Diploma', 'Transportation issues', 'Treating school like a job']

[34, 17]	2	43	['Connect veteran with school vet organizations', 'Civilian brotherhood lacks depth', 'Age gap', 'Feeling independent', 'Financial burden', 'Creating deeper friendship through military service', 'Connect veteran to other veterans', 'Military experiences impact personality', 'Starting education at community college', 'Discussing service with friends', 'Moving someplace new', 'Having more world experience', 'Social anxiety', 'Disability', 'Hypervigilance', 'Disability claims difficult', 'Finish degree', 'Time constraints', 'VA unpleasant', 'Transition difficult', 'VA corruption', 'Search job postings', 'Talking to friends who are still in military', 'View veteran benefits for disabilities', 'Civilian asks about killing', 'Understand VA benefits', 'Receive GI Bill benefits', 'Receive advice from other veterans', 'Civilian questions', 'Discuss military experiences with other veterans', 'Isolation easy', 'Veteran stereotype', 'Acquire VA benefits', 'Connect local veterans', 'Poor living situation', 'Feeling acceptance', 'Veteran lacks ability to discuss combat experience', 'Finish degree quickly', 'Civilian cluelessness', 'Hangout with veteran friends', 'Disrespectful civilians', 'Connect veteran', 'Treating school like a job']

[20, 17]	2	42	['Connect veteran to civilians', 'Civilian brotherhood lacks depth', 'Different life experiences', 'Feeling independent', 'Financial burden', 'Receive assistance from organizations', 'Connect veteran to other veterans', 'Find support group', 'Outdoor activities enjoyable', 'Moving someplace new', 'Civilian offends veteran', 'Civilian lacks empathy for combat veteran', 'Hypervigilance', 'Paying for education by military', 'Joining right after high school', 'Struggling to build relationships', 'Spending time with kids', 'Housing costs', 'Differing military experience between veterans', 'VA unpleasant', 'Connect veteran to vet organizations', 'Transition difficult', 'Search job postings', 'Culture shock', 'Receive GI Bill benefits', 'Civilian asks about killing', 'Military experiences impact personality', 'Being a student again', 'VA limits medical help', 'Civilian questions', 'Feeling pride', 'Isolation easy', 'Veteran stereotype', 'Connect veteran', 'Poor living situation', 'Feeling acceptance', 'Veteran lacks ability to discuss combat experience', 'Low income', 'Civilian cluelessness', 'Missing military structure', 'Disrespectful civilians', 'Feeling supported by family']
[29, 20]	2	33	['Disregarding time', 'Spending time with kids', 'Independence issues', 'Financial burden', 'GI Bill steps lack clarity', 'Young veterans lack life skills', 'Land navigation easy', 'Find support group', 'View job postings for veterans', 'View job postings', 'Find purpose', 'Receive assistance after military', 'Familiarizing self with area', 'Joining right after high school', 'Struggling to build relationships', 'Housing costs', 'VA unpleasant', 'Know GI Bill amount', 'Veteran has too much free time', 'Establish routine', 'Experience fulfillment', 'Search job postings', 'Acquire job', 'Receive GI Bill benefits', 'Transfer GI Bill benefits', 'Feeling frustrated', 'Transition difficult', 'Veteran isolates himself', 'Civilian life lacks structure', 'Freedom overload', 'Spending time with friends', 'Missing military structure', 'Military takes care of basic needs']

[31, 16]	2	30	['Civilian brotherhood lacks depth', 'Mental health issues', 'Civilians worry about trivial things', 'Connect veteran to other veterans', 'Find support group', 'Find purpose', 'Receive resume writing help', 'Connect veteran', 'Stress causes suicide', 'Stigma', 'Help people and community', 'Struggling to build relationships', 'Receive medical assistance', 'Find housing', 'Enjoying outdoors', 'Transition difficult', 'Acquire job', 'Family understanding after deployment', 'Job search difficult', 'Civilian asks about killing', 'Civilian questions', 'Feel productive', 'Isolation easy', 'Civilian life lacks structure', 'Poor living situation', 'Veteran stereotype', 'Civilians lack discipline', 'Civilian cluelessness', 'PTSD', 'Connect local veterans']
[21, 16]	2	29	['Civilian brotherhood lacks depth', 'Feeling supported by community', 'Independence issues', 'Feeling independent', 'Mental health issues', 'Connect veteran to other veterans', 'Malingerer vets', 'Connect veteran', 'Stigma', 'Help people and community', 'Starting over', 'Receive medical assistance', 'Housing costs', 'Enjoying outdoors', 'Homelessness', 'Find vet-friendly stores', 'Job search difficult', 'Acquire job', 'VA benefits process difficult', 'Anxiety', 'Poverty', 'Feel productive', 'Veteran isolates himself', 'Feeling supported by family', 'Veteran stereotype', 'PTSD', 'Military experiences impact personality', 'Receive assistance', 'Connect local veterans']

[40, 17]	2	28	['Receive education information', 'Different life experiences', 'Age gap', 'Feeling independent', 'Military experience provides different perspective', 'Creating deeper friendship through military service', 'Connect veteran to other veterans', 'Find support group', 'Integration takes time', 'Civilians worry about trivial things', 'Connect veteran', 'Discussing service with friends', 'Social anxiety', 'Feeling supported by community', 'Joining right after high school', 'Receiving appreciation from civilians', 'Hangout with veteran friends', 'Receive financial guidance', 'Talking to friends who are still in military', 'Translate military skills', 'Discuss military experiences with other veterans', 'Feeling supported by family', 'Malingerer vets', 'Translate military skills to civilian job', 'Civilian cluelessness', 'Missing military structure', 'Military experiences impact personality', 'Connect local veterans']
[25, 20]	2	28	['Connect veteran to civilians', 'Independence issues', 'Receive assistance from organizations', 'Connect veteran to other veterans', 'Find support group', 'Find community activities', 'Lower enlisted soldiers receive less education', 'Find purpose', 'Connect veteran', 'Housing costs', 'Veteran has too much free time', 'Providing for children', 'Establish routine', 'Education disparity', 'Receive GI Bill benefits', 'Stay busy', 'Isolation easy', 'Freedom overload', 'Veteran isolates himself', 'Civilian life lacks structure', 'Poor living situation', 'Veteran stereotype', 'Civilian cluelessness', 'Missing military structure', 'Military experiences impact personality', 'Receive assistance', 'Feeling supported by family', 'Addiction']

[13, 10]	2	26	['Living with parents', 'Different life experiences', 'Age gap', 'Feeling independent', 'Financial burden', 'Starting education at community college', 'Maturity gap', 'Lazy civilians', 'View community calendar', 'Getting involved in military organization', 'Find housing', 'Finish degree', 'Housing costs', 'Military life regimented', 'Being a student again', 'Translate military skills', 'Adjusting to no income', 'Veteran isolates himself', 'Civilian life lacks structure', 'Freedom overload', 'Civilians lack discipline', 'Translate military skills to civilian job', 'Finish degree quickly', 'Civilian cluelessness', 'Feeling supported by family', 'Video games relaxing']
[36, 34]	2	24	['Civilian brotherhood lacks depth', 'Make friends', 'Creating deeper friendship through military service', 'Connect veteran to other veterans', 'View veteran discounts', 'Stigma', 'Receive veteran discounts', 'Veteran misses military brotherhood', 'Feeling independent', 'Post-deployment decompression', 'Civilian asks about killing', 'Disrespectful civilians', 'Connect veterans to prevent suicide', 'Drinking alcohol', 'Civilian questions', 'Connect veteran', 'Feeling acceptance', 'Civilian cluelessness', 'Alcohol issues', 'Hangout with veteran friends', 'Military experiences impact personality', 'Connect local veterans', 'Receive recognition', 'Veteran is indifferent to achieve acceptance']
[27, 10]	2	24	['Living with parents', 'Different life experiences', 'Age gap', 'Connect veteran to other veterans', 'Starting education at community college', 'Weight gain', 'Attending class with younger people', 'View community calendar', 'Friends live far away', 'View local events', 'Leisure activities expensive', 'Finish degree', 'Housing costs', 'Going out to eat in excess', 'View vet-interest newsfeed', 'Going to college as a parent', 'Receive GI Bill benefits', 'Being a student again', 'Veteran isolates himself', 'Civilian life lacks structure', 'Veteran stereotype', 'Military takes care of basic needs', 'Connect veteran', 'Veterans unfairly begrudge civilians']

[41, 19]	2	23	['Find purpose', 'Connect veteran to other veterans', 'View job postings for veterans', 'View job postings', 'Know triggers', 'Control emotions', 'Social anxiety', 'Job unsatisfying', 'View local events', 'Community involvement difficult', 'Veteran misses military brotherhood', 'View volunteer opportunities', 'Anger issues', 'Find roommate', 'Translate military skills', 'Connect local veterans', 'Depression', 'Feeling acceptance', 'Translate military skills to civilian job', 'Veteran lacks emotional control', 'Civilian cluelessness', 'PTSD', 'Connect veteran']
[41, 16]	2	23	['Prevent suicide', 'Feeling supported by community', 'Feeling independent', 'Mental health issues', 'Connect veteran to other veterans', 'View job postings for veterans', 'View job postings', 'Find purpose', 'Control emotions', 'Job unsatisfying', 'Feeling alone', 'Receive medical assistance', 'Living where veteran grew up', 'Civilian asks about killing', 'Civilian misplaces blame for war on veteran', 'Civilian questions', 'Poverty', 'Connect local veterans', 'Depression', 'Veteran lacks emotional control', 'Civilian cluelessness', 'PTSD', 'Connect veteran']
[37, 16]	2	22	['Independence issues', 'Connect veteran to other veterans', 'Find purpose', 'Having more world experience', 'Civilian lacks empathy for combat veteran', 'Hypervigilance', 'Struggling to build relationships', 'Find housing', 'Find vet-friendly stores', 'Feeling supported by friends', 'Civilian questions', 'Veteran isolates himself', 'Connect veteran', 'Veteran stereotype', 'Civilians lack discipline', 'Feeling supported by family', 'Veteran lacks emotional control', 'Civilian cluelessness', 'PTSD', 'Military doctors provide lacking treatment', 'Military experiences impact personality', 'Connect local veterans']

[37, 3]	2	22	['View veteran reviews', 'Civilians being supportive', 'Connect veteran to other veterans', 'Find community activities', 'Military provides purpose', 'Military lacks empathy', 'Veteran outcast from society', 'Civilian lacks empathy for combat veteran', 'Hypervigilance', 'Brain injury', 'Find vet-friendly stores', 'Military experience strains relationships', 'Civilian questions', 'Enjoying alone time', 'Service-related injuries', 'Veteran isolates himself', 'Feeling supported by family', 'Veteran stereotype', 'Veteran lacks emotional control', 'Civilian cluelessness', 'PTSD', 'Connect veteran']
[37, 19]	2	22	['Wife must mitigate interaction with civilians', 'Make friends', 'Connect veteran to other veterans', 'Civilian cluelessness', 'Military provides purpose', 'Find purpose', 'Anger issues', 'Struggling to build relationships', 'Independence issues', 'Find housing', 'Post-deployment decompression', 'Veteran isolates himself', 'Connect veteran', 'Feeling supported by family', 'Veteran lacks emotional control', 'Receive information on VA', 'PTSD', 'Military experiences impact personality', 'Spousal dishonesty', 'Connect local veterans', 'View local events', 'Veteran is indifferent to achieve acceptance']
[35, 34]	2	20	['View veteran discounts', 'Connect local veterans', 'Stigma', 'Feeling acceptance', 'Veteran distrusts VA', 'Receive veteran discounts', 'VA lacks accountability', 'Veteran misses military brotherhood', 'Civilian asks about killing', 'Creating deeper friendship through military service', 'Civilian cluelessness', 'Connect veteran to other veterans', 'Feeling independent', 'Civilian questions', 'Hangout with veteran friends', 'Disrespectful civilians', 'Feel productive', 'Connect veteran', 'Veteran stereotype', 'View volunteer opportunities']

[12, 10]	2	16	['Civilian lacks empathy for combat veteran', 'Veteran struggles with close relationships', 'Living with parents', 'Freedom overload', 'Age gap', 'Acquire job', 'Finish degree quickly', 'Military life regimented', 'Finish degree', 'Professor lacks understanding', 'Financial ignorance', 'Attending class with younger people', 'Poor living situation', 'Feeling supported by family', 'Video games relaxing', 'Treating school like a job']
[19, 23, 16]	3	21	['Establish routine', 'Veteran isolates himself', 'Connect veteran', 'Military experience provides different perspective', 'Military experiences impact personality', 'Job unsatisfying', 'Help people and community', 'Find vet-friendly company', 'Acquire job', 'Job search difficult', 'Civilian cluelessness', 'Connect veteran to other veterans', 'Find housing', 'Connect local veterans', 'View job postings', 'Locate VA hospital', 'Find purpose', 'Feel productive', 'Know GI Bill amount', 'Feeling supported by family', 'Struggling to build relationships']
[28, 34, 17]	3	19	['Connect veteran', 'Poor living situation', 'Veteran stereotype', 'Age gap', 'Feeling independent', 'Creating deeper friendship through military service', 'Civilian asks about killing', 'Military experiences impact personality', 'Finish degree quickly', 'Civilian cluelessness', 'Connect veteran to other veterans', 'Finish degree', 'Having more world experience', 'Disrespectful civilians', 'Discuss military experiences with other veterans', 'Connect local veterans', 'Isolation easy', 'Discussing service with friends', 'Feeling acceptance']

[26, 34, 10]	3	19	['Civilian life lacks structure', 'Poor living situation', 'Veteran stereotype', 'Age gap', 'Friends live far away', 'Feeling independent', 'Treating school like a job', 'Finish degree quickly', 'Receive GI Bill benefits', 'Connect veteran to other veterans', 'Alcohol issues', 'Finish degree', 'Disability', 'Civilian cluelessness', 'Understand VA benefits', 'Transition difficult', 'Connect veteran', 'Adjusting to no income', 'Having more world experience']
[18, 19, 2]	3	19	['Establish routine', 'Connect local veterans', 'Freedom overload', 'Make friends', 'Connect veteran', 'Acquire job', 'Understand VA benefits', 'Translate military skills to civilian job', 'Receive therapy', 'Help people and community', 'PTSD', 'Connect veteran to other veterans', 'Military experiences are unrelatable', 'Translate military skills', 'Feel productive', 'Family lives far away', 'Feeling supported by family', 'Receive assistance', 'Adjusting to new place']
[26, 34, 17]	3	19	['Connect local veterans', 'Poor living situation', 'Veteran stereotype', 'Age gap', 'Feeling independent', 'Finish degree quickly', 'Having more world experience', 'Creating deeper friendship through military service', 'Receive GI Bill benefits', 'Connect veteran to other veterans', 'Finish degree', 'Disability', 'Civilian cluelessness', 'Understand VA benefits', 'Transition difficult', 'Connect veteran', 'Isolation easy', 'Hypervigilance', 'Treating school like a job']
[22, 23, 19]	3	19	['Anger issues', 'Social anxiety', 'Veteran struggles with close relationships', 'Enjoying leisure time', 'Translate military skills to civilian job', 'Job unsatisfying', 'Help people and community', 'Struggling to build relationships', 'Job search difficult', 'Civilian cluelessness', 'Receive job assistance', 'Find housing', 'Connect veteran to other veterans', 'Military experiences impact personality', 'Translate military skills', 'Know GI Bill amount', 'Connect veteran', 'Acquire job', 'Find leisure activities']

[26, 34, 16]	3	19	['Receive therapy', 'Prevent suicide', 'Civilian life lacks structure', 'Poor living situation', 'Veteran stereotype', 'Feeling independent', 'Having more world experience', 'Creating deeper friendship through military service', 'Civilian cluelessness', 'Relaxation difficult', 'Connect local veterans', 'Connect veteran to other veterans', 'Feel productive', 'Know GI Bill amount', 'Connect veteran', 'Isolation easy', 'Transition difficult', 'Adjusting to no income', 'Hypervigilance']
[33, 34, 26]	3	18	['Connect local veterans', 'Civilian life lacks structure', 'Veteran stereotype', 'Age gap', 'Having more world experience', 'Civilian cluelessness', 'Relaxation difficult', 'Alcohol issues', 'Feel productive', 'Receive therapy', 'Connect veteran to other veterans', 'Receive information on VA', 'Military pays for everything while in', 'Budget money', 'Transition difficult', 'Connect veteran', 'Job uncertainty', 'Hypervigilance']
[5, 19, 2]	3	17	['Establish routine', 'Adjusting to civilian life', 'Feeling supported by family', 'Poor living situation', 'Freedom overload', 'Age gap', 'Independence issues', 'Translate military skills to civilian job', 'Acquire job', 'View job postings for veterans', 'Connect veteran to other veterans', 'Translate military skills', 'PTSD', 'View job postings', 'Receive assistance', 'Connect veteran', 'Adjusting to new place']
[15, 23, 11]	3	16	['Veteran isolates himself', 'Connect veteran', 'Receive GI Bill benefits', 'Age gap', 'Translate military skills to civilian job', 'Acquire job', 'Civilian cluelessness', 'Civilians anger veteran', 'View job postings', 'Culture shock', 'Civilian workforce differs from military', 'Civilians worry about trivial things', 'Translate military skills', 'Feel productive', 'Feeling supported by family', 'Find leisure activities']

[35, 41, 17]	3	13	['Connect local veterans', 'Feeling acceptance', 'Feeling supported by community', 'Translate military skills to civilian job', 'Receiving appreciation from civilians', 'Civilian asks about killing', 'Civilian cluelessness', 'Connect veteran to other veterans', 'Feeling independent', 'Hangout with veteran friends', 'Translate military skills', 'Connect veteran', 'Civilian questions']
[4, 7, 3]	3	13	['Connect veteran', 'Shoot guns', 'Financial burden', 'Know triggers', 'Service-related injuries', 'Connect veteran to other veterans', 'Malingerer vets', 'PTSD', 'Disrespectful civilians', 'VA benefits process difficult', 'Vietnam-era civilian/vet relationship', 'Feeling supported by family', 'Fighting the VA for benefits']
[12, 17, 10]	3	9	['Civilian lacks empathy for combat veteran', 'Poor living situation', 'Age gap', 'Finish degree quickly', 'Finish degree', 'Professor lacks understanding', 'Attending class with younger people', 'Feeling supported by family', 'Treating school like a job']
[12, 23, 7]	3	8	['Establish routine', 'Manage stress', 'Age gap', 'Go outdoors', 'Acquire job', 'Find vet-friendly company', 'Attending class with younger people', 'Feeling supported by family']
[5, 19, 20, 2]	4	13	['Establish routine', 'Adjusting to civilian life', 'Feeling supported by family', 'Poor living situation', 'Freedom overload', 'Independence issues', 'Acquire job', 'Connect veteran to other veterans', 'View job postings for veterans', 'View job postings', 'Receive assistance', 'Connect veteran', 'Adjusting to new place']
[10, 17, 34, 7]	4	13	['Acquire VA benefits', 'Veteran stereotype', 'Age gap', 'Feeling independent', 'Financial burden', 'Understand VA benefits', 'Civilian cluelessness', 'Connect veteran to other veterans', 'Disability', 'Receive GI Bill benefits', 'Disrespectful civilians', 'Connect veteran', 'Having more world experience']

[30, 34, 39, 26]	4	10	['Civilian life lacks structure', Military experiences impact personality', 'Creating deeper friendship through military service', 'Civilian cluelessness', 'Connect veteran to other veterans', 'Receive information on VA', 'Understand VA benefits', 'Transition difficult', 'Connect veteran', 'Isolation easy']
[30, 34, 39, 17]	4	10	['Feeling independent', 'Creating deeper friendship through military service', 'Civilian cluelessness', 'Connect veteran to other veterans', 'Receive advice from other veterans', 'VA unpleasant', 'Understand VA benefits', 'Transition difficult', 'Connect veteran', 'Isolation easy']
[12, 23, 33, 9]	4	6	['Establish routine', 'Veteran struggles with close relationships', 'Age gap', 'Acquire job', 'Attending class with younger people', 'Feeling supported by family']
[7, 10, 23, 34, 2]	5	8	['Age gap', 'Feeling independent', 'Financial burden', 'Acquire job', 'Disrespectful civilians', 'Connect veteran to other veterans', 'Understand VA benefits', 'Connect veteran']
[12, 23, 33, 2, 19]	5	6	['Establish routine', 'Veteran struggles with close relationships', 'Age gap', 'Acquire job', 'Military experiences impact personality', 'Feeling supported by family']
[8, 10, 19, 23, 33, 2]	6	8	['Veteran struggles with close relationships', 'Age gap', 'Translate military skills to civilian job', 'Connect veteran', 'Acquire job', 'Connect veteran to other veterans', 'Translate military skills', 'Feeling supported by family']
[8, 10, 11, 33, 5, 23]	6	8	['Connect veteran', 'Age gap', 'Translate military skills to civilian job', 'Financial burden', 'Acquire job', 'Find housing', 'Translate military skills', 'Feeling supported by family']
[8, 10, 19, 23, 33, 5]	6	8	['Connect veteran', 'Age gap', 'Translate military skills to civilian job', 'Acquire job', 'Connect veteran to other veterans', 'Find housing', 'Translate military skills', 'Feeling supported by family']

[7, 10, 23, 24, 34, 2]	6	6	['Feeling independent', 'Acquire job', 'Disrespectful civilians', 'Connect veteran to other veterans', 'Understand VA benefits', 'Connect veteran']
[14, 16, 34, 39, 9, 20]	6	6	['Civilian life lacks structure', 'Civilian brotherhood lacks depth', 'Feeling independent', 'Civilian cluelessness', 'Connect veteran to other veterans', 'Transition difficult']
[7, 10, 23, 33, 34, 38]	6	6	['Age gap', 'Civilian cluelessness', 'Connect veteran to other veterans', 'Disrespectful civilians', 'Connect veteran', 'Maturity gap']
[7, 10, 23, 33, 34, 3]	6	6	['Veteran stereotype', 'Financial burden', 'Civilian cluelessness', 'Connect veteran to other veterans', 'Disrespectful civilians', 'Connect veteran']
[2, 20, 23, 24, 34, 36]	6	6	['Stigma', 'Feeling independent', 'Military experiences impact personality', 'Connect veteran to other veterans', 'Disrespectful civilians', 'Connect veteran']
[7, 10, 23, 24, 34, 35]	6	6	['Veteran stereotype', 'Feeling independent', 'Civilian cluelessness', 'Connect veteran to other veterans', 'Disrespectful civilians', 'Connect veteran']
[2, 20, 23, 33, 34, 39]	6	4	['Connect veteran', 'Civilian life lacks structure', 'Connect veteran to other veterans', 'Military experiences impact personality']
[2, 20, 23, 34, 36, 38]	6	4	['Connect veteran', 'Connect veteran to other veterans', 'Disrespectful civilians', 'Military experiences impact personality']
[8, 10, 11, 19, 23, 5, 33]	7	7	['Feeling supported by family', 'Age gap', 'Translate military skills to civilian job', 'Acquire job', 'Find housing', 'Translate military skills', 'Connect veteran']
[14, 16, 34, 39, 10, 20, 26]	7	6	['Civilian life lacks structure', 'Poor living situation', 'Feeling independent', 'Civilian cluelessness', 'Connect veteran to other veterans', 'Transition difficult']

[2, 20, 23, 33, 34, 36, 38]	7	4	['Connect veteran', 'Connect veteran to other veterans', 'Disrespectful civilians', 'Military experiences impact personality']
[2, 20, 23, 34, 36, 39, 40]	7	4	['Feeling independent', 'Connect veteran', 'Connect veteran to other veterans', 'Military experiences impact personality']
[2, 20, 33, 34, 36, 38, 39, 40]	8	3	['Connect veteran', 'Connect veteran to other veterans', 'Military experiences impact personality']