An Exploration of Attunement in Counselor Education

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Dissertation submitted to the faculty of the Virginia Polytechnic Institute and State University in partial fulfillment of the requirements for the degree of

Doctor of Philosophy
In
Counselor Education

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February 27, 2018
Blacksburg, VA

Keywords: attunement, relational, interpersonal, counselor education, embodied, pedagogical, expressive arts

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ABSTRACT

Experiences of attunement, a deeply felt and embodied state of consciousness that results from tuning in to oneself, others, events, energies, and the environment, are the basis for realization of innate human capacities for connection and growth (Kossak, 2015). In an educational context, the process of ‘tuning in’ fosters the development of relationally based and embodied knowledge (Blades & Bester, 2013; Lutzker, 2014). Though rarely referenced and never studied comprehensively in counselor education, attunement contributes to the development of relational qualities and creativity necessary to provide effective counseling services (Duffey, Haberstroh, & Trepal, 2009; Kossak, 2015). Based on a synthesis of knowledge from diverse fields, this study was an exploration of attunement in counselor education involving several forms of measurement and the expressive arts as vehicles through which to foster attuned states. The researcher explored attunement as it occurred among master’s level counselors-in-training engaging in improvisational group drumming, an intervention that has been shown to promote attunement (e.g., Kossak, 2008a). Perceptual, behavioral, and physiological measures were used to identify an occurrence of attunement. Audio and video data were used to contextualize the overall drumming experience and the process of ‘tuning in’ that led to attuned states. Findings from this study increase understanding of the phenomenon of attunement in the context of improvisational group drumming. Results shed light on how relational qualities and creativity develop and may promote more relational-responsive pedagogical practices in counselor education. Ultimately, results may contribute to the development of counselors with greater
capacities for relating to diverse clients, responding to the complexities of their work, and creating meaningful change within their communities and society at large.

*Keywords:* attunement, relational, interpersonal, counselor education, embodied, pedagogical, expressive arts
Acknowledgments

I would like to extend my sincere gratitude to Drs. Laura Welfare, Laura Farmer, Nicole Abaid, Nancy Bodenhorn, and Robin Queen for their continued guidance and support throughout this process. Thank you for offering your expertise and for never saying ‘no,’ even as I dove deeper and deeper down the rabbit hole! To my friends and colleagues in the Office of Assessment, thank you for bearing warm witness to the everyday ups and downs that constituted this journey. To my colleagues in Counselor Education, thank you for being my mentors, role models, and friends throughout this process. I would also like to thank my family members for the support they provided and the sacrifices they made so I could walk this path. I thank my partner, Peyton, for being willing to take this risk with me. I thank my daughter, Frances, for making me a mother in the midst of my doctoral studies and for all those early moments of connection that inspired this research! To my sister, Emily, thanks for being a constant sounding board and source of encouragement. To my mom and dad, thanks for always encouraging me to follow my dreams and for providing opportunities to do so. Mom, I extend a special thanks to you for spending all that extra time with your new granddaughter so I could focus on my studies. I would also like to thank my former clients, who taught me the true value of the expressive arts as tools for growth and healing. Finally, to those who participated in this study, I am humbled by your courage and creativity and will be forever grateful to you for helping to bring this research into the world.
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CHAPTER ONE

INTRODUCTION

Though attunement has been referenced in many helping fields as a factor leading to the development of creativity and relational abilities that are critical to effective counseling practice, the concept is rarely discussed within the field of counselor education. Until the time of this study, attunement had not been studied in a comprehensive manner within the field. Attunement is defined as “a felt embodied experience that can be individualistic as well as communal, that includes a psychological, emotional, and somatic state of consciousness” (Kossak, 2009, p. 14). This experience involves a process of ‘tuning in’ to oneself, others, events, energies, and the environment, and is thus a complex phenomenon that occurs on multiple levels of experience, including cognitive, affective, and physiological. Attuned states may most easily be fostered through the use of expressive arts experiences (Kossak, 2015). This study was an initial exploration of the construct of attunement within the field of counselor education. Attunement was explored in the context of master’s level counselors-in-training participating in an improvisational, group drumming experience. Multiple measures, including perceptual, physiological, and behavioral, were used to describe the drumming experience and identify an occurrence of attunement. Video and audio data were used to further contextualize the process by which attuned states developed within this group. Findings provide empirical evidence of the occurrence of attunement during improvisational group drumming. Individual experiences during the drum circle are described. The phenomenon of attunement and the process through which it occurred in this study are richly illustrated. It is hoped that the results of this study will increase the consideration of attunement in counselor education and lead to further integration of experiences that foster attuned states within counselor education classrooms.
Context for Study

Information regarding the context in which this study was conducted is useful to understanding the meaning and relevance of the phenomenon of attunement in counselor education. This section contains information to situate the study within counselor education and the use of expressive arts experiences. Among areas discussed are the preparation of counselors-in-training, including the qualities necessary for becoming an effective counselor and strategies employed to foster those qualities. Because the expressive arts are used to create opportunities for attuned states in this study, background on use of the expressive arts in counselor education is provided. Attunement is then presented in the context of counselor education.

Counselor Preparation

The primary function of counselor education programs is to prepare future counselors to be good practitioners (Tang, Addison, Lasure-Bryant, Norman, Co’Connell, & Steward-Sicking, 2004). The work of counseling, defined as “a professional relationship that empowers diverse individuals, families, and groups to accomplish mental health, wellness, education, and career goals” (Kaplan, Tarvydas, & Gladding, 2014, p. 368), is complex. Counselors work with diverse clients and address a variety of issues for which cause and effect are rarely clear (Kottler & Shepard, 2011). As such, the work of counselors is by nature uncertain and ambiguous (Kottler & Shepard, 2011). In order to respond effectively to the complexities and uncertainties inherent to their work, counselors require relational skills as well as creativity (Gladding, 2013).

Among the relational abilities necessary to become a good counselor are reflexivity, empathy, and cultural relativism (Gladding, 2013; McAullife, 2011). Empathy is defined as the ability to “enter the client’s phenomenal world, to experience the client’s world as if it were your own without ever losing the ‘as if’ quality” (Rogers, 1961, p. 284). Reflexivity has been defined
as “a turning back on oneself, a form of self-awareness” that challenges preconceived notions regarding knowledge and truth (Lawson, 1985, p. 9). Cultural relativism refers to the ability to de-center from assumptions related to one’s own cultural background (McAuliffe, 2011). These relational abilities are distinct yet intertwined. For example, reflexivity increases awareness of one’s own cultural background, which enhances one’s ability to be culturally relativistic.

Though relational abilities are paramount to counseling, they must be met with creativity if counselors are to effectively adapt their approaches to meet the needs of unique clients. Creativity refers to a “non-sequential experience that involves two parts: originality and functionality” (Gladding, 2016, p. 4). This experience results from a creative process, defined as “the emergence in action of a novel relational product, growing out of the uniqueness of the individual on the one hand, and the materials, events, people, or circumstances of his life on the other” (Rogers, 1961, p. 350). According to Thelma Duffey (2015), who coined the phrase ‘creativity in counseling,’ “creativity is as fundamental to counseling practice as the therapeutic relationship” (n.p.). Qualities associated with creativity, which include flexibility, spontaneity, openness, and adaptability (Carson, 1999; Duffey, 2015; Duffey, Haberstroh, & Trepal, 2009; Kipper, Green, & Prorak, 2010), enable counselors to cope with uncertainty, remain present, and adapt to the needs of their clients. These qualities function systemically and develop simultaneously with the relational capacities previously mentioned (Duffey, Haberstroh, & Trepal, 2009). For example, counselors who are empathetic with their clients may foster openness in the therapeutic relationship. Openness may lead to the development of new approaches in counseling and foster greater connection between the counselor and client.
Fostering Development of Relational and Creativity Qualities

Within counselor education programs, opportunities for counselors-in-training to develop relational and creative capacities are created in various ways, including through the structure of the program, the teaching methodology applied by individual instructors, and the interventions used within the classroom. For example, the use of a cohort model is a strategy that may foster relational development. In the field of education, a cohort refers to “a group of students who begin and complete a program of studies together, engaging in a common set of courses, activities, and/or learning experiences” (Barnett & Muse, 1993, p. 401). Among the benefits of employing a cohort model is increased group cohesion, “a positive bond that exists between all group members” (Harpine, 2011, p. 117).

Certain teaching methodologies may also foster relational and creative development. Of particular interest for this study are pedagogies derived from a constructivist framework. Constructivism is a way of understanding how humans make meaning of their experiences based on the idea that knowledge is not simply discovered but jointly created between individuals and that “individuals actively create the world as they experience it” (McAuliffe, 2011, p. 4). Pedagogical practices originating from this framework are relationally responsive given their focus on the creation of meaning from a relativistic viewpoint.

The Expressive Arts

The use of expressive arts techniques in the counselor education classroom can also be considered a relationally responsive practice. The expressive arts refer to a variety of modalities, including drama, dance, music, storytelling, play, and the visual arts, among others. The arts can be viewed as both forms of communication that transcend words and powerful tools for growth and healing. Benefits of integrating the arts into counselor education curricula include greater
self-awareness (e.g., Gibbs & Green, 2008; Sommer, Ward, & Scofield, 2010), increased group cohesion (e.g., Ziff & Beamish, 2004), and enhanced learning via an appeal to both affective and perceptual learning styles (Shepard & Brew, 2013). Given the universality of the arts, they are also considered effective tools for promoting development in individuals from a variety of cultural backgrounds (Degges-White, 2011).

The modality of interest in this study is music, which is a universally applicable and powerful tool for promoting catharsis, creativity, and communication (Gladding, 2016). Music has been applied in myriad ways in both counseling and counselor education. The benefits of using music in counselor education are as plentiful as the ways in which music can be applied. For example, song lyrics have been used to improve confidence in counselors-in-training regarding their ability to listen reflectively (Davis & Pereira, 2010). The use of music videos related to sensitive course material may increase counseling students’ emotional connection and openness to themselves and one another (Lenes, Swank, & Nash, 2015). A peer-to-peer music exchange program has been shown to increase sense of connection among future counselors (Minor, Moody, Tadlock-Marlo, Pender, & Person, 2013).

**Group Music Making**

When applied in a group setting, music can help participants understand themselves and one another (Gladding, 2016). One example of this type of activity is a drum circle. A drum circle is an aesthetic experience involving active participation in improvisational drumming that is rooted in ancient practice and designed to promote creative expression and human connection (Stevens, 2003). Participation in drum circles is open to anyone, regardless of age or previous musical experience (Stevens, 2003). The use of drum circles has been shown to encourage positive emotional states among participants, build sense of community, unify participants across
cultural backgrounds, and encourage group engagement (Camilleri, 2002; Hawkins, 1999; Mungas & Silverman, 2014).

**Improvisation.** There is evidence to suggest that individuals attune to one another while engaging in improvisational music making (e.g., Kossak, 2008a), and co-improvised music making has been described as a process of attunement (Pavlicevic & Ansdell, 2004). It is thus likely that the improvisational nature of drum circles lends to the development of attuned states among participants. Within this study, improvisation refers to the shared activity of creating and performing music in real-time (Biasutti, 2015). The spontaneous creation and performance of a coherent piece of music in a collaborative environment requires focused listening and execution of subtle adjustments that support the group sound. In order to ‘tune in’ and respond to the subtleties of the process, participants must experience a sense of safety while also being willing to take risks (Kossak, 2015). This balance of safety and risk taking has been suggested as a factor that fosters attunement in the context of group music making and drumming in particular (Kossak, 2015).

**Entrainment.** The occurrence of attunement in group music making is explained by the related construct of entrainment. Entrainment is defined as “a process whereby two rhythmic processes interact with each other in such a way that they adjust towards and eventually ‘lock in’ to a common phase and/or periodicity” (Clayton, Sager, & Udo, 2005, p. 2). For example, in a drum circle, entrainment is reflected by the creation of a shared pulse among participants. One aspect of musical entrainment is therefore rhythmic synchrony, or the presence of a “distinct, steady pulse” in the music (Schneck & Berger, p. 118).

**Group Synchronization.** Evidence of attunement in music goes beyond the synchronization of musical elements to include embodied aspects of synchronization, which are
considered the building blocks of interpersonal bonds (Feldman, 2012). The primary characterization of synchronous events is their proximity to one another in time (Feldman, 2012), and synchrony can occur on many levels, including physiological and behavioral. For example, while performing music together, individuals may synchronize the movement of their heads (Varni, Camurri, Coletta, & Volpe, 2008). Based on research showing that individuals engaging in a shared experience exhibit complementary states in certain parts of the brain (Haas & Langer, 2014; Lerner, Honey, Silbert, & Hasson, 2011), it is likely that physiological aspects, such as heart rate, also synchronize between individuals as they engage in group music making. This study involved the discernment of periods of rhythmic synchrony as well as the investigation of synchronization of behavioral and physiological processes in a group. For the purposes of this study, the term group synchrony refers to the alignment of more than two processes, either rhythmic, behavioral, or physiological, across a period of time.

**Attunement in Counselor Education**

Attunement is fundamental to any type of therapeutic work (Pavlicevic & Ansdell, 2004) and has been linked to the development of holistic knowledge through the integration of cognitive awareness with embodied ways of knowing (e.g., Markula, 2004). The experience has also been associated with the development of relational and creative qualities necessary for providing effective counseling services (e.g., Kossak, 2015).

Though the relational and creative qualities of interest in this study are capacities possessed by all human beings, they are not necessarily fully developed in all individuals. They are difficult to teach didactically, as individuals may best realize them through direct experience. Counselor education programs must foster the development of these critical relational and creative qualities by offering opportunities for attunement to occur. Within the counselor
education classroom, this may most easily be accomplished in the context of expressive arts experiences, interventions that are increasingly being applied in the field of counselor education (e.g., Barrio Minton, Wachter Morris, & Yaites, 2014) and fit within the context of the constructive teaching methodologies commonly employed in the field. However, prior to this study, attunement had only been studied once (e.g., Schomaker & Ricard, 2015) and had not been considered comprehensively within counselor education.

**Statement of the Problem**

Attunement holds relevance within the field of counselor education as a process that fosters relational development and creativity, factors linked to the effective provision of counseling services. The construct has been explored in many fields, including psychology (e.g., Baker, 2016; McCluskey, Roger, & Nash, 1997; Stern, 1985), neuroscience (e.g., Feldman, 2015; Gallese, 2006; Hibel et al., 2015), expressive arts therapy (e.g., Kossak, 2008a), and nursing (Carnevale, 2009; Trout, 2011). Within education, attunement has been discussed as a practice that fosters more holistic and relational ways of knowing (Blades & Bester, 2013; Lutzker, 2014). Within health fields, attunement has been described as a state existing within and between people that contributes to positive relational qualities including deep understanding, empathy, and compassion (Siegel, 2007, 2010). Several authors speak to the importance of fostering attunement in emerging health professionals (e.g., Keane, 2014). The construct of attunement holds potential for explaining the development of qualities that underlie a strong therapeutic relationship, contributing to holistic ways of knowing, and improving emerging counselors’ ability to relate to and work with diverse clients. For these reasons, this study focused on exploring attunement comprehensively within the field of counselor education.
Though definitions of the construct differ, literature from diverse fields suggests that attunement is a rich, multileveled phenomenon, which contributes to individuals’ wellbeing and ability to connect to others. In light of the complex nature of attunement, which consists of many levels of ‘tuning in’ to self, others, and in some cases, transpersonal states of consciousness (Kossak, 2015), a comprehensive exploration of the construct necessitated multiple forms of measurement. While the single study on attunement within counselor education (Schomaker & Ricard, 2015) measured attunement on a solely perceptual level, a comprehensive study of the phenomenon involved multiple forms of measurement, including perceptual, behavioral, and physiological. Additionally, because recent literature indicates attunement is fostered through expressive arts experiences (e.g., Kossak, 2015), attunement was most naturally studied within the context of a group expressive arts intervention, specifically a drum circle.

**Purpose of Study and Research Question**

The purpose of this study was to explore attunement in a comprehensive manner within the field of counselor education. A comprehensive study of attunement in the field involved use of an expressive arts experience to foster attuned states and required multiple measures, including self-report, behavioral, and physiological. In this quantitative study, the following research questions were used to explore the nature of attunement as it occurred between master’s level counselors-in-training participating in an improvisational drum circle:

1. What is the nature of attunement over the course of the drum circle, as evidenced by perceptual data?

2. What is the nature of attunement during the ‘Improvisation with Eyes Closed’ phase of the drum circle, as evidenced by perceptual, physiological, behavioral, and audio data?
3. What is the context of attunement during a specific period of heightened synchronization within the ‘Improvisation with Eyes Closed’ phase of the drum circle, as evidenced by physiological, behavioral, and audio data?

Definitions of Terms

In this section, definitions of key terms and constructs relevant to the study are provided.

Attunement: “a felt embodied experience that can be individualistic as well as communal, that includes a psychological, emotional, and somatic state of consciousness” (Kossak, 2009, p. 14). For this study, attunement was operationally defined as a period of greater than 5 seconds during which participants simultaneously experienced heightened synchronization of movement and heart rate.

Constructivism: a way of understanding how humans make meaning of their experiences, which holds that “individuals actively create the world as they experience it” (McAuliffe, 2011, p. 4).

Cohort: “a group of students who begin and complete a program of studies together, engaging in a common set of courses, activities, and/or learning experiences” (Barnett & Muse, 1993, p. 401).

Counselor-in-training: In this study, counselor-in-training refers to a master’s level student enrolled in a counselor education program accredited by the Council for Accreditation of Counseling and Related Educational Programs (CACREP).

Creativity: “a non-sequential experience that involves two parts: originality and functionality” (Gladding, 2016, p. 4). This experience results from a creative process, defined as “the emergence in action of a novel relational product, growing out of the uniqueness of the individual on the one hand, and the materials, events, people, or circumstances of his life on the
other” (Rogers, 1961, p. 350).

*Embodyment:* “a body-centered intelligence that informs how one knows and experiences the world” (Kossak, 2015, p. 37). This term acknowledges that knowledge arises not only from the mind but also from physical, bodily experience (Kossak, 2015).

*Empathy:* In a therapeutic context, empathy refers to the ability to “enter the client’s phenomenal world, to experience the client’s world as if it were your own without ever losing the ‘as if’ quality” (Rogers, 1961, p. 284).

*Entrainment:* “a process whereby two rhythmic processes interact with each other in such a way that they adjust towards and eventually ‘lock in’ to a common phase and/or periodicity” (Clayton, Sager, & Udo, 2005, p. 2).

*Expressive arts:* This term refers to a variety of artistic modalities, including drama, dance, music, storytelling, play, and the visual arts, which are forms of communication and expression as well as powerful tools for growth and healing.

*Group cohesion:* “a positive bond that exists between all group members” (Harpine, 2011, p. 117).

*Group synchrony:* Group synchrony involves the alignment of more than two processes across a period of time. Synchrony can occur on many different levels. For this study, group synchrony was assessed on physiological and behavioral levels. The synchronization of heart rates among participants was used as a physiological measure of attunement. The synchronization of head movements among participants was used as a behavioral measure of attunement.

*Improvisation:* a shared activity of creating and performing music in real-time (Biasutti, 2015).

*Mindfulness:* “paying attention in a particular way: on purpose, in the present-moment,
and non-judgmentally” (Kabat-Zinn, 1994, p. 4). In this study, mindfulness was assessed using the Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003).

**Periodicity:** “the tendency of an event to recur in cyclic intervals” (Schneck & Berger, 2006, p. 34). Periodicity reflects the most basic aspect of organization in music, that of rhythm (Schneck & Berger).

**Phase synchrony:** an in-the-moment measure of entrainment whereby occurrences of oscillatory events become locked in time (Manrubia, Mikhailov, & Zannette, 2004, p. 152). In this study, phase synchrony of head movements was used as a measure of group entrainment.

**Rhythmic synchrony:** Within music, this term refers to the presence of a “distinct, steady pulse” (Schneck & Berger, p. 118). In the context of a drum circle, this translates to the creation of a clear and steady pulse by all group members.

**Synchronicities:** moments during which events or the inner states of unique individuals become aligned in a way that is meaningful but not causally affiliated (Jung & Pauli, 1955).

**Volume:** In literature regarding music, volume refers to “sound energy level” and is thought to convey affective elements of a piece of music (Schneck & Berger, 2006, p. 35).

**Overview of the Method**

A single-case research design was used for this study. Participants included 6 members of a master’s level cohort in their first semester of a CACREP-accredited (Council for Accreditation of Counseling and Related Educational Programs) counselor education program within a large, public university in the Southeastern United States. The study involved participation in a drum circle led by the researcher. No experience was required for participation in the intervention, which lasted for approximately 32 minutes. Behavioral data in the form of
pitch of head movement was captured via a 24 camera Qualisys motion capture system installed within the research facility. Physiological data in the form of heart rate was gathered through use of a Zephyr™ team based performance monitoring system. Audio recording software and high definition video recording offered additional opportunities for obtaining data. Perceptual data was gathered through administration of an informational questionnaire, the Mindful Attention Awareness Scale (Brown & Ryan, 2003), an adapted version of the Inclusion of Community in Self scale (Mashek, Cannaday, & Tangney, 2007), and a self-report measure of interpersonal connection.

In order to allow for a richer exploration of the phenomenon of interest, analysis was focused on a specific intervention within the drum circle. During this intervention, which lasted for 3 minutes 43 seconds, participants were invited to drum with their eyes closed, altering the rhythm and dynamics of their playing as they see fit. As discussed in more detail in the following chapter, literature on attunement (e.g., Kossak, 2015) suggests that this highly improvisational phase of the drum circle may have been most conducive to fostering attuned states among participants.

Quantitative analysis of behavioral and physiological data during the ‘Improvisation with Eyes Closed’ phase of the drum circle elucidated the process of attunement, including any distinct occurrences of attunement. For this study, attunement was operationalized as a period of greater than 5 seconds during which group members simultaneously experienced heightened synchronization in phase of head movements and phase of heart rates. Perceptual data, audio data, and events illustrated via video files provided descriptive and contextual information regarding the development of attuned states within the group.
Document Organization

This document consists of five chapters. Within the first chapter, the context for the study, statement of the problem, purpose of the study and research question, definition of key terms, and overview of the method are provided. The second chapter consists of a literature review, including more detail on the specific context of the study, statement of the problem, and summary of the gap in the literature. The third chapter is focused on the methodology of the study, including the research design, research question, methods of data analysis, and limitations. Chapter Four contains the results of the study. The final chapter includes a discussion of and implications regarding the findings. Also included in this chapter are the limitations of the study, areas for future research, and conclusions.
CHAPTER TWO
LITERATURE REVIEW

Construct of Attunement

Given a lack of literature about attunement in the fields of counseling and counselor education, a history and conceptualization of the construct was synthesized from the literature of related fields, including psychology, neuroscience, and expressive arts therapy. Among these fields, the earliest literature that directly discusses attunement can be traced to the field of psychology. Within psychology, the construct originated from studies involving mother-infant dyads (e.g., Stern, 1985; Stern, Hofer, Haft, & Dore, 1985). For example, Stern (1985) explored interactions between mothers and their infants, observing that mothers perceived infants’ expressions of affect and reflected the feelings back to the infants with emphasis. Stern (1985, 2004) termed this process affect attunement, noting that, rather than being limited to mere behavioral imitation, achievement of this state of tuning in between mother and infant involves the entire internal state of the infant.

Inclusion of the construct of attunement in the field of neuroscience was more recent and can be attributed to the discovery of a special class of premotor neurons in the brain, termed mirror neurons (Gallese, Fadiga, Fogassi, & Rizzolatti, 1996; Rizzolatti, Fadiga, Gallese, & Fogassi, 1996), which are said to allow an observer to automatically and unconsciously simulate the actions, emotions, and sensations experienced by another individual (Gallese, Eagle, & Migone, 2007). The discovery of mirror neurons led to increased interest in psychological events that occur concordantly between individuals (Gallese, 2001; Haas & Langer, 2014; Semin & Cacioppo, 2008). For example, Gallese (2006) described how mirror neurons enable a process of “intentional attunement… a form of experiential understanding of others” through which an
observer can experience the observed as ‘another self’ (p. 15). In defining the concept of intentional attunement, Gallese pointed out that understanding in interpersonal relationships goes beyond social metacognition, or considering another’s experience cognitively through abstract representations, to include a direct, embodied awareness.

Perhaps the most comprehensive conceptualization of the construct of attunement arose from the field of expressive arts therapy, in which Kossak (2008a, 2008b, 2009, 2015) considered the phenomenon from multiple perspectives, making a strong case for its applicability in therapeutic work. In addition to providing a framework through which to foster attunement through expressive arts interventions, Kossak (2015) offered a strong theoretical basis from which to describe its occurrence in the context of expressive arts therapies. Drawing on the work of transpersonal psychologist, William James (1902/1982), Kossak (2009) argued that attunement can be experienced on not only intra- and interpersonal levels, but also on a transpersonal level, where an individual achieves a sense of oneness with other people, events, the environment, or the universe itself.

Literature across fields suggests a multileveled conceptualization of the construct of attunement, not only regarding its relational nature but also the depth to which it may be experienced. For example, on an interpersonal level, attunement is described as going beyond mere validation of experience to involve direct experience of an individual’s inner world (Siegel, 2007, 2010; Snyder, Shapiro, & Treleaven, 2011). Siegel (2010) illustrated this point well, noting that to achieve attunement, a counselor must be fully present with a client in order to embrace the client’s entire lived experience. The degree of experiencing at this depth is viewed as occurring not only on affective and psychological levels but also on a physiological level. Use of biological measures of attunement in research with mother-infant dyads (e.g., Feldman,
Attunement thus occurs on many levels, including physiological, affective, and psychological, both within and between individuals. The complexity and richness of the construct is reflected well by Erskine’s (1998) definition of attunement as “a kinesthetic and emotional sensing of others-knowing their rhythm, affect and experience by metaphorically being in their skin, and going beyond empathy to create a two-person experience of unbroken feeling connectedness by providing a reciprocal affect and/or resonating response” (para. 7). Kossak (2009) also acknowledged that multiple levels of experience are involved in attunement, which he defined as “a felt embodied experience that can be individualistic as well as communal, that includes a psychological, emotional, and somatic state of consciousness” (p. 14). Embodiment here refers to “a body-centered intelligence that informs how one knows and experiences the world,” through which knowledge arises from physical, bodily experience (Kossak, 2015, p. 37). Given its comprehensive nature, which suggests broad applicability to the work of counselors and counselor educators, Kossak’s (2009) definition of attunement was used as the basis for the current study.

The Process of Attunement

Kossak (2008b, 2015) conceptualized attunement as an experience that occurs through a process of tuning in. Though this process can involve tuning in to events, energies, the environment, or even transcendental states of consciousness (Kossak, 2015), in a therapeutic context, tuning in refers to “the art of being with another person and listening to what is said and what is implied” (Kossak, 2008b, Conclusions section, para. 10). While experiences of attunement occur during moments when therapist and client become deeply connected (Kossak,
attuned states develop through a process involving periods of misunderstanding or disconnection. Improvisational music making, which entails periods of connection as well as disconnection and requires a balance of safety and risk taking, may be considered a metaphor for the process of attunement (Kossak, 2015).

**Improvisation.** The balance of safety and risk taking involved in ‘tuning in’ while engaging in music making may be best understood through consideration of the nature of improvisation (e.g., Kossak, 2008b, 2015). Improvisation, which is the shared activity of creating and performing music in real-time (Biasutti, 2015), has been described as a process of attunement (Pavlicevic & Ansdell, 2004), and there is evidence that individuals attune to one another while engaging in improvisational music making (e.g., Kossak, 2008a). Improvisation is distinguished from other types of musical engagement, such as music composition and performance, based on the degree of spontaneity required to simultaneously create and perform in the present moment (Biasutti, 2015). In fact, improvisation mirrors the ongoing process of deep listening and subtle adjustment of approach that is involved in counseling. Counselors-in-training who participate in improvisational music making may thus have opportunities to exercise the relational qualities and creativity necessary for providing effective counseling services.

In addition to providing an experience of qualities important to counseling, improvisation is also an opportunity for individuals to de-center from cultural assumptions. Engaging in improvisation requires risk taking and creates vulnerability (Kossak, 2008b). In doing so, the act temporarily levels all social roles (Ruud, 1995). For counselors, who must sensitively address the needs of clients from a variety of cultural backgrounds, realization of the ability to de-center from their own cultural assumptions is critical (McAuliffe, 2011).
Though musical improvisation may be a meaningful experience for counselors-in-training, engaging students in this type of activity is not without challenges. In a culture in which linear understanding is valued over other ways of knowing (Lutzker, 2014), the unpredictable nature of improvisation may lead to discomfort among participants. Yet if uncertainty is honored, this unpredictability can lead to powerful shifts in awareness (Kossak, 2008b) and increased connection with oneself and others (Kossak, 2008a).

**Stages of Tuning in.** As mentioned previously, the process of improvisation involves periods of disconnection as well as connection. Similarly, the process of attunement entails developmental stages, not all of which reflect a state of alignment (Kossak, 2008a, 2008b, 2015). The developmental stages involved in the creation of attunement were identified by Kossak (2008a), who conducted a qualitative, grounded theory study consisting of a series of hour long experiments in which musicians and therapists improvised together with sound and rhythm. One experiment involved a group of four therapists, including the researcher, who use sound and rhythm in their work. The second experiment involved a group of six, including therapists, professional musicians, and the researcher. Additional experiments involved dyads, one of which consisted of the researcher and a clinical psychologist, the other of which consisted of the researcher and a professional musician. Following each experiment, Kossak conducted hour-long interviews with participants regarding their experience with improvisation. The researcher videotaped each session and interview for observational analysis. Videos were catalogued for behaviors and words indicating aspects of the process of attunement. Subgrouping of the behaviors and words led to the identification of what Kossak deemed “intersubjective relational qualities” (p. ii), referring to the qualities necessary to experience another as oneself. Among the identified qualities were “understanding, support, deep listening, a willingness to hold and give
space, the ability to tolerate chaotic or unpredictable states, and empathy” (p. ii). These qualities are similar to the relational qualities, including deep listening and empathy, and creativity, including the ability to tolerate uncertainty, necessary for providing effective counseling services. Indeed, Kossak (2008b) acknowledged the idea that “a sense of connectivity to self, other, and a universal quality, can also be viewed as a very important and necessary quality to hold as a stated goal in clinical practice” (Conclusions section, para. 41).

The ten phases of engagement that emerged from Kossak’s (2008a) study include:

- warming up to space and sounds, seeking safety, experimentation, risk taking and vulnerability,
- experiences of chaotic states or misattunement, entrainment or merging,
- embodied shifts in consciousness, intersubjective empathy, flow, and shared intimacy where research participants reported a sense of interconnected unity with something greater than self similar to peak or unitive states of consciousness. (p. ii)

The developmental process reflected by the progression of stages supports the balance of risk taking and safety necessary to achieve attunement. For example, periods of warming up and seeking safety are followed by increased risk-taking behaviors. These findings also promote the idea that states of disconnection may be necessary to achieve attunement. For example, within the process of engagement, the phase of misattunement, referring to a state of disconnection, is followed by the phase of entrainment, a period during which previously distinct processes come into alignment. Though a discussion of each of the phases identified by Kossak (2008a) is beyond the scope of this literature review, two of the phases are of particular relevance to the current research. These are described in more detail in the following sections.

**Misattunement.** Of the ten phases of improvisational engagement identified by Kossak (2008a), misattunement is one that has particular relevance to the current study. Connotations of
misattunement, when considered a description of overall interactional patterns, are often negative. For example, within attachment literature, misattunement between an infant and primary caregiver is considered a factor that weakens relational bonds (Kossak, 2009). The weakening of these bonds is said to be the basis of disorders in attachment, whereby individuals develop patterned defenses in their relationships with others (Kossak, 2009). Yet when considered as a momentary state that is part of a greater process, misattunement, or the inability to attune on an interpersonal level (Kossak, 2009), can also be considered a natural experience that is necessary for deepening relational interactions.

Within a therapeutic relationship, moments of misattunement may be particularly beneficial (Kossak, 2009; Nolan, 2012). Though the experience of being disconnected from a therapist may temporarily cause a client discomfort, if it is addressed and repaired, the client may internalize awareness of the ability to overcome the temporary ruptures that characterize all interpersonal relationships. Additionally, in moments during which a client is overwhelmed by emotional content, it may be detrimental for the counselor to become attuned to the state. In a metaphorical sense, a counselor’s decision to remain detached from the client’s emotion may be thought of as a choice not to add fuel to the fire or one of promoting emotional safety in the session. A further benefit of misattunement in a therapeutic context includes the development of alternate approaches to addressing issues in counseling through awareness and identification of approaches that are currently not effective (Kossak, 2009). Given the many benefits of experiences of disconnection in a therapeutic relationship, some authors have argued that purposeful misattunement is an integral tool for therapeutic work (e.g., Kossak, 2015; Nolan, 2012).
Misattunement has also been discussed in reference to expressive arts therapy, in which the improvisational creation of various art forms may at times be perceived as dissonant or disconnected (e.g., Kossak, 2009). For example, clients may judge their artwork to be ‘ugly.’ Yet the creation of ‘ugly’ work may lead to increased awareness or, through the expression of previously repressed emotion, open the door to new possibilities. Within the context of expressive arts therapy, the improvisational nature of many methods used to enhance exploration may lead to clients feeling “decentered,” as if venturing into the unknown (Kossak, 2009). Yet if the therapist can foster a sense of safety and embrace the uncertainty, deep connection and shifts in awareness may result (Kossak, 2009). Experiences of misattunement, when held in a therapeutic manner, may allow individuals to safely traverse ambiguous or unknown circumstances. Additionally, the experiences of interpersonal disconnection that are followed by repair may encourage rather than hinder the realization of relational qualities such as empathy. It is these benefits related to misattunement that are of primary importance within this study, as they lend credence to the idea that a process of attunement fosters the creativity and key relational qualities that counselors require for their work.

**Entrainment.** Another phase of the process of engagement identified by Kossak (2008a) that may directly contribute to the development of relational and creative qualities counselors need is entrainment. In Kossak’s study of attunement occurring through improvisational music making, entrainment is described as an experience of merging with sounds and rhythms. An additional definition of entrainment in the context of musical activity is “a process whereby two rhythmic processes interact with each other in such a way that they adjust towards and eventually ‘lock in’ to a common phase and/or periodicity” (Clayton, Sager, & Udo, 2005, p. 2). This second definition holds the greatest relevance for this study, and greater detail related to
Entrainment in the context of improvisational group drumming is provided later in this chapter within a section on drum circles. Here, background on entrainment in a broader sense is provided to explain the phenomenon’s relevance to this study.

In general, entrainment refers to the development of a resonance, or synchronous pattern of vibration, between two fields of energy or rhythmic patterns (Kossak, 2008b). This phenomenon is “important to understand for any kind of therapeutic relationship where an embodied empathic response or synchrony between therapist and client is extremely important in order to create safety and trust” (Kossak, 2015, p. 97). The construct of entrainment is thus relevant to understanding how attuned states develop through use of the expressive arts, which are by their very nature tools for embodied expression.

Entrainment can describe various interpersonal processes, such as the synchronization of women’s menstrual cycles with lunar cycles and the patterning of circadian rhythms with the daily cycling of sunlight and darkness (Kossak, 2008b). The phenomenon can occur intrapersonally or interpersonally. As an example of intrapersonal entrainment, a pattern of breathing creates resonances in the human nervous system. While shallow breathing stimulates the sympathetic nervous system and activates a stress response, deep breathing has been shown to create a resonance in the nervous system that stimulates a parasympathetic, or calming reaction (Jerath, Jerath, Edry, & Barnes, 2006). This example also points to the fact that within a person, the synchronization of physiological rhythms can lead to affective shifts. Entrainment of two processes thus may create a domino effect, whereby latter processes come into resonance with those that occur earlier.

This domino effect extends beyond the individual, as intrapersonal occurrences of entrainment cannot be fully separated from interpersonal aspects of the process. For example, in
studies of infants and primary caregivers, it has long been acknowledged that affective displays of the primary caregiver create an affective resonance in the infant (e.g., Hornik, Risenhoover, & Gunnar, 1987). There is also evidence that, in the presence of a minimal amount of social connection, adults can experience emotional and embodied resonance with one another (e.g., Cwir, Carr, & Walton, 2011). These examples speak to the fact that the internal world of individuals cannot be fully separated from their external world, as external events affect individuals’ experiences and vice versa. As an explanation for how external circumstances drive individual experiences, entrainment can also refer to “what is occurring when the human organism succumbs to a forcing function” (Schneck & Berger, 2006, p. 118). An external forcing function can include a range of events or circumstances and, at its most basic level describes the impact of vibrational frequencies of light, color, and sound (Kossak, 2008b). Even subtle external functions such as these can result in measurable effects on human experience. For example, the rhythm of music can drive temporal components of human movement (Thaut, 2008). Rhythm as a forcing function of music is pertinent to this study in that it has been argued to be the primary means through which human movement is entrained to music (Thaut, 2008).

Though the term entrainment is often used interchangeably with attunement, the phases of ‘tuning in’ provided by Kossak (2008a) suggest a distinction. While occurrences of entrainment connect processes both within and between individuals, each is a separate manifestation of the phenomenon. In contrast, attunement simultaneously involves multiple occurrences of entrainment and results in a deeply felt and embodied experience of oneness (Kossak 2008a, 2008b, 2015). Entrainment occurrences can thus be thought of as individual elements that come together to create a more profound experience termed attunement.
**Group Synchronization.** As entrainment is often used synonymously with attunement, so is the term synchronization often used interchangeably with entrainment. Like entrainment, interpersonal synchrony can occur on many levels, including physiological and behavioral, with embodied aspects of synchronization considered to be the building blocks of interpersonal bonds (Feldman, 2012). A distinction between the two terms is derived from the way in which each is typically used. Synchronization, which refers to the alignment of processes across a period of time, is determined primarily by the temporal proximity of events (Feldman, 2012). Because synchronization is based on the measurable dimension of time, it is the term more often used to assess for the shared resonances that are similarly described by the theoretical construct of entrainment.

A wealth of studies focus on the synchronization of processes in time. With regard to interpersonal synchronization, examples include the synchronization of individuals’ head movements during musical performance (Varni, Camurri, Colleta, & Volpe, 2008). Additionally, in the presence of a stressful event, the heart rates of adults who have a social connection to one another may synchronize (Cwir, Carr, & Walton, 2011). Further detail on the use of synchronization as a form of measurement of attunement is provided later in this chapter in a section on measurement. At this point it is important to note that synchronization is the term used throughout this document to operationally describe entrainment, or the development of alignment between processes that contribute to occurrences of attunement. Additionally, because this study involves discernment of degree of synchrony among members of a group rather than between dyadic partners, the term group synchrony refers to the manifestation of alignment of more than two processes across a period of time. Because synchrony may denote the measurable degree of alignment between various processes, including behavioral, physiological, or rhythmic, within
Attunement in Education

While attunement has not been presented in a comprehensive manner within the field of counselor education, the construct has been presented in an educational context. Within education, the process of attunement has been described as entering the experience of another through deep and attentive listening (Lutzker, 2014). Like the process through which an instrument is tuned, listening leads to purposeful and subtle adjustments being made to promote an attuned state (Lutzker, 2014). In an educational culture focused on efficiency and effectiveness, attunement offers a present oriented alternative to teaching that is directed toward the realization of fully human qualities, such as empathy (Lutzker, 2014).

Attunement has also been called a relational-responsive pedagogy, which involves opening space to allow an encounter of the self in relation to another (Blades & Bester, 2013). Opening such a space in the classroom requires use of all the senses, entails risk, and requires vulnerability (Blades & Bester, 2013). The benefits of doing so include the development of holistic knowledge among learners who are able to “witness and experience fulfilled human lives that can contribute to healthy and sustainable relationships and communities” (Blades & Bester, 2013, p. 4).

Given its emergence from multiple levels of experience, attunement can also be viewed as a deeply felt and embodied way of knowing, whereby individuals discover aspects of themselves and the world, “not as minds separate from and independent of [their] bodies, but as integrated human beings” (Markula, 2004, p. 61). Blades and Bester (2013) considered attunement as a relational-responsive pedagogy, requiring vulnerability on the part of instructor and student.
Similarly, Biesta (2004) argued for the importance of allowing a space between instructor and student that involves risk and opportunity.

Based on a review of literature in the field of education regarding attunement, it is clear that attunement offers benefits for learners within various disciplines. Attunement contributes to the development of relational qualities, embodied knowledge, and deep learning. Of relevance for the current study, consideration of attunement in the field of education indicates that practices of attunement may be integrated within higher education classrooms as a way to enhance learning and create learners who are better able to respond to the complex needs of their communities and society at large.

**Facilitating Attunement in Higher Education**

Though the expressive arts are used as the basis for fostering attunement in an educational setting within this study, other strategies and pedagogical frameworks within higher education may also facilitate attunement. Among educational programs, those that employ cohort models and constructivist teaching methodologies may most easily integrate and reap benefits from attunement fostering practices within curricula.

**Cohort Models.** Given the relational focus of strategies that foster attunement, integration of practices of attunement may most naturally occur in the context of a cohort model educational program. In the field of education, a cohort refers to “a group of students who begin and complete a program of studies together, engaging in a common set of courses, activities, and/or learning experiences” (Barnett & Muse, 1993, p. 401). A primary rationale for employing a cohort model in graduate education is to increase student academic success (Ross, 2001). For example, cohort models have been shown to increase protection and support for students (Weise, 1992), factors that may contribute to academic persistence. The use of cohorts may also foster
richer learning experiences by increasing students’ willingness to take risks, including discussing sensitive issues in the classroom (Teitel, 1997), and offering opportunities for culturally diverse students to interact in a more meaningful way (Barnett & Caffarella, 1992). These benefits may be moderated by the group cohesion that is fostered by use of a cohort model. Group cohesion is defined as “a positive bond that exists between all group members” (Harpine, 2011, p. 117). This construct is especially relevant in the field of counselor education, within which positive group bonds may increase student resiliency and encourage the type of communication that is critical to relational development (Lewis, Ascher, Hayes, & Ieva, 2010).

**Constructivist Teaching Methodology.** Practices that foster attunement may also be naturally applied within the context of pedagogies based in a constructivist framework. Constructivism, a way of understanding how humans make meaning of their experiences, holds that “individuals actively create the world as they experience it.” (McAuliffe, 2011, p. 4). Knowledge is not simply discovered but is created jointly between individuals (McAuliffe, 2011).

The use of constructivism as a pedagogical foundation within counselor education is well documented (Barrio Minton, Wachter Morris, & Yaites, 2014). Within counselor education, constructivist teaching approaches model for and encourage learners to reject the idea of one true reality and to consider how diverse others make sense of their worlds (McAuliffe, 2011). Constructivist pedagogical practices can therefore be a valuable approach to preparing learners for the complexities involved in counseling.

**Attunement in Counselor Education**

Kossak’s (2009) definition of attunement offers a perspective on the construct of attunement that has relevance for consideration in education and counselor education in
particular. The primary function of counselor education programs is to prepare students to be effective counseling practitioners (Council for Accreditation of Counseling and Related Educational Programs [CACREP], 2015). Multiple researchers have shown that the strength of the relationship between counselor and client is a primary factor in determining success of treatment outcomes (e.g., Castonguay, Goldfried, Wiser, Raue, & Hayes, 1996; Raue, Goldfried & Barkham, 1997). Influential theorists in the field of counseling have long acknowledged that the counselor client relationship is a critical aspect of the work of counseling (e.g., Beck, Rush, Shaw, & Emery, 1979; Rogers, 1968). In order for counselors-in-training to apply relational skills in their work with clients, they must have opportunities in their education to experience their relational capacities.

Interpersonal attunement contributes to the strength of the counseling relationship and can be considered a marker of its quality. In fact, attunement has been cited as an indicator of a strong therapeutic alliance and for this reason has been suggested as being important to counselor education (Schomaker & Ricard, 2015). Additionally, the construct has been mentioned as contributing to rapport and thus has been explored in many helping professions, including nursing (e.g., Trout, 2011) and psychology (e.g., Shapiro & Carlson, 2009).

Experiences of attunement can promote the realization of relational capacities that contribute to the development of effective counselors. Yet attunement has not yet been studied in counselor education in a comprehensive manner. To lend further credibility to the importance of attunement in the field, it is useful to review one aspect of the greater process of ‘tuning in’ involved in attunement, that of mindfulness, which has been widely studied in many helping professions including counselor education.
Mindfulness

There is a growing body of research on the utility of mindfulness in various helping professions (e.g., Shapiro & Carlson, 2009). Mindfulness, which can be defined as “paying attention in a particular way: on purpose, in the present-moment, and non-judgmentally” (Kabat-Zinn, 1994, p. 4), has been proposed as a way to foster self-attunement, a state of being present with and having compassion for one’s own experience (Bruce, Manber, Shapiro, & Constantino, 2010; Siegel, 2007). A state of self-attunement has also been argued to be the basis for attunement to others (Baker, 2016; Bruce, Manber, Shapiro, & Constantino, 2010; Siegel, 2007). In fact, multiple authors have proposed that mindfulness practice that fosters therapist attunement to self may contribute to therapist-client interpersonal attunement (Baker, 2016; Bruce, Manber, Shapiro, & Constantino, 2010; Siegel, 2007).

Many studies have been conducted on the use of mindfulness practice with therapists in training (Davis & Hayes, 2011). Mindfulness practice, considered here as a way to foster self-attunement, has also been shown to increase attunement to others. For example, studies on mindfulness training with counseling students have demonstrated such positive effects as increased self-awareness, acceptance of personal experiences, increased clarity of thought, improved affect, improved emotion regulation, improved relational skills, and increased compassion and empathy for others (Davis & Hayes, 2011; Schomaker & Ricard, 2015; Schure, Christopher, & Christopher, 2008).

The many studies regarding mindfulness in helping professions and counselor education confirm the relevance of intrapersonal attunement to counselor education. Though intrapersonal aspects of attunement result in many therapeutic and relational benefits, they are only part of a
greater process of ‘tuning in.’ In order to fully understand and reap the benefits of attunement in counselor education, interpersonal aspects of attunement must also be studied.

**Interpersonal Aspects of Attunement**

While mindfulness has been researched in counselor education, a review of the literature in the same field yielded a single study on interpersonal aspects of attunement. In comparison to intrapersonal aspects, which involve deeper connection within an individual, interpersonal aspects of attunement refer to connections between individuals. An overview of the single study within counselor education regarding interpersonal aspects of attunement is provided as context for a study that involves a greater focus on interpersonal elements.

Schomaker and Ricard (2015) examined the effects of a 6-week mindfulness training program for counselor trainees on counselor-client attunement. The study involved a series of quantitative and longitudinal single-case research designs and included a comparison group. Participants in the treatment ($n = 4$) and comparison groups ($n = 5$) were master’s level counselors-in-training, who were enrolled in a university accredited by CACREP and providing clinical counseling services within the program’s clinic. The sample of clients ($N = 47$) consisted of adults who received counseling services during the study from the counselors-in-training in the treatment and comparison group.

Over the course of 6 weeks, the treatment group participated in 9 hours of structured, manualized mindfulness training. An additional aspect of the training involved interpersonal and relational skill building. Baseline data was collected from all counselors-in-training and their clients during the 4 weeks prior to the training. Treatment phase data was collected from all counselors-in-training and their clients over the course of the 6 weeks during which the counselors in the treatment group received the training. Data was gathered by administering the
Session Rating Scale Version 3 (Duncan et al., 2003), a measure of clients’ perception of counseling sessions with relatively high internal consistency (α = 0.88 to 0.93) across client populations. The Session Rating Scale was administered to both clients and counselors immediately after each counseling session. The difference between counselor and client global Session Rating Scale scores was used as the measure of attunement, whereby level of attunement was considered to be highest at an absolute difference of 0.

Multiple nonoverlapping methods of analysis were applied to determine the effect of the mindfulness intervention on attunement. First, scores at the beginning of the study were compared with scores over time. Weekly median attunement scores were calculated across sessions for each counselor and were depicted visually, allowing identification of characteristics related to change in attunement levels over time. The researchers assessed the impact of the mindfulness intervention on counselor-client attunement by calculating the percentage of data exceeding the median (e.g., Ma, 2006) for each counselor-in-training, with higher values indicating greater effect of treatment. To assess the impact of the mindfulness intervention on the treatment group versus the comparison group, relative success rate was calculated.

Overall, results indicated the MI was effective in improving attunement of counselors-in-training to clients. For example, percentage exceeding the median scores for three out of five counselors-in-training in the treatment group were values of 1, indicating very high effectiveness of the intervention. The resultant relative success rate value of 1.58 suggests that participants in the treatment group were 1.58 times more likely to improve attunement over the course of the treatment than participants in the comparison group.

Strength of the researchers’ methods include use of SCRD with visual analysis of characteristics of the data over time, allowing consideration of each participant’s response to the
intervention in the context of the participant’s background, strengths, and unique challenges. An additional strength of this study’s research design is the inclusion of a comparison group, which allowed for analysis across participants and increased empirical validity of findings.

One of the main limitations of this study is lack of generalizability of findings. A small sample size, the fact that participants self-selected, and use of participants from a single master’s program suggest that the sample is not representative of counselors-in-training in general. Additionally, between group differences regarding gender and counseling experience represent potentially confounding variables. Further limitations relate to the treatment being studied and construct validity. Because the mindfulness intervention was supplemented with interpersonal and relational skills training, findings may not reflect the impact of a mindfulness intervention in particular. Also, the operationalization of attunement as similarity of counselor and client ratings on the Session Rating Scale may not be a valid measure of attunement. Firstly, the Session Rating Scale is designed for use by clients rather than counselors. Secondly, if the measure does capture attunement, it does so only on a perceptual level. Given the multileveled nature of the construct of attunement, use of multiple measures would have greatly enhanced understanding of the construct.

Despite limitations of this study, the researchers added to existing knowledge in the field of counselor education. The researchers’ use of mindfulness as a way to foster interpersonal attunement provides support for earlier studies suggesting that intrapersonal attunement enhances relational capacities (Davis & Hayes, 2011). Of primary importance to this researcher is the fact that the construct of attunement was introduced, indicating its relevance to counselor education. Schomaker and Ricard (2015) also recommended that additional research be conducted on the interpersonal nature of attunement, which is the focus of this study.
In addition to an overall lack of research on attunement in counselor education, the need for more studies on the topic is further illustrated by the absence of literature regarding the value of interpersonal attunement as a pedagogical technique. When considered comprehensively, the value of attunement goes beyond increased understanding of self and improvement of the quality of counseling relationships to include significant gains in learning.

Attunement as a Pedagogical Technique

As previously discussed, attunement may also be considered a way of knowing (e.g., Markula, 2004). Attunement as a way of knowing has important implications within counselor education. For example, McAuliffe (2011) emphasizes the complexity of the work of counselors, suggesting a need for counselors to develop a “flexible, reflexive mindset, or way of knowing” (p. 4). Additionally, from a constructivist perspective, which holds that “individuals actively create the world as they experience it” and that creating new meaning is a “joint enterprise” between individuals (McAuliffe, 2011, p. 4), attunement as a way of knowing holds particular significance. Counselors require certain relational abilities in order to become effective counselors. Among these are reflexivity, empathy, and cultural relativism (Gladding, 2013; McAuliffe, 2011). If given opportunities to ‘tune in’ to other learners in the classroom, counseling students may have increased chances to develop these relational qualities. Additionally, given the interpersonal elements of the phenomenon of attunement, knowledge that develops in the context of experiences of attunement is by nature relativistic, the result of connections between learners.

In order to cope with uncertainty, remain present, and adapt to the needs of clients, counselors require not only relational abilities but also creativity. Qualities of creativity, including flexibility, spontaneity, openness, and adaptability (Carson, 1999; Duffey, 2015;
Duffey, Haberstroh, & Trepal, 2009; Kipper, Green, & Prorak, 2010), may be inspired through integration of practices of attunement in the classroom. Blades and Bester (2013) discussed the pedagogy of attunement as one that allows space for uncertainty and vulnerability. The interpersonal interactions involved in counseling are fraught with ambiguity (e.g., Kottler & Shepard, 2011). Effective navigation of these experiences requires counselors to hold uncertainty and be willing to be vulnerable. By engaging in practices of attunement in the counselor education classroom, students may be better prepared to exercise the creativity that is necessary in counseling.

Practices of attunement also encourage the development of holistic knowledge, which is not only relativistic but also deeply felt and embodied. In preparing future counselors for careers involving work that is intended to have a direct impact on the wellbeing of other human beings, it is imperative that instructors deliver learning material so that it is fully understood. Students of counseling tend to remember educational material based not on didactic methods of teaching but on the passion and humility of their faculty or “experiential work in the classroom that touched them far deeper than at an intellectual level alone” (Cashwell & Barrio Minton, 2012, p. 166). It is also likely that knowledge developed in conjunction with affective and somatic experience is more easily and naturally applied outside of the classroom. Because experiences of attunement foster knowledge on affective and embodied levels as well as the cognitive level, counselors-in-training may be more likely to apply their learning in work with future clients.

When creating meaning while attuned with one another, emerging counselors may have increased opportunities for de-centering from their own cultural assumptions, developing knowledge from a relativistic context, and tolerating states of uncertainty, all of which are critical capacities for counselors to cultivate (McAuliffe, 2011). Practices of attunement in the
counselor education classroom may provide opportunities for counselors to develop the relational qualities and creativity necessary for providing effective counseling services. Additionally, these practices are likely to encourage deep learning that results in greater application of learning material in work with clients.

**Fostering Attunement**

Though attunement offers powerful opportunities for increasing self-awareness, building relationships, and learning, it is not necessarily a difficult state to achieve. As Trout (2011) pointed out, research on attunement between mothers and infants shows that humans have had the capability for attunement since birth. Indeed, experiences of attunement may be the basis for our earliest and most profound learning experiences. Interpersonal attunement is therefore a natural experience and integral aspect of human development that may be leveraged to enhance learning. Unfortunately, the educational system in Western society focuses primarily on transmission of knowledge to students rather than development of creative thought (Csikszentmihalyi, 2014). It is possible that the focus within secondary education on cognitive learning rather than ways of knowing that are sensorial, kinesthetically, or affectively based, leaves adult learners shut down to these embodied learning approaches when they are introduced in the context of traditional learning environments. Thus, opportunities for interpersonal engagement through embodied approaches must be introduced with careful consideration of the balance of safety and risk involved in engaging with the unfamiliar.

**Synchroniciticies.** To identify modalities for fostering attunement, reflection on the conditions under which the state occurs is useful. This may best be accomplished through review of the related construct of synchronicity. Jung and Pauli (1955) defined synchronicity as a moment during which events or the inner states of unique individuals become aligned in a way
that is meaningful but not causally affiliated. Similarly, attachment literature suggests that the unique bonds representative of attachment relationships are formed from repeated experiences of synchronized biobehavioral events, such as those occurring between mothers and infants (Feldman, 2007, 2012; Fleming, O’Day, & Kraemer, 1999). Feldman (2012) points out that, in this context, synchronous events, which are characterized primarily by their proximity to one another in time, can be considered the building blocks of interpersonal bonds. Synchronicities may contribute to achieving interpersonal attunement or attunement to events, energies, or conditions, resulting in meaningful connection and understanding on an unconscious level.

**Expressive Arts**

If synchronous experiences contribute to attunement, then experiential processes provide ample opportunities through which to achieve an attuned state. Research has shown that when individuals engage in experiences together in time, they demonstrate complementary states in certain parts of the brain (Haas & Langer, 2014; Lerner, Honey, Silbert, & Hasson, 2011). On an interpersonal level, the sharing of experience in time fosters aspects of attunement. Additionally, nonverbal processes may provide means for experiencing synchrony in ways that verbal interactions do not. Natalie Rogers (2011) discussed a collective resonance, a state of psychic, energetic union, which occurs when people engage together in expressive arts process. Rogers (2011) posited that through group arts experiences, it is possible to achieve a peaceful and harmonious collective consciousness. The means by which this occurs through the expressive arts may be due in part to the unpredictable nature of every creative journey. For example, Kossak (2008b) explored the process through which jazz musicians improvise with one another. The author emphasized the need during such experiences for each participant to be willing to experiment and tolerate ambiguity. Indeed, the act of creation of any kind, whether through art,
music, dance, or any other modality, requires openness and willingness to take risks. On an individual level, this may mean willingness to explore one’s own experience fully with the potential for discovery of unknown aspects of self.

The expressive arts provide a rich platform for holistic exploration, in that they invite a kinesthetic and sensory experience of self that may be integrated with the more cognitive ways of knowing that have traditionally been privileged within Western society (Fitzgerald, 2012). The artistic process provides an open channel through which the body may communicate with the mind, potentially unlocking previously hidden information and contributing to a more integrated sense of self. Additionally, because the arts provide a container for experience, they may lessen perceived risk in exploration (Kossak, 2015). For example, rather than directly confronting fearful material, an individual creating a painting has the ability to ‘tune in’ to his or her experience through a tangible piece of artwork. Similarly, on an interpersonal level, individuals may more easily connect with one another by creating together or spending time tuning in to existing creations, such as songs or dramatic performances. When applied to a learning environment, these examples reveal expressive arts processes as a tangible representation of the type of beneficial spaces between instructor and student described by Biesta (2004) as entailing great risk and opportunity.

Experiential and expressive arts interventions are increasingly being incorporated into counselor education programs (e.g., Graham, Scholl, Smith-Adcock, & Wittmann, 2014). With an ear toward fostering attunement through these processes, interventions can be tailored to meet the unique needs of counseling students. Given the importance of tolerance of ambiguity during expressive and experiential work, one of the most important aspects of the process to attend to is the balance between safety and risk (Kossak, 2015). Though moments of unpredictability may be
met with discomfort, it is likely that these moments provide the most fertile meeting ground on which to experience interpersonal synchrony. However, if the risk is determined to be too high, individuals may shut down to the process entirely. Acknowledging the need for a sense of trust in creative process, Kossak (2015) outlined in detail the delicate dance between safety and risk that is necessary for fostering attunement in the context of expressive arts experiences.

**Expressive Arts in Counseling**

The use of artistic modalities within counseling has increased in recent years, as evidenced by the emergence in 2004 of a new association with the field, the Association for Creativity in Counseling (ACC). Some counselor education programs, such as Appalachian State University, now allow counselors-in-training to specialize in creative arts therapies. Within other programs, content related to expressive modalities within counseling is introduced within core courses (e.g., Waliski, 2009) or comprises an entire course (e.g., Ziff & Beamish, 2004).

The expressive arts refer to a variety of modalities, including drama, dance, music, storytelling, play, and the visual arts, among others. The arts can be viewed as both a form of communication that goes beyond words as well as powerful tools for growth and healing. For example, the expressive arts have been said to “assist individuals and groups to experience transformations that help them effectively and powerfully face personal, community, and global challenges” (Rogers, 2011, p. 4). Given the universality of the arts, they are also considered effective tools for promoting the healthy development of individuals from a variety of cultural backgrounds (Degges-White, 2011). Specialized training is required to become certified in any of these modalities, and the use of certain techniques also requires additional education. However, the arts may be effectively incorporated into counselors’ clinical work across an assortment of settings (Degges-White, 2011). Creative modalities may be used in alignment with
the American Counseling Association Code of Ethics (2014) whereby “counselors practice only within the boundaries of their competence, based on their education, training, supervised experience, state and national professional credentials, and appropriate professional experience” (C.2.a., p. 8) and on the basis that creativity is an innate, growth fostering capacity possessed by all human beings (Rogers, 1993) that is fundamental to the therapeutic relationship (Duffey, Haberstroh, & Trepal, 2009).

**Expressive Arts in Counselor Education**

The increasing acknowledgement of the value of the arts within counseling practice is mirrored by growing use of creative techniques within counselor education, a trend that is well documented (Barrio Minton, Wachter Morris, & Yaites, 2014). Shepard and Brew (2013) posited that the main rationale for integrating the arts in counselor education is to encourage the personal growth of students. An additional reason for using the arts in the counselor education classroom is the need for students to gain personal experience with the use of these interventions (Shepard & Brew, 2013).

Within counselor education, the creative arts have been shown to offer benefits in different facets of counselor preparation, including supervision (e.g. Sommer, Ward, & Scofield, 2010; Gibbs & Green, 2008) and instruction (e.g. Bodenhorn & Starkey, 2005; Henderson & Malone, 2012) and at different points in counselor training, such as during practicum (e.g. Shepard & Brew, 2013) and internship (e.g., Sommer, Ward, & Scofield, 2010). Literature suggests that integrating the expressive arts into counselor education may increase students’ self-awareness (e.g., Gibbs & Green, 2008; Sommer, Ward, & Scofield, 2010), encourage group cohesion (e.g., Ziff & Beamish, 2004), and enhance learning by appealing to both affective and perceptual learning styles (Shepard & Brew, 2013). The relational benefits of using expressive
arts interventions in counselor education, including increased self-awareness and group cohesion, as well as the deep learning facilitated through use of these modalities can be viewed as functions of attunement. The expressive arts may therefore be considered vehicles for facilitating attunement, as suggested by Kossak (2008a, 2008b, 2009, 2015).

**Music in Counselor Education.** Music is a universally applicable and powerful modality for promoting catharsis, creativity, and communication (Gladding, 2016). This modality has been applied in varied ways in both counseling and counselor education. Musical activities in counseling range from listening to preexisting music to performing, composing, and improvising (Gladding, 2016). In both counseling and counselor education, the choice of musical activity is wide ranging and based on the goals of the work. For example, a popular use of music in counselor education is the presentation of existing songs to bring learning material to life (e.g., Louden-Gerber & Duffey, 2008). Popular songs may also be used as a lens through which to understand the cultural messages that impact health within our society (Gladding, 2016).

The benefits of using music in counselor education are as plentiful as the ways in which music can be applied. For example, song lyrics have been used to improve confidence in counselors-in-training regarding their ability to listen reflectively (Davis & Pereira, 2010). The use of music videos related to sensitive course material may increase counseling students’ emotional connection and openness to themselves and one another (Lenes, Swank, & Nash, 2015). The identified benefits of using music in counselor education suggest that music may be a particularly powerful modality for fostering attunement.

Further support for using music in counselor education and as the context for this study is provided by Minor, Moody, Tadlock-Marlo, Pender, and Person (2013). These researchers conducted a qualitative, grounded-theory (Corbin & Strauss, 2008) exploration of the processes
of connection and growth of master’s level counseling students engaging in a peer-to-peer music exchange group. The sample included 5 students enrolled in an introductory counseling course within a CACREP-accredited program at a midsized Western university.

The music exchange involved each student burning musical selections representing experiences in their current life stage to a compact disc, which was distributed to other participants on a rotating weekly basis during the first half of the semester. Following each individual’s week of sharing music, an individual, semi-structured interview was completed by one of the five researchers. This procedure was repeated for a second and final round of the study. A focus group was conducted at the end of the study.

The grounded theory that emerged from analyses included music as the representation and embodiment of students’ risk taking, wants, and emotions, whereby amount of risk taking increased the degree of connection to self and others. Participants’ awareness of the intensity of emotions experienced grew as risk taking and wants from the group increased. By sharing elements of themselves via the music exchange process, participants became more at ease in their interpersonal and intrapersonal connections. Though the context of the study limits generalizability of these findings, results have important implications for counselor education and for the current study. For example, results highlight the value of fostering connections within and between members of a counselor education master’s program cohort and indicate the potential of musical interventions in enhancing those connections. In keeping with Kossak’s (2015) suggestion that individuals must balance sense of safety and risk taking in order to achieve attunement, results of this study support the idea that risk taking in the context of expressive arts experiences contributes to enhanced sense of interpersonal connection. Exploration of the construct of attunement, using musical experience as a vehicle through which
to achieve the state, could greatly enhance understanding of the development of interpersonal connections between counselors-in-training.

**Drum Circles**

Many different musical interventions have been applied in counselor education, most of which could be argued as means of fostering attunement. However, certain musical interventions are better suited for use in a study that focuses specifically on the process of attunement as it occurs among members of a group of students. Shared musical experiences may be particularly useful in enhancing individual’s understanding of themselves and one another (Gladding, 2016). Additionally, improvisational music making provides the balance of safety and risk taking necessary for fostering attunement (Kossak, 2008b, 2015). For these reasons, an intervention involving improvisational group music making, the active creation and performance of music in a collaborative environment, is chosen as the vehicle through which to explore attunement in this study.

A drum circle, which involves group improvisational music making, is open to participants of all backgrounds, and requires no previous musical experience (Stevens, 2003), is the specific intervention chosen for the current study. Drum circles are aesthetic experiences involving active participation in improvisational drumming that is rooted in ancient practice and designed to promote creative expression and human connection (Stevens, 2003). These experiences have been used to build sense of community, unify participants across cultural backgrounds, and encourage group engagement (Camilleri, 2002; Hawkins, 1999). Unfortunately, few empirical studies have been conducted on the use of drum circles. To this researcher’s knowledge, no studies on the use of drum circles have been published within counselor education.
Because attunement involves an in-the-moment experience of connectedness, of published studies involving drum circles, research of particular interest includes those studies that focus on the immediate effects of drumming interventions. Though not involving attunement or interpersonal connection, the research of Mungas & Silverman (2014) is relevant to this study given its focus on the immediate effects of a group-based wellness drumming session on affective states of university students. The design for this study was quasi-experimental, and convenience sampling was used to recruit participants. The control group \( (n = 33) \) consisted of students from two beginning group classical guitar classes, while the experimental group \( (n = 17) \) was recruited from music therapy classes and via word-of-mouth across the university. Of note is the fact that control group participants had significantly less group musical experience than experimental participants, \( F(1, 48) = 6.63, p = 0.013 \). Though the researchers did not report whether musical experience of participants impacted the results of the drumming intervention, their consideration of this contextual factor suggests that this variable may be useful to take into account in the current study.

To assess mood states before and after the drumming session, the researchers used the Quick Mood Scale (Woodruffe-Peacock, Turnbull, Johnson, Elahi, & Preston, 1998), which measures six factors of mood, including drowsiness, anxiety, depression, aggression, confusion, and lack of coordination. A control group was also assessed using the Quick Mood Scale. For the experimental group, additional aspects of participants’ experience were assessed. A five-point likert-type scale (Very Comfortable to Very Uncomfortable) was used to determine experimental participants’ comfort level during each drumming intervention. Experimental participants were also provided with a space to make comments about their experience. The primary investigator (PI) facilitated a single drum circle for each of the 2 experimental groups. Components of the
drum circle were based on the HealthRhythms® protocol, an approach to fostering wellness through group-based drumming.

Independent samples $t$-tests determined no significant differences between the control and experimental groups on any pretest measure ($p > 0.18$ for all comparisons). However, via correlational analyses, all pre- and posttest measures were found to be significantly correlated ($p < 0.012$ for all measures). Thus, to determine posttest differences between the control and experimental groups, ANCOVAs were used, whereby pretest scores were designated as a covariate. The ANCOVAs revealed significant differences between groups on five out of six posttest measures, with the experimental group mean being significantly higher than the control group mean for all measures other than lack of coordination. Frequency data from the likert-type assessment tool indicated that participants were generally comfortable across interventions throughout the drumming session, and qualitative data supported the idea that participants generally had a positive experience during the drumming session.

Though findings from this study are not generalizable, the research holds implications for introduction of shared music making experiences in higher education. Additionally, the findings indicate that a single drum circle experience can result in immediate positive effects for participants. Of further relevance to the current study is the consideration of specific elements within the drumming protocol, as these interventions can be viewed as ways to adjust the balance of risk and sense of safety within the experience in order to foster attunement.

**Entrainment in Drum Circles**

Of particular relevance to the current study is the impact of the forcing function of sound, specifically that of a rhythmic nature, on the physiological and affective experiences of individuals. In the context of group improvisational drumming, entrainment may best be
described as “a process whereby two rhythmic processes interact with each other in such a way that they adjust towards and eventually ‘lock in’ to a common phase and/or periodicity” (Clayton, Sager, & Udo, 2005, p. 2). In the context of group drumming, the group rhythm can be considered the forcing function that leads to entrainment. In fact, multiple authors suggest that of all the features of music, humans may most readily synchronize their movements to the underlying beat (e.g., Thaut, 2008). The rhythm is thus the musical vehicle through which individuals entrain to one another by locking in to its phase and periodicity and providing feedback to one another by shifting musical expressions and altering the group sound. The influence of processes of musical rhythm, individual physiological and behavioral responses, and group musical expression on one another reflects a complex and dynamic system in which individual processes are interconnected with and transformed by one another. A conceptual diagram of this system is offered in Appendix A to illustrate its interconnected nature.

Although a discussion of each aspect of music and its impact on affective and behavioral processes is beyond the scope of this literature review, an overview of several aspects of music that are of primary importance to the current study is provided below. Specifically, the key elements of periodicity, phase synchrony, rhythmic synchrony, and dynamics are reviewed based on their relevance to exploring attunement in the context of group drumming.

**Periodicity.** Periodicity refers to “the tendency of an event to recur in cyclic intervals” (Scheck & Berger, 2006, p. 34). Periodicity reflects the most basic aspect of organization in music, that of rhythm (Schneck & Berger, 2006). In musical performances, including group drumming, periodicity can be found in the repetition of the underlying beat or in the recurrence of particular body movements of participants. In the case of entrainment of body movements to the rhythm of music, period information reflects “the adaptation of the movement duration to the
rhythmic stimulus duration” (Thaut, 2008, p. 142).

**Phase synchrony.** In literature regarding nonlinear systems, phase is a variable that corresponds to oscillatory movement in proportion to time and increases by $2\pi$ during each period of oscillation (Pikovsky, Rosenblum, & Kurths, 2000). In literature regarding synchronization of complex systems, phase synchrony is referred to as “a form of entrainment where the frequencies of oscillations become locked while the amplitudes of the chaotic trajectories evolve weakly correlated” (Manrubia, Mikhailov, & Zannette, 2004, p. 152). Phase synchrony bears similarities to the alignment of frequency or periodicity. However, as Manrubia, Mikhailov, and Zannette (2004) explain, there are important differences. First, as is implied by Manrubia et al.’s definition, phase synchronization does not rely on adaptation of the amplitude of events. This fact is important, given that even weak forcing functions can have a prolonged effect on the variable of phase (Pikovsky, Rosenblum, & Kurths, 2000; Pikovsky, Rosenblum, & Kurths, 2001). In contrast, the variable of amplitude tends to return to a stable value in the presence of a weak forcing function (Pikovsky, Rosenblum, & Kurths, 2000; Pikovsky, Rosenblum, & Kurths, 2001). Phase synchronization is thus a variable capable of reflecting subtle aspects of entrainment. Second, in frequency synchronization the entrained variable is the average frequency of the oscillators, irrespective of their instantaneous phase values, whereas in phase synchronization, instantaneous phases are locked (Manrubia, Mikhailov, & Zannette, 2004). In keeping with Manrubia et al.’s definition of the term, for the purposes of the current study, phase synchrony can be thought of as an in-the-moment measure of entrainment whereby occurrences of oscillatory events become locked in time. When individuals’ body movements entrain to the rhythm of music, phase information indicates “the coincidence of the response event to the occurrence of the rhythmic beat” (Thaut, 2008, p. 142). This measure can reflect
rhythmic aspects of performance, body movements, or physiological processes. In this study, phase synchrony was used as a measure of degree of synchronization of participants’ head movements and heart rates. These measures are discussed in more detail later in this chapter in a section on measurement.

**Rhythmic synchrony.** In a drum circle, entrainment is also reflected by the creation of a shared pulse among participants. One aspect of musical entrainment is therefore rhythmic synchrony, or the presence of a “distinct, steady pulse” in the music (Schneck & Berger, 2006, p. 118). Rhythmic synchrony is a variable that could be used to measure entrainment. However, within the current study, detection of rhythmic synchronization was likely to be more subjective than other behavioral measures of synchronization, such as that of phase of movement and heart rate. The variable of rhythmic synchrony was therefore used for descriptive purposes and to add richness to understanding how attunement develops through a process.

**Volume.** In literature regarding music, volume refers to “sound energy level” and is said to convey affective elements of a piece of music (Schneck & Berger, 2006, p. 35). Volume can be operationalized as the amplitude, or height, of a sound wave (Schneck & Berger, 2006). In this study, changes in group volume of drumming were considered reflections of energy expenditure. When shifts in volume occur organically, in the absence of facilitation, they are also considered potential indications of shifts in the affective experience of participants. Like rhythmic synchrony, within this study, volume was used for descriptive purposes and to enhance understanding of the context in which attunement developed.

**Measuring Attunement**

The process of attunement is a complex phenomenon, which cannot be evaluated through use of single variables, especially if the embodied nature of the phenomenon is to be accounted
for (Seikkula, Karvonen, Kykyri, Kaartinen, & Penttonen, 2015). If attunement is to be studied in counselor education, ways of capturing the complexity of the phenomenon must be identified. Measurement of attunement must also reflect the breadth and depth of the construct. Existing quantitative forms of measurement of attunement are wide ranging and include assessment of physiological, behavioral, and perceptual experiences of synchronization. Based on Kossak’s (2009) description of attunement as “a felt embodied experience… that includes a psychological, emotional, and somatic state of consciousness” (p. 14), the current study involved measurement of all three of these experiences of ‘tuning in’.

**Behavioral Synchronization**

Literature on attachment highlights the need for behavioral measures of attunement. Recent research in this area indicates the primary means for nonverbal synchrony between parent and child are behavioral elements of expression, including gaze synchrony, affect synchrony, and vocal synchrony (e.g., Feldman, Magori-Cohen, Galili, Singer, & Louzoun, 2011). In addition to being means for child-parent attunement, Feldman, Magori-Cohen, Galili, Singer, and Louzoun (2011) suggested that these elements of behavioral synchronization may lead to the alignment of parent and child heart rhythms and encourage regulation of the child’s autonomic nervous system. The interdependence of interpersonal behavioral and physiological experiences further supports the use of multiple measures in exploring attunement.

Components of expression related to affect have also been used as means for studying attunement between adults (e.g., Forster & Iacono, 2014; Havas, Svardberg, & Ulvenes, 2015). Unfortunately, measures related to gaze, vocalization, facial expression, and verbal communication are not appropriate to use in a study in which participants are engaging in music making. While drumming collaboratively, participants communicate in a manner that does not
involve verbalization and offers few opportunities for alignment of nonverbal affective cues. Rather participants communicate through the creation and performance of music as well as body movements.

**In Drumming.** In the context of a drumming experience, synchronization has been measured as the alignment of aspects of the performance. For example, Endedijk et al. (2015) conducted an observational, quantitative study focused on interpersonal aspects of drumming, including interpersonal coordination, between two-, three-, and four-year-old children as they drummed together. Participants consisted of 100 two-year-olds, 60 three-year-olds, and 66 four-year-olds, paired together based on age and gender. Materials used for the intervention included two plastic mallets and two 10-inch children’s drums, which were attached to height adjustable stands and connected to MIDI audio receivers via piezo contact microphones affixed to the drum heads. Video recording equipment was used to capture visual aspects of the performances. Each session began with a short period of free play and a 5 minute cooperation task, after which the drumming exercise began.

Drumming bouts, or periods of time during which children produced sequential hits on their drums, were delineated within the time series based on number of hits and calculations involving intertap intervals, or the time elapsed between hits on the drum. Interpersonal coordination was measured as the degree of overlap of bouts occurring between partners. Percentage of bouts that overlapped for each dyad was calculated, revealing that while most bouts between partners overlapped, the percentage of overlapping bouts was significantly higher for four-year-olds versus two-year-olds and three-year-olds. Additional findings included a significant impact of age on duration of overlapping bouts within dyads, with four-year-olds producing significantly longer overlapping bouts as compared to two-year-olds.
The researchers also investigated whether coordination between dyads was more than would be expected by chance by comparing time spent producing overlapping bouts in the existing time series to time spent producing overlapping bouts in randomized time series. Children were found to display significantly higher interpersonal coordination than what would be expected based on chance, with four-year-olds showing more coordination than two-year-olds and three-year-olds.

The measure of interpersonal coordination used in this study is not suitable for application in a study involving adults, who coordinate their drumming behavior at a level higher than production of overlapping bouts. However, the unique behavioral measure the researchers employed to assess interpersonal coordination within the context of a drumming intervention suggests the need for innovative methods to assess behavioral aspects of attunement in the context of a drum circle. Additionally, the researchers demonstrated that interpersonal coordination at the behavioral level may best be captured by analyzing shorter segments of interactions rather than the duration of the drumming experience.

**Group Movement Synchronization.** A behavioral measure that holds more relevance for use in this study is that of synchronized movement. Just as the behavioral aspects of affective expression previously mentioned are rooted in infancy, so too is body movement a means of tuning in that develops early in life. Multiple authors speak to the fact that humans learn to communicate through body movements prior to developing language (Seikkula, Karvonen, Kykyri, Kaartinen, & Penttonen, 2015; Sheet-Johnstone, 2010). According to Seikkula, Kykyri, Kaartinen, and Penttonen (2015, p. 704), “we are born as humans through body movements and by attuning to each other in a musical, rhythmic way.” The importance of this form of
communication persists well beyond childhood, as adults also synchronize body movements when engaging in collaborative tasks (Wiltermuth & Heath, 2009).

Though synchronization of body movement has historically been difficult to assess, with the advent of motion capture technology, researchers are becoming more likely to exploit this promising form of measurement (e.g., Himberg & Thompson, 2011; Richardson, Garcia, Frank, Gergor, & Marsh, 2012). A number of movements, ranging from those of isolated joints to the full body, may be measured. However, head movements in particular have been acknowledged as being related to aspects of musical performance (e.g., Varni, Camurri, Coletta, & Volpe, 2008) and are thus of particular relevance to this study.

In an innovative study on emotional entrainment to music, Varni, Camurri, Coletta, and Volpe (2008) explored the synchronization of head movements between pairs of performing violin players. The researchers asked 4 violin players to perform an approximately 25 second long fragment of a musical piece in pairs. Several trials were conducted, in which one player of the duo was instructed to play in a manner that would elicit an emotional response from the other player. Four different emotional states were tested across two different feedback conditions, the first of which allowed players to coordinate their performance through both sound and gaze, the second of which allowed coordination through sound only. For the second condition, players were separated by a wallboard.

Four video cameras were used to track the movement of performers’ heads. The researchers used EyesWeb XMI technology to detect and track head movements from a top down perspective. Recurrence plots and recurrence quantification analysis were used to identify periods of phase synchronization between performers. Although analysis of phase synchronization did not provide evidence of emotional entrainment between players, analysis of
trajectories of head motion via captured videos showed a more ordered direction of motion in feedback conditions that allowed eye contact versus those performances in which players were separated by a wallboard.

Findings from Varni, Camurri, Coletta, and Volpe’s (2008) study suggest the usefulness of head movement data in determining behavioral synchrony in a musical activity. Yet the study involved dyads rather than a group of participants. Very little research has been conducted to date regarding the movement synchronization of groups of 3 or more participants (Ellamil, Berson, & Margulies, 2016; Richardson, Garcia, Frank, Gergor, & Marsh, 2012), and there is currently no agreed upon method for analyzing movement data (Larboulette & Gibet, 2015) or the synchronization of behavior of 3 or more individuals (Ellamil, Berson, & Margulies, 2016). However, a handful of recent studies have employed novel methods of analysis capable of detecting synchronization at the group level (Ellamil, Berson, & Margulies, 2016).

**Analysis of group movement synchronization.** Studies regarding group synchronization have differed primarily in their focus on either state differences, which involve a comparison of degree of synchrony under certain conditions, or temporal dynamics, involving a comparison of degree of synchrony over a period of time (Ellamil, Berson, & Margulies, 2016). While methods of analysis within studies on state differences tend to be correlational in nature, for studies involving investigation of temporal dynamics, analysis of group phase differences is a preferred method (Ellamil, Berson, & Margulies, 2016). As an example of a study of group synchronization involving analysis of phase difference, Richardson, Garcia, Frank, Gergor, and Marsh (2012) studied group movement synchrony among 8 groups of 6 adults as they rocked in rocking chairs. Rocking chairs were arranged in a circle, and motion tracking sensors were placed behind each chair’s head rest. Given previous studies that determined the synchronization
of rocking chair movements among participants who can see one another versus those who
cannot see one another (Richardson, Marsh, Isenhower, Goodman, & Schmidt, 2007), this
rocking chair procedure was chosen as a way to determine whether a cluster phase method of
analysis proposed by Frank and Richardson (2010) could be useful in identifying phase
synchronization within a group. Each group of participants rocked in two conditions, one with
eyes open and one with eyes closed. The statistical method used successfully differentiated
between eyes-open and eyes-closed conditions and determined whether the movements of
particular individuals were coordinated with the whole group.

Another study that explored the temporal dynamics of synchronization of movements
among members of group was conducted by Himberg and Thompson (2011), who studied
elements of group movement synchronization among a group of Finnish choir singers and a choir
from South Africa. The South African choir members taught South African songs with
choreographed dances to the Finnish participants. The Finnish participants taught a Finnish song
to the South African participants, who developed a simple choreography for the song. Motion
capture data was used to track the movements of participants as they danced to the songs. Video
and audio data were also gathered. Two recordings, one of the performance of the South African
song and one of the performance of the Finnish song were analyzed. Though multiple methods of
analysis were applied in this study, given their relevance to the current study, only the methods
and results related to analysis of group head movement synchronization during the Finnish
performance are discussed here.

A total of 10 participants, 7 of whom were South African and 3 of whom were Finnish,
performed the Finnish song. Participants wore reflective head markers that allowed for
movement data to be captured via the Qualisys Motion Capture system. Movement data was
analyzed in the software program MATLAB. In order to determine degree of synchronization of
the whole group, calculations of the phase of the vertical head movements were made. To
accomplish this, a Gaussian band-pass filter was applied to the movement data. The center
frequency of the filter was set at the period of the basic beat of the music. A Hilbert
transformation (e.g., Feldman, 2011) was then applied to determine the immediate phase of the
vertical movement. A model developed by Kuramoto (e.g., Acebrón, Bonilla, Vicente, Ritort, &
Spigler, 2005) for determining alignment of phase was applied, resulting in an index measure
ranging from 0 to 1, with calculations closer to 1 indicating greater synchrony. Results indicated
that Finnish participants were better-coordinated in their movements than South African
participants. These results were to be expected, given the simplicity of the choreography and the
fact that Finnish participants were experts of the song. Coordination of movement was likely
more difficult for the South African participants, who were simultaneously working to remember
a new song’s melody and lyrics.

*Analysis of temporal dynamics of group synchronization.* The cluster phase method and
Kuramoto model employed by Richardson, Garcia, Frank, Gergor, and Marsh (2012) and
Himberg and Thompson (2011), respectively, are capable of providing a direct and intuitive
measure of group synchrony over a period a time (Ellamil, Berson, & Margulies, 2016).
However, these methods typically rely on the presence of a stable oscillator as a way to gauge
synchronization. Another method, which does not require a stable oscillator, utilizes the
aggregate of pairwise dynamics. Within this method, degree of synchronization may be
operationalized as the mean or median of pairwise synchronization calculations. The result is an
index that represents synchrony of the group as a whole over a period of time. This index can be
graphed as a function of time to illustrate whether and how synchronization develops throughout
a process. Not only does this method hold relevance for use in analysis of behavioral data in the current study, for purposes of consistency and comparison, it may also be applied to physiological data (e.g., Ellamil, Berson, & Margulies, 2016).

**Physiological Synchronization**

In order to reflect the embodied and emotional aspects of the phenomenon of attunement, physiological measures must be used. Physiological synchronization, referring to the interpersonal alignment of biological states (Suveg, Shaffer, & Davis, 2016), has been successfully demonstrated through use of varied biological markers, including salivary alpha amylase (e.g., Gordis, Margolin, Spies, Susman, & Granger, 2010), salivary levels of cortisol (e.g., Hibel et al., 2015), cardiovascular activity (e.g., Feldman, Magori-Cohen, Galili, Singer, & Louzoun, 2011; Suveg, Shaffer, & Davis, 2016; Tang et al., 2009; Tantia, 2012; Zelenko, Kraemer, Huffman, Gschwendt, Pageler, & Steiner, 2005), skin conductance response (e.g., Tang et al., 2009), respiration (e.g., Codrons, Bernardi, Vandoni, & Bernardi, 2014; Tang et al., 2009), and levels of oxytocin (e.g., Feldman, 2012; Feldman, 2015). In the context of group musical performance, there is even evidence of interpersonal synchronization of brain waves (Lindenberger, Li, Gruber, & Müller, 2009). The multiple biological measures used to assess interpersonal synchronization and attunement speak to the importance of consideration of the physiological basis of the construct as well as the accessibility and usefulness of physiological data.

**Heart Rate Synchronization.** Of all the types of physiological data, heart rate data may be the most relevant for use in this study. Other physiological measures, such as salivary cortisol levels, would require the intervention to be stopped, altering the natural flow of the session. Additionally, while certain types of data can only be gathered at discrete points, the
determination of physiological synchrony in the context of an ongoing process requires measurement of physiological signals in real-time (Suveg, Shaffer, & Davis, 2016). For this reason, heart rate data has previously been used as a way to determine physiological synchrony as it occurs on a moment-to-moment basis (e.g., Suveg, Shaffer, & Davis, 2016).

As a means for assessing autonomic nervous system activation based on cardiovascular responses (Mauss & Robinson, 2009), heart rate can be viewed as an indicator of emotional and embodied experience. A bit of background on the autonomic nervous system further explains the usefulness of heart rate as a measure of attunement. The autonomic nervous system consists of two branches, the parasympathetic and sympathetic, which together regulate many biological functions, including digestion, attention, and effort (Berntson & Cacioppo, 2000; Öhman, Hamm, & Hugdahl, 2000) and impact emotional experiences, such as that of stress or relaxation. The autonomic nervous system has been suggested as an indicator of empathic attunement between individuals, whereby responses of the biological system are instantaneous, occurring before conscious thought (Seikkula, Karvonen, Kykyri, Kaartinen, & Penttonen, 2015). While measures of autonomic nervous system activity have not yet been conclusively linked to the presence of particular emotions, these measures can provide an indication of the dimensionality of an emotional experience (Mauss & Robinson, 2009). For example, rather than indicating a particular emotion, heart rate may suggest degree of emotional arousal.

The synchronization of heart rate is further applicable to this study given the nature of the measure, which reflects a repetitive, rhythmic process. Just as rhythmic synchrony of pulse in music is an indication of entrainment in the context of a drum circle, so too can rhythmic synchrony of heart rate be viewed as an indication of physiological entrainment. The synchronization of the rhythm of heart rates thus provides a fitting translation of musical
experience into physiological form. The rhythm of heart rate is reflected through the values of interbeat intervals, or time between heartbeats (Suveg, Shaffer, & Davis, 2016). Through the comparison of interbeat interval time series, the nuances of physiological synchrony can be assessed on a moment-to-moment basis (e.g., Feldman, Magori-Cohen, Galili, Singer, & Louzoun, 2011; Suveg, Shaffer, & Davis, 2016).

**Analysis of heart rate synchronization.** Methods of analysis for physiological synchronization have traditionally focused on dyadic interactions, and very few studies have explored any measure of physiological synchronization within a group of three or more people (Ellamil, Berson, & Margulies, 2016). Thus, no consensus yet exists regarding the best way to determine physiological synchronization at the group level (Ellamil, Berson, & Margulies, 2016).

To this researcher’s knowledge, the current study is the first to explore the development of group heart rate synchronization over a period of time (e.g., Ellamil, Berson, & Margulies, 2016). However, some researchers have compared differences in group heart rate synchronization under certain conditions. For example, Müller and Lindenberger (2011) compared the phase synchronization of heart rate variability and respiration among members of a choir, including 1 conductor and 11 singers, under different experimental conditions, such as while singing and while at rest. Electrocardiogram was used to capture cardiovascular data, from which the timing of beats was derived and instantaneous heart rate signals were created. The time series were smoothed and normalized. A Morlet wavelet transform was used to compute instantaneous phase. To determine synchronization, multiple synchronization indices, which took into account duration and direction of phase synchronization between each pair of participants for each data point across signals for a given window of time, were calculated at six different
frequencies. A two-way repeated measures ANOVA was completed with condition and frequency as the within-subject factors. A one-way repeated measures ANOVA was completed for each frequency with condition as the within-subject factor. Results indicated higher synchronization during periods of singing versus at rest and higher effects of condition at higher frequencies.

Müller and Lindenberger’s (2011) methods of analysis were not ideal for the current study, which involved investigation of how heart rate synchronization developed through a process rather than comparison of synchronization under different conditions. However, they do indicate that phase is an aspect of heart rate that is useful to determining physiological synchronization among members of a group. As suggested by Ellamil, Berson, and Margulies (2016) and described within the previous section on analysis of group movement synchronization, the temporal dynamics of heart rate synchronization may be better explored through creation of an index of group heart rate synchronization.

Perceptual Measures

Various measures have been used to determine individuals’ experiences of attunement at a cognitive level. As previously discussed, Kossak (2008a) used interviews to explore participant experiences of attunement during improvisational music making. Findings provided useful information about the construct of attunement and the process through which individuals ‘tune in’ to one another while making music. These findings inform the current study and allow for a more in-depth exploration of attunement through quantitative measures.

The majority of quantitative measurement of perceptions of attunement involve participant self-rating (e.g., Baer, Smith, Hopkins, Kriitemeyer, & Toney, 2006; Cwir, Carr, Walton, & Spencer, 2011; Lau, Fung, Wang, & Kang, 2009). These measures provide useful information
about how individuals experience attunement on a cognitive level. Yet they are not without limitations. Self-rating measures are by nature reflective and thus not able to capture individuals’ perceptions of their experiences as they occur in real time. Additionally, in a study involving an active group process, these measures cannot be administered until completion of the experience lest the flow of the process be disrupted. Thus, perceptual measures in this study were used to lend credence to the occurrence of attunement among participants but were not used to precisely identify specific periods of synchrony. The limitations of perceptual measures further support the use of multiple measures for this study.

Currently, no instrument exists to specifically measure either occurrence or degree of attunement. Researchers have assessed perceptions of attunement in various ways. Cwir, Carr, Walton, and Spencer (2011) conducted a particularly pertinent experimental study on whether sense of social connectedness between new interaction partners causes shared emotional and physiological states. The sample for the first experiment consisted of undergraduate students \(N = 71\). The students, who were led to believe they would be taking part in a study on personality and cognitive tasks, participated in dyads with a confederate, who acted as another participant. Sense of social connectedness was manipulated through a series of introductory questions asked of the participant and confederate. Based on responses to a prestudy survey questionnaire regarding unique interests, the confederate’s answers to three out of five questions matched those of the participants in the connection condition. For those in the non-connection condition, the confederate’s responses did not match their own. The students were then assigned to complete a personality test, and the confederate was assigned to memorize and present a speech on neurophysiology to a panel of judges. While the confederate practiced her speech, participants
completed a questionnaire containing measures of stress-related emotion and checks for social connectedness.

Stress-related emotion was measured by providing a list of 24 emotion words, among which 11 stress-related words with high internal consistency (e.g., stressed, alarmed; $\alpha = 0.91$) were embedded, and asking participants to rate their feelings on a likert scale ranging from 1 = not at all to 7 = extremely well. Three separate measures were used to assess sense of social connectedness. First, participants were asked to rate their interest in getting to know the other participant better (1 = not at all interested, 7 = extremely interested). Second, closeness was determined from 2 items modified from the Relationship Closeness Inventory (Berscheid, Snyder, & Omoto, 1989); e.g., “Relative to your other relationships, if you and this person were to become friends, how close do you think you would be?” (1 = not at all close, 7 = extremely close; $r = 0.74, p < 0.01$). Because the Relationship Closeness Inventory was developed to measure perceived closeness between individuals in long-standing relationships (Berscheid, Snyder, & Omoto, 1989), relevant items were modified significantly. Finally, sense of shared self was assessed by use of the 2-item “oneness index” (Cialdini, Brown, Lewis, Luce, & Neuberg, 1997), consisting of the Inclusion of the Other in the Self Scale (Aron, Aron, & Smollan, 1992) and participant rating of the extent to which they would use the term “we” to describe their relationship with the confederate; ($r = 0.60, p = 0.001$). The Inclusion of the Other in the Self scale is a simple, pictorial measure that has been used to assess sense of shared self between both longstanding relationship partners and new acquaintances (Gachter, Starmer, & Tufano, 2015). As a final step to ensure believability of the stated intent of the study, several personality measures were completed. Results indicated that those in the socially connected group were more interested in getting to know the confederate, felt closer to the confederate,
reported greater stress, and experienced a greater sense of oneness with the confederate than those in the non-connected condition.

Findings from Cwir, Carr, Walton, and Spencer’s (2011) study provide support for the idea that a sense of connection, even between individuals not in a longstanding relationship, can result in empathic or synchronistic emotional states. With regard to the current study, findings suggest that students who share an area of study and common set of classes can attune with one another emotionally under certain conditions. These findings and the use of multiple measures of social connectedness indicate that sense of connection is a variable that contributes to the ability to ‘tune in’ on an interpersonal level. Additionally, the researchers’ use of the Inclusion of the Other in the Self scale (Aron, Aron, & Smollan, 1992) as a simple measurement of sense of oneness between individuals not in a longstanding relationship holds promise as a self-report measure of attunement between learners in the classroom setting. In addition to being easy to use, this instrument is highly replicable and can be used to assess closeness across multiple types of relationships (Gachter, Starmer, & Tufano, 2015).

The Inclusion of the Other in the Self scale (Aron, Aron, & Smollan, 1992) was used in Cwir, Carr, Walton, & Spencer’s (2011) study to determine sense of oneness between adults and a single individual with whom they were newly acquainted. The current study required a measure that assesses sense of oneness with a group. The Inclusion of Community in Self scale (ICS; Mashek, Cannaday, & Tangney, 2007), developed from the Inclusion of the Other in the Self scale, is such a measure. Though the ICS had not previously been used to measure attunement, it had been used successfully to measure sense of connection to various groups, such as a criminal community and the community at large (Folk, Mashek, Tangney, Stuewig, & Moore, 2016) as well as a college community (Branand, Mashek, Wray-Lake, & Coffey, 2015).
Within the current study, this instrument was used as a way for participants to reflect on their experiences of attunement with the group during different phases of the drumming intervention. While data from this instrument was not analyzed to determine periods of synchronization, it was used to more richly describe how aspects of attunement develop over the course of the entire drumming experience.

**Summary**

The richness and multileveled nature of the construct of attunement as well as the many forms of measurement that have been used to assess aspects of the phenomenon suggest that its measurement should also be multileveled. The current study utilized physiological, behavioral, and perceptual measures with the goal of capturing somatic, affective, and cognitive aspects of the process of ‘tuning’ in during group, improvisational music making. Few studies have explored the synchronization of physiological or behavioral processes among more than 2 participants (Ellamil, Berson, & Margulies, 2016). The few that have indicate that the temporal dynamics involved in a process of attunement may best be explored through analysis of phase synchronization using a group phase synchronization index (Ellamil, Berson, & Margulies, 2016). The ICS was a useful tool for gathering participants’ perceptions of attunement with the group across the entire drumming intervention.

**Conclusions**

Attunement is a deeply felt and embodied state of consciousness that results from a process of ‘tuning in’ to oneself, others, events, energies, and the environment (Kossak, 2015). Experiences of attunement may lead to the realization of innate human capacities for connection and growth (Kossak, 2015) and are the building blocks of interpersonal bonds (Feldman, 2012). The construct of attunement holds relevance in counselor education as a way of understanding
how counselors-in-training develop the relational qualities and creativity that contribute to becoming effective counseling practitioners. When applied in the classroom setting, the process of attunement can be viewed as a pedagogical practice that leads to the creation of relativistic and embodied knowledge.

Intrapersonal aspects of attunement have previously been studied in counselor education, yet very few researchers have explicitly investigated interpersonal aspects of attunement in the field (e.g., Schomaker and Ricard, 2015). An additional lack of attention in the field to the somatic and affective components of the phenomenon suggests that a comprehensive exploration of attunement is warranted. In order to thoroughly investigate attunement in counselor education, cognitive, affective, and physiological aspects of the phenomenon must be considered.

This study was designed to promote further consideration of the phenomenon of attunement in counselor education, including the conditions under which attunement occurs and the context in which the process may most easily be fostered. The process of attunement may be most naturally integrated in the context of an educational program that employs a cohort model and constructivist teaching methodologies. Although the phenomenon of attunement is complex and multileveled, the conditions under which it occurs may most readily be created through use of an expressive arts process (Kossak, 2015). Given the literature supporting musical processes as ways to facilitate attunement (e.g., Kossak, 2008a, 2008b) and findings that indicate group drumming produces immediate psychological effects (Mungas & Silverman, 2014), a drum circle was provided as the vehicle through which to explore attunement in counselor education.

Though fostering attunement in counselor education may be relatively simple, measuring the phenomenon is more complex. In order to reflect the richness of the construct, consideration of its interpersonal nature and use of multiple measures is required. Within this chapter, literature
and studies on related topics from diverse fields were reviewed in order to determine the feasibility of measuring attunement from physiological, behavioral, and perceptual perspectives in the context of a group expressive arts process. Group synchronization was suggested as the primary way to operationalize different aspects of attunement, and phase synchronization was identified as a variable that may be useful in determining degree of synchronization of physiological and behavioral measures. Specifically, the degree of phase synchronization of pitch of head movements and heart rates during a portion of the drum circle in which participants improvise with their eyes closed was proposed as a way to assess for occurrences of attunement. The ICS scale was introduced as a simple self-report measure of learners’ cognitive perceptions of interpersonal attunement with the drumming group.

It is hoped that this comprehensive introduction of attunement within counselor education will lend credibility to the construct within the field. Further consideration of attunement may result in increased understanding of how counselors-in-training develop the relational skills, creativity, and holistic knowledge that lead to provision of more efficacious counseling services. Ultimately, findings from this study may result in the integration of more relational-responsive pedagogical practices within counselor education programs and the development of counselors with greater capacities for relating to diverse clients and navigating the complexities of their work.
CHAPTER THREE

METHODOLOGY

The purpose of this study was to explore attunement as it occurs between master’s level counselor education students participating in improvisational group drumming. The study was designed to reflect, through use of multiple and varied measures, the many-leveled nature of attunement as it occurs on physiological, affective, and cognitive levels. Participants were first year master’s students in their first semester of a cohort model counselor education program within a large, public university in the Southeastern United States. The study was conducted at a research facility within the institution. The following research questions were used to explore the nature of attunement as it occurs between master’s level counselors-in-training participating in an improvisational drum circle:

1. What is the nature of attunement over the course of the drum circle, as evidenced by perceptual data?

2. What is the nature of attunement during the ‘Improvisation with Eyes Closed’ phase of the drum circle, as evidenced by perceptual, physiological, behavioral, and audio data?

3. What is the context of attunement during a specific period of heightened synchronization within the ‘Improvisation with Eyes Closed’ phase of the drum circle, as evidenced by physiological, behavioral, and audio data?

This chapter focuses on the methodology used for the study. Information regarding research design, participant selection, procedures employed for the study, and instruments is provided. Methods of data collection and analysis are also included.
Research Design

Given limited prior exploration of the phenomenon of attunement in the context of group music making, the design of this study was based on literature regarding group synchronization and physiological and behavioral responses to music. This literature indicates that even when studying a single aspect of attunement to music, multimodal analysis methods greatly enrich understanding of the phenomenon (e.g., Camurri & Volpe, 2011). Recommendations for gathering information about responses to music include use of varied methods, including documentation of verbal accounts, physiological measurement, and the study of physical action (Schacher, 2015).

In order to capture the large amount and varied types of data needed for this study, a single case research design (SCRD) was applied. Whereas the large number of participants in group research designs is a limit to the ways in which a dependent variable can be measured (Morgan & Morgan, 2009), SCRD designs allow the use of repeated measures over the course of an intervention (Gallo, Comer, & Barlow, 2013). For this study, the SCRD format offered greater depth of observation of the phenomenon of attunement. Based on the context of a study, the case of interest in an SCRD may be an individual participant, social unit, or organizational body (Morgan & Morgan, 2009). Because this study focused on attunement among participants during a shared experience, the case of interest consisted of the entire group of participants. While quantitative data was used to elucidate occurrences of attunement, contextual and descriptive data was used to enrich understanding of the process of attunement and the context in which it occurred.

In order to synthesize data resulting from a variety of measures used in this study, analysis was focused on a short segment of the broader drum circle intervention. The portion of
interest, which lasted for 3 minutes and 43 seconds, involved participants drumming in an improvisational manner with their eyes closed. Please see the study procedures portion of this chapter for more information on this specific activity. As opposed to other portions of the group music making intervention, which involved a greater degree of researcher-led facilitation, this segment of the drumming experience provided an opportunity for participants to connect more directly with one another. While participants’ eyes were closed, they were not responding to visual cues provided by the facilitator. In order to ‘tune in’ to the group during this activity, participants had to listen to one another attentively. Without the assistance of a facilitator, participants also had to improvise to a greater degree. Though risk was involved in participation during this activity, because it occurred toward the end of the group experience, it is likely that a sense of safety had also been established among participants. In keeping with Kossak’s (2015) conceptualization of the development of attuned states as a process involving a balance of safety and risk taking, the conditions necessary for attunement to occur were more likely to be present during this activity than other portions of the experience. The use of this segment for analysis also meant that shifts in participant response and expressive aspects of the music created were not likely to be the result of the facilitator’s verbal or postural cues. For these reasons, this portion of the drum circle was chosen as the basis for an initial exploration of attunement in counselor education.

**Participants**

Potential participants consisted of all master’s level students enrolled in their first semester of a counselor education program within a large, public university in the Southeastern United States. The counselor education program from which participants were drawn employs a cohort model. As described by Hayes and Paisley (2002), cohort models within counselor
education programs provide support and authentic opportunities for learning through the development of empowered learning communities. As a means of establishing a sense of community, the intervention chosen for this study was fitting for use with a group of counselor education students in the early stages of group development. The selected cohort of students, likely less cohesive than a cohort further along in the program, also provided a unique context in which to explore attunement. This cohort was likely to experience more frequent and distinct shifts between attuned and non-attuned states, providing a clearer picture of the phenomenon of interest.

All members of the program’s first year cohort were invited to participate in this IRB approved study. The invitation to participate was provided verbally during the final class session of an introductory counseling course. A 15-dollar gift card was offered in appreciation for participation. Potential participants were informed that participation was voluntary, with no repercussions attached to a decision not to participate. An informed consent document was also provided at that time. Potential participants indicated their interest in the study by responding to a Qualtrics scheduling survey, which the researcher provided by e-mailing a link to all potential participants following the class session during which the verbal invitation was issued. A follow-up e-mail was sent to those potential participants who had not taken the survey a week after the initial e-mail was sent. The Qualtrics survey allowed participants to select their top choices among several available time slots. In order to provide a meaningful group experience for participants, the researcher chose to offer the group drumming experience for all time slots during which 6 or more potential participants indicated availability. A total of 14 students responded to the survey. However, only 1 time slot met the scheduling criteria, with 8 potential participants indicating availability on the same date and time.
The informed consent process was completed immediately prior to the study following participants’ arrival at the research facility. Recruitment documents, including the recruitment script, initial and follow-up e-mails, and the informed consent form are provided in Appendix B, C, and D, respectively.

**Instruments**

The following self-report instruments were used to gather perceptual data for this study: the Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003), a modified version of the Inclusion of Community in Self scale (ICS; Mashek, Cannaday, & Tangney, 2007), an interpersonal connection measure, and an information questionnaire.

**Mindful Attention Awareness Scale**

Previous studies suggest the impact of mindfulness on ability to attune with others (e.g., Baker, 2016). Thus, a measure of trait mindfulness was chosen to capture this aspect of the attunement process. The Mindful Attention Awareness Scale (MAAS), which can be found in Appendix E, was developed by Brown and Ryan (2003) to measure “the presence or absence of attention to, and awareness of, what is occurring in the present moment” (p. 824). Perhaps due to its brevity and simple structure, the MAAS is the most widely cited measure of mindfulness (Medvedev, Siegert, Feng, Billington, Jang, & Krägeloh, 2016). The MAAS is a self-report questionnaire consisting of a single dimension and 15 items. Responses are based on a 6-point Likert-type scale, where 1 = ‘almost always’ and 6 = ‘almost never.’ Scores are derived from averaging responses across all 15 items, with higher scores indicating higher levels of mindfulness.

Brown and Ryan’s (2003) initial validation of the instrument involved several studies and samples. The first sample consisted of 327 students enrolled in a United States university.
The second consisted of 239 adults from throughout the United States. The researchers determined good internal consistency with regard to the first two respective samples ($\alpha = 0.82$, .87). Test-retest reliability was determined through a separate study of 60 psychology students from a single university over a 4-week period. Reliability, as measured through intraclass correlation, was .81, $p < 0.001$ (Brown & Ryan, 2003). Additional initial studies conducted by the researchers revealed strong convergent validity with measures of well-being and divergent validity with measures of psychological distress. Construct validity was further supported by findings that members of a Zen center, who were known to actively practice mindfulness, scored significantly higher on the MAAS than a sample of gender and age matched adults from the general community.

Subsequent studies involving the MAAS have revealed weak to moderate convergent validity with other mindfulness measures (see Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006; Christopher & Gilbert, 2010). Construct validity is further supported by findings that experienced meditators score significantly higher on the MAAS than novices (Brown & Ryan, 2003). Numerous studies (e.g., Carlson & Brown, 2005) have provided support for the unidimensional nature of the MAAS. Given its strong psychometric properties and relative brevity, the MAAS was considered an ideal tool through which to measure trait mindfulness, a variable of contextual interest in this study.

**Inclusion of Community in Self Scale**

The Inclusion of Community in Self scale (ICS; Mashek, Cannaday, & Tangney, 2007) measures community connectedness via a single pictorial item. The item consists of seven pairs of overlapping circles, with each pair of circles overlapping slightly more than its preceding pair. Participants are asked to select the pair of circles that best describes their sense
of oneness with the community. Greater sense of connectedness is indicated by a choice of circles with a greater amount of overlap. The ICS was derived from an earlier developed tool, the Inclusion of the Other in the Self Scale (Aron, Aron, & Smollan, 1992), which measures interpersonal connectedness through a similar series of Venn diagrams. Though the ICS shares the efficiency and accuracy of the Inclusion of the Other in the Self scale and builds on similar theoretical and methodological models (Mashek, Cannaday, & Tangney, 2007), the ICS is distinct in that it measures the degree to which the community, rather than another individual, is included as a part of the self. The ICS was chosen for this study given its focus on a group level phenomenon as well as its conceptualization of community connectedness as the sense of oneness, a concept that more closely reflects the perceptual aspect of attunement than the idea of social connection in general.

Mashek, Cannady, and Tangney’s (2007) initial validation of the ICS involved two studies. The first of these involved 190 undergraduate students enrolled in psychology classes within a public, United States institution. The researchers administered the ICS along with other instruments and self-report measures, including the Inclusion of the Other in the Self scale and the Psychological Sense of Community instrument (Obst, Smith, & Zinkiewicz, 2002) to assess convergent and discriminant validity. Test-retest reliability for the ICS, determined over a two week period, was $r = .63$ ($n = 49$). In comparison to relevant Psychological Sense of Community subscales, the ICS was found to correlate positively ($r = 0.27$ to $0.45$). As expected, no correlations were found between the Inclusion of the Other in the Self scale and any of the Psychological Sense of Community subscales ($r = 0.04$ to $0.08$), supporting discriminant validity of the ICS. Similarly, while the ICS was found to correlate positively with measures of community helping and negatively with measures of community
hurting behaviors, the Inclusion of the Other in the Self scale did not correlate with any community helping or hurting behaviors. Also supporting discriminant validity was the determination that, while the Inclusion of the Other in the Self scale was positively correlated with most relationship-specific measures of connectedness, the ICS was not correlated with any. The ICS was further determined to be uncorrelated with factors deemed conceptually irrelevant, such as social desirability and self-esteem. The correlation of the ICS with Psychological Sense of Community subscales and its lack of correlation with conceptually different constructs, some of which did correlate with the Inclusion of the Other in the Self scale, suggest strong convergent and discriminant validity of the instrument.

A second study was performed as part of the initial validation of the ICS. Participants for this study included a sample of 297 male inmates within an Adult Detention Center outside of Washington, D.C. Helping behaviors were again found to be positively correlated with the ICS ($r = 0.19$). Self-reports of antisocial behavior were negatively correlated ($r = -0.20$). As expected, no correlations were found between the Inclusion of the Other in the Self scale and helping or antisocial behavior. Factors deemed conceptually irrelevant, including mania and somatic complaints, were not found to correlate with the ICS or Inclusion of the Other in the Self scales. However, positive impression management correlated positively with both the ICS and Inclusion of the Other in the Self scales. Findings from the second study further support its convergent and discriminant validity. The psychometric properties of the ICS scale, including sound test-retest reliability and strong convergent and discriminant validity, indicate its suitability for use in this study.

With permission of the author (D. Mashek, personal communication, April 6, 2017), the ICS scale was adapted for this study from a single item to several items,
each consisting of six sets of overlapping circles. This adaptation allowed participants to share their experiences of oneness with the group in the context of different phases of a music making experience. By elucidating participant perceptions of group connectedness at different points during the drum circle, responses to the adapted instrument provided valuable context regarding the development of conditions that may encourage attunement during the portion of the drum circle that is of particular interest in this study. The use of six rather than seven sets of circles was intended to improve ease of use by allowing for a more streamlined display of the instrument over several items. The adapted instrument can be found in Appendix F.

**Interpersonal Connection Measure**

An interpersonal connection measure designed specifically for this study was included to elucidate individual experiences with single group members during the ‘Improvisation with Eyes Closed’ phase of the drum circle. Although this study primarily focused on attunement at the group level, individual connections likely informed the group process. Thus, awareness of interpersonal dynamics within the group experience provided additional context through which to understand the group as a whole.

This measure consisted of a circular depiction of group members as they were seated within the drum circle. Participants were asked to denote the person or persons, other than themselves, to whom they felt most and least connected during the ‘Improvisation with Eyes Closed’ portion of the drum circle. Because the facilitator shifted into a participant role during this phase of drum circle, the facilitator’s name was also included on this measure. A copy of the measure is provided in Appendix G. To protect participant confidentiality, neither names nor pseudonyms are included on this copy. For the actual measure, participant names were filled in by a research assistant once participants were seated during the drum circle.
Information Questionnaire

The information questionnaire developed for this study consists of 6 items. The first 4 items were designed to capture relevant demographic information including age, gender, race/ethnicity, and sexual orientation. Participants were given the option to choose a preferred pseudonym for identification and reporting purposes. A question regarding previous musical experience, as developed by Mungas and Silverman (2014), was included to provide context about participants’ responses to the drumming experience. Literature suggests that novice musicians have different experiences with (e.g., Mungas & Silverman, 2014) and respond in different ways (e.g., Eerola, Luck, & Toiviainen, 2006) to musical experiences than seasoned musicians. For example, experienced musicians may be more comfortable engaging in improvisational music making than novice musicians. Additionally, experienced musicians may move to music in more complex ways than novice musicians (Eerola, Luck, & Toiviainen, 2006). Previous experience with group drumming may similarly influence participation in and responses to subsequent drumming experiences. Thus, a question regarding previous experience with group drumming was also included in the questionnaire, which is located in Appendix H of this document.

Data Collection Technology

Physiological and behavioral data was gathered through the use of wearable sensor technology. A Zephyr™ team based performance monitoring system was used to gather physiological data. Behavioral data was gathered through the use of a Qualisys motion capture system (Qualisys, 2016) installed within the research facility. Additional data was collected through the use of high definition video recording equipment.
Physiological Signal Technology

A Zephyr™ team based physiological monitoring system was used to collect physiological data for this study. Participants wore Zephyr™ elasticated straps directly on their skin, attached around the chest. Each chest strap was equipped with electrode sensors, which were configured to detect heart rate in beats per minute at a sampling rate of once per second across the drumming experience. A BioModule™ device was attached to the front of each chest strap. This logging and transmitting device simultaneously and wirelessly streamed heart rate data through a Zephyr™ ECHO Gateway device to a laptop computer running Omnisense 3.9.7 analysis software.

The Zephyr™ system is designed to capture physiological information during engagement in sports or other activities involving high intensity physical activity. This system was chosen as a superior alternative to other wearable physiological technologies, such as those utilizing wrist sensors, which could be unduly influenced by the physical act of drumming. The precision of heart rate data measured by the Zephyr™ system has been shown to be very high, especially at low velocities of movement (e.g., Johnstone, Ford, Hughes, Watson, & Garrett, 2012). Given a low level of whole body movement anticipated during this study, accuracy of the system was expected to be high.

Motion Capture Technology

The research facility chosen for this study is 50 feet wide by 40 feet long by 32 feet high. This large space is equipped with a 24 camera Qualisys motion capture system (Qualisys, 2016). The Oqus 5 motion capture cameras installed within the facility are designed to detect reflective markers through the reflection of infrared light. These cameras were set in a top
down, 360° arrangement for the study and were calibrated prior to participants’ arrival at the research facility.

Data for head movements was of particular interest to the researcher due to a previously established relationship between head movement and affective aspects of musical performance (e.g., Varni, Camurri, Coletta, & Volpe, 2008). Head movements have also been shown to accurately reflect the periodic movement of the whole body (Toiviainen, Luck, & Thompson, 2010) and the timing structure of musical pieces (Visi, Coorevits, Schramm, & Miranda, 2016). To accurately capture head movement data, participants wore plastic helmets affixed with four small markers, each of which was coated with retroreflective tape to increase its detection over other potentially reflective materials in the research space. Motion capture data, consisting of recorded position (XYZ) and orientation with 6 degrees of freedom, was streamed securely and wirelessly to a computer running Qualisys Track Manager 2.14 software. Data was collected across the duration of the drumming experience at a sampling rate of 60 Hz.

**Video and Audio Data**

Video data was recorded using a high definition camcorder mounted to a flexible tripod. The dimensions of the research facility allowed for the tripod to be positioned above the drum circle in a manner that captured all participants from a downward looking perspective. Audio data was later extracted from the video data via iMovie, an accessible video editing software, and imported into Audacity software (version 2.1.2; Audacity Team, 2016). The Audacity program allowed for playback of audio data and visual inspection of audio waveforms.
Study Procedures

Participants met at the research facility at the specified time. As they arrived, the informed consent process was completed. Each participant then drew a participant number out of a hat denoting where they would be seated during the drum circle. Participants randomly chose a Zephyr™ BioModule™, each of which was associated with a unique identifying number. The researcher demonstrated how to insert the BioModule™ into the chest strap and how to wear the chest strap monitor directly on the skin in order to obtain accurate heart rate readings. Participants were provided with a private area for fitting the device. After fitting the physiological equipment, participants randomly chose motion capture helmets, each of which was associated with a unique identifying name. Participants placed the helmets on their heads. In order to better track position and interactions during the intervention, the researcher also wore the physiological device and motion capture helmet. Staff of the research facility offered assistance to participants with fitting the technology and ensuring all sensors were capturing data before beginning the study. The video recording equipment was set to record.

Participants were instructed to sit in the chair corresponding to their participant number and complete the associated packet, which was also labeled with their number. Each packet contained a copy of the MAAS and the information questionnaire. Completion of the survey and questionnaire took approximately five minutes, which allowed for participant adjustment to the wearable technology. A previous study focusing on physiological synchronization (e.g., Cwir, Carr, Walton, & Spencer, 2010) allowed a period of 3 minutes for participant adjustment to physiological technology. However, additional time was offered in this study given the use of multiple wearable technologies, which may have increased initial reactivity.
Participants’ chairs formed a circle around a diverse assortment of world rhythm instruments, as suggested to allow participants to switch instruments freely and enhance flexibility of expression (Ierardi, 2011). Instruments included standing drums, hand drums, wooden percussion, metal percussion, and shakers. In drum circles, the variety of instruments is important, as each instrument plays a unique acoustical role (Stevens, 2003). To further increase participant ability to switch roles, more than twice the number of instruments as participants was provided.

The researcher began facilitation of the drum circle by demonstrating a procedure that would later allow all streams of data to be synchronized. The procedure involved bending fully forward, then sitting up and clapping a single time once fully vertical. The researcher asked the group to repeat the procedure four times to allow for easy detection of the synchronization event among all streams of data.

Facilitation of the drum circle followed a semi-structured protocol, with different portions lasting about 2 to 7 minutes each. The drum circle itself lasted 42 minutes. The phases of the drum circle were designed in consideration of the continuum of safety and risk-taking identified by Kossak (2015) as involved in achieving an attuned state. The use of structure is an important tool for creating safety (Kossak, 2015), and drum circle participants likely require less structure as their experience progresses (Ierardi, 2011). Early phases of the drum circle thus involved more structure than later phases.

Because participants knew one another and the facilitator/researcher already, the drum circle did not involve introductions. The drum circle began with an overview of what to expect during the study. To decrease anxiety about participation in a likely unfamiliar intervention, the facilitator/researcher emphasized to participants that there is no right or wrong way to engage in
a drum circle. The facilitator also familiarized participants with each instrument by demonstrating its use and offered time for participants to ask questions about the instruments and drumming experience. A period of approximately two minutes was then offered for participants to choose and experiment with their instruments as the facilitator encouraged participants to play their instruments in different ways, loud and soft, fast and slow. Participants were informed that they may change instruments during this experimentation phase or during any break in group playing.

Two warm-up exercises were used to further decrease anxiety about participation and to acclimate the participants to their instruments and the group sound. Both the ‘let’s all play our drum’ and ‘rumble’ warm-ups (adapted from Kalani, 2004) involved significant facilitation, whereby the facilitator requested participants play on specific beats and vary the dynamics of their playing based on visual and verbal cues. These activities were designed to increase participants’ confidence in their ability to create and maintain a group rhythm and to encourage variation in style of playing.

An entrainment exercise was used to further players’ confidence in the music making process. The facilitator began this phase of the drum circle by describing the phenomenon of entrainment to music. Because non-moving participants with limited experience in music-making may have difficulty finding a beat without executing the rhythm through movement (Su and Pöppel, 2012), participants were encouraged to move to the music in a way that felt natural to them. This exercise involved some improvisation, with the facilitator beginning a group rhythm and instructing each player to add to the rhythm by coming in one at a time until all players had joined. The facilitator used hand signals and movement to change the dynamics, including the group volume and tempo, and to switch play back and forth between different sides
of the circle. The facilitator offered opportunities for softer instruments to be heard by silencing different players at different times. To encourage further improvisation, at certain times, some players were instructed to clap while others played. The group was offered an opportunity to discuss experiences with entrainment following the exercise.

The final portion of the drum circle protocol was group improvisation, named such to reflect the higher degree of improvisation involved in this portion of the experience relative to previous exercises. Players were informed prior to beginning that at some point during this experience, as a way to focus more intently on the group rhythm, they would be invited to close their eyes if they felt comfortable doing so. The facilitator also informed participants that they were not required to keep their eyes closed for the entire portion of the experience and that, as an alternative, they could choose to focus on something within the room or on their instrument. To begin this phase of the drum circle protocol, the facilitator started a rhythm, and players were invited to join the rhythm at whatever point and in whatever way felt right. Players were encouraged to adjust their dynamics, shift their style of playing, and move to the music however they saw fit over the course of the experience. After about five minutes of playing, participants were invited to close their eyes if they felt comfortable doing so and continue to adjust their playing and movement as felt right to them. Approximately three minutes and 43 seconds were allowed for the group to improvise with their eyes closed, with the facilitator closing the experience at a time when the group sound was relatively stable. The facilitator determined stability by assessing for rhythmic synchrony, or a “distinct, steady pulse” (Schneck & Berger, p. 118), and the absence of any shifts in dynamics or tempo. The drum circle was concluded with a breathing exercise. Participants were then provided with the final survey instruments, the ICS scale and the interpersonal connection measure. Following this final study procedure, the
researcher facilitated a verbal discussion of the group experience, as is important to achieve closure following a drum circle (Ierardi, 2011). An outline of the study and drum circle procedures, including the approximate duration of each procedure, is included in Appendix I.

**Data Analysis**

This section describes how the data was analyzed. The rationale for each method of analysis is provided based on its relevance to each of the research questions:

1. What is the nature of attunement over the course of the drum circle, as evidenced by perceptual data?
2. What is the nature of attunement during the ‘Improvisation with Eyes Closed’ phase of the drum circle, as evidenced by perceptual, physiological, behavioral, and audio data?
3. What is the context of attunement during a specific period of heightened synchronization within the ‘Improvisation with Eyes Closed’ phase of the drum circle, as evidenced by physiological, behavioral, and audio data?

Analysis was completed for each level of the phenomenon of attunement, including physiological, behavioral, and perceptual. The majority of analyses for heart rate, motion capture, and audio data was completed via Matlab software version 2016b. Results of these analyses were used to identify an occurrence of attunement, which was ultimately described and contextualized through multiple perspectives, as described below.

**Synchronization of Time Series**

Prior to analysis of any data, the time series of each of the data streams were synchronized. The bending and clapping event, produced by the group’s simultaneous enactment of a postural shift and single clap prior to beginning the drum circle, served as a point from
which to synchronize physiological, behavioral, video, and audio data. Synchronization was performed by clipping the beginning of each data stream to the third of four total group clapping events. The third of the clapping events subsequently represented the first frame of data captured for all time series.

Within each stream of data, the researcher identified the third time in a series of four postural events in which participants’ posture became fully upright following a forward bend. For the physiological data, this was discerned through exploration of postural data captured by the Zephyr™ system. The researcher graphed the posture of each participant over time to identify when participants simultaneously executed the third postural event. A similar method was used to extract data for the ‘Improvisation with Eyes Closed’ phase of the drum circle from the overall motion capture data. The researcher graphed the Z coordinate of participants’ position over time to illustrate group vertical postural changes. The video and audio data were synchronized through visual inspection and by listening for the third clapping event.

**Motion Capture Data**

Motion capture technology is just emerging as a way to capture movement data in music-related research (Himberg & Thompson, 2011). As such, methods of analysis for this study are limited by a lack of prior research. Currently, no consensus exists to identify the best descriptors of motion quantity or quality (Larboulette & Gibet, 2015). Additionally, very few researchers have explored movement synchronization in groups of 3 or more participants (Ellamil, Berson, & Margulies, 2016; Richardson, Garcia, Frank, Gergor, & Marsh, 2012). Finally, there are currently no verified statistical methods for measuring the magnitude or stability of synchrony between the movement time-series of multiple group members (Richardson, Garcia, Frank, Gergor, & Marsh, 2012). Methods of data analysis for this investigation were based on the few
Studies that have explored group movement synchronization (e.g., Himberg & Thompson; Richardson et al.) and the literature on entrainment to music, which suggests that, of all the features of music, humans may most readily synchronize their movements to the underlying beat (Thaut, 2008).

Entrainment has been defined as “a process whereby two rhythmic processes interact with each other in such a way that they adjust towards and eventually ‘lock in’ to a common phase and/or periodicity” (Clayton, Sager, & Udo, 2005, p. 2). For this study, degree of behavioral synchronization was operationalized as the degree of phase synchronization of the pitch of group members’ head movements over a period of time. Regarding head movement, pitch is a variable that captures motion of the head in the sagittal plane. Phase synchronization is an in-the-moment measure of entrainment whereby occurrences of oscillatory events become locked in time (Manrubia, Mikhailov, & Zannette, 2004). This measure was chosen based on prior studies of music-related movement and group movement synchronization. Findings from these studies indicate that expressive dimensions of music-related movement are impacted by factors unique to each individual, such as personality (Luck, Saarikallio, Burger, Thompson, & Toivainen, 2010; Luck, Saarikallio, & Toivainen, 2009). Because the measure of phase synchronization does not take into account the expression of hierarchical features of movement to music, such as amplitude (Manrubia, Mikhailov, & Zannette, 2004), it is likely to be sensitive to periods of group synchronization. Additional support for use of this measure was gleaned from its successful application in other studies in which degree of group behavioral synchronization has been investigated (e.g., Richardson, Garcia, Frank, Gergor, & Marsh, 2012) and in a study of group movement synchronization among musical performers (e.g., Himberg & Thompson, 2011). The pitch of head movement was of particular interest in this study, as it may
provide the clearest representation of periodic movement to music for novice musicians (e.g., Eerola, Luck & Toiviainen, 2006) and has been used by other researchers to determine group phase synchronization of movement to music (e.g., Himberg & Thompson).

Data analysis methods were chosen based on literature indicating that temporal dynamics of group synchronization may best be investigated through determination of an index of instantaneous phase synchronization over a period of time (Ellamil, Berson, & Margulies, 2016). Because the researcher was a participant during the experiment phase of the drum circle, the researcher’s data was included in the analysis of movement data. Please see the synchronization analysis section of this chapter for details of the analysis procedures.

Physiological Data

For this study, degree of physiological synchronization was operationalized as the degree of phase synchronization of participant heart rates, with higher calculations indicating a higher level of physiological synchronization. The Zephyr™ team-based physiological system used for the study provided a simultaneous and direct measure of heart rate, sampled at a rate of once per second, for each participant.

Literature regarding group synchronization indicates that temporal dynamics of synchronization are best investigated through determination of a group measure of instantaneous phase synchronization (Ellamil, Berson, & Margulies, 2016). For this reason and for purposes of consistency, heart rate synchronization was determined via the same analytical method chosen for behavioral data.

Synchronization Calculation

Given differences in calibration of the motion capture equipment and the Zephyr™ BioModules™, pitch and heart rate data points for each participant’s time series were first
normalized to zero mean across the duration of the drumming experience (from the clap event to the end of the experiment). The procedures described in this section were used to calculate two separate indices of synchronization -- one for movement and one for heart rate.

A Hilbert transformation was applied to identify from each data point an instantaneous phase angle. Using the phase calculation, The Phase Locking Value (PLV) (e.g., Lachaux, Rodriguez, Martinerie, & Varela, 1999) was then calculated for each pair of participants. The formula used to determine PLV $P$ between participant $m$ and participant $n$ is:

$$P(m,n) = \frac{1}{T} \left| \sum_{t=1}^{T} \exp \left( i (\theta_m(t) - \theta_n(t)) \right) \right|,$$

where $T$ is the number of timesteps, $t$ is the index for time steps, $\theta_m(t)$ is the instantaneous phase of person $m$ at timestep $t$, $i = \sqrt{-1}$ is the imaginary unit, and $|\bullet|$ is the magnitude of a complex argument. This calculation depends on a window of $T$ timesteps. A 5 second time window was selected by inspection as being representative of the characteristic time of the phenomenon. Application of this formula resulted in an index measure of synchronization between pairs of participants for almost all time steps of the experiment by averaging over a moving 5 second window. By nature of the averaging, the resulting time series is 5 seconds shorter than the original time series. Synchronization values ranged from 0 to 1, with values closer to 1 indicating greater synchronization.

Because of the small number of participants in the study and the presence of outliers, the median PLV of pairwise comparisons was determined to be a superior measure of central tendency for this sample. The median PLV of pairwise comparisons was thus calculated at each time step as an index of group phase synchronization. Phase synchronization calculations for pairs of participants and the group as a whole were visualized in multiple ways, including.
through use of line graphs and heat maps, to illustrate degree of movement and heart rate synchronization across the experiment.

**Video Data**

Video data for the experiment, which consisted of the period during which participants’ eyes were closed, was extracted from the overall data via the video editing application of iMovie. Video data was coded for drumming behavior by visually inspecting each participant’s behavior over the course of the experiment while listening to the group rhythm. For each second of the experiment, the researcher noted any changes in posture, style of playing, and periods during which the individual was off from the predominant beat of the group rhythm. For any periods during which an individual was ‘off beat’, the researcher noted when the participant came back ‘on the beat’. Doing so provided support for the use of 5 second windows for analysis of movement, heart rate, and tempo data. As can be seen in Table J1 of Appendix J, periods of asynchrony between individual participants and the group as a whole tended to occur over 5 second intervals. The researcher also made notes regarding each participants’ overall style of playing, including expressiveness of movement, willingness to change rhythm and style of playing, and volume of playing.

**Audio Data**

Audio data for the experiment was extracted from the video data via iMovie and imported into Audacity software for audio editing. The waveform data, sampled at a rate of 48,000 Hz, was then analyzed with MIRtoolbox for Matlab (Lartillot & Toiviainen, 2007). Tempo was chosen as the variable by which to quantify the audio data given the ability to visually discern periods of notable rhythmic synchrony versus asynchrony by plotting tempo over time. The MIRtoolbox functions calculate tempo of waveform audio based on “detecting periodicities in a
range of [beats per minute], and choosing the maximum periodicity score for each frame separately” (Lartillot, 2017, p. 97). A 5 second frame decomposition was selected as being representative of the characteristic time of the phenomenon. Using the frame decomposition length of 5 seconds, the tempo function returned tempo values in beats per minute at .5 second increments.

**Perceptual Data**

Perceptual data was used to describe the context of individuals’ experiences in the drum circle. Descriptive statistics, including mean and median scores, were calculated for participants’ overall level of trait mindfulness, as indicated by responses to the MAAS. Similar statistics were used to contextualize participants’ experiences of oneness with the group while improvising with their eyes closed versus at other times during the drum circle, as indicated by responses to the modified ICS scale. Descriptive statistics were used to illustrate phases of the drum circle during which multiple participants acknowledged experiencing the group as being especially connected.

**Identification of Occurrence of Attunement**

Kossak’s (2009) definition of attunement denotes a multi-leveled experience, which involves a “psychological, emotional, and somatic state of consciousness” (p. 14). In keeping with this definition, attunement was operationally defined within this study as a period of time during which group members experienced both heightened synchronization of heart rate and movement for a period of greater than 5 seconds. Based on observation of individual drumming behavior, a threshold of 5 seconds was chosen as being representative of the characteristic time of the phenomenon. An occurrence of simultaneously heightened group heart rate and movement synchronization was identified by inspection of line graphs illustrating degree of synchronization.
over time during the experiment. Paired samples $t$-tests ($p < 0.05$) were completed to determine if a statistically significant difference exists between different periods.

**Synthesis of Information**

Attunement was explored through comparison and synthesis of multiple measures, including physiological, behavioral, and perceptual. Heat maps were created to illustrate pairwise degree of synchronization of movement and heart rate over time, using a 5 second moving window. Heat maps were also used to illustrate average pairwise synchronization of movement and heart rate across the experiment. Line graphs of group PLV of movement and heart rate over time were used to identify a specific occurrence of heightened synchronization, as an indicator of attunement. To establish statistical significance ($p < 0.05$) of a period of apparent heightened synchronization, pairwise $t$-tests were completed for PLV of movement and heart rate data. For this period of heightened synchronization, observational data from video and audio recordings as well as tempo data was used to contextualize its occurrence. This data situated participant experiences through description of events, including periods of rhythmic synchrony and noticeable shifts in tempo that preceded, occurred concordantly with, or followed the period of attunement.

**Limitations**

As an initial exploration of the phenomenon in counselor education, this study was not designed to establish the causes or effects of attunement. Additionally, due to the small sample size and specific context in which the study is conducted, results are not generalizable. Further, though efforts were made to capture attunement as it occurs on multiple levels, it is likely that the measures used do not fully represent the complexity of the phenomenon. There is currently no consensus regarding how to measure attunement. Even pertaining to the measures chosen for
this study, there exists no agreement on which statistical methods are best implemented to
determine synchronization. In order to conduct an initial exploration of attunement, an
assumption was made that attunement is actually occurring between counselors-in-training as
they engage in improvisational music making. Though literature regarding the conditions under
which attunement is likely to occur informs this study and the procedures involved, it is not
possible to ensure that an attuned state has been achieved.

In single-case research, several specific threats to data-evaluation validity exist. Kazdin
(2011) discusses five primary threats and the way in which they limit one’s ability to make valid
interpretations of findings. These include excessive variability in the data, unreliability of the
measures, trends in the data, insufficient data, and mixed data patterns (p. 41). The researcher
addressed these threats in the following ways. First, the researcher attempted to avoid excessive
data variability by reducing the number of outside influences within the study environment. For
example, the researcher limited the number of persons present for the study to those who were
necessary for data collection. All research assistants were instructed to remain silent for the
duration of the experiment. The entire study procedure was piloted on a group of the researcher’s
colleagues prior to conducting the study, and adjustments were made to the survey instruments
and drumming protocol based on feedback provided by those participants. The drumming
intervention was offered according the same protocol outlined within this document. The
physiological and motion capture technology was also piloted on a group of the researcher’s
colleagues prior to the study. The researcher triangulated the data through use of multiple
measures of the same construct. Despite these efforts, it is still possible that factors out of the
researcher’s control, such as significant differences among subjects, changes within individuals,
or mechanical errors influenced the findings. Additionally, it is possible that the data gathered were simply insufficient to characterize participant performance or identify trends.

Summary

This study was an initial exploration of attunement between counselors-in-training as they engaged in group, improvisational music making. Participants were 6 members of a cohort of master’s level students in their first semester of a counselor education program within a large, public, Southeastern university. The study was conducted at a research facility within the institution and involved participation in a drum circle, which was facilitated by the lead researcher. Movement data was captured via a Qualisys motion capture system installed within the research facility. Heart rate data was gathered through the use of a Zephyr team-based physiological monitoring system. The use of a high definition video recording device offered additional opportunities for gathering observational and audio data. Participants completed an informational questionnaire, the MAAS (Brown & Ryan, 2003), an adapted version of the ICS (Mashek, Cannaday, & Tangney, 2007), and an interpersonal connection measure. Quantitative analysis of movement and physiological data elucidated occurrences of attunement, while perceptual data, audio data, and video files provided descriptive and contextual information regarding the development of attuned states. Results provide insight into how attunement may be studied and promoted in counselor education in hopes of increased consideration of this important aspect of interpersonal connection within the field.
CHAPTER FOUR

RESULTS

This chapter includes a description of the study participants and presentation of research findings. In order to evaluate the phenomenon of attunement in greater breadth and depth, the results presented in this chapter focus on individual experiences during the drum circle as well as group trends. For this reason, participants were assigned pseudonyms, which are used to refer to individual participants throughout this chapter and the next. Multiple types of data were analyzed to explore the nature of attunement as it occurs among master’s level counselors-in-training engaging in an improvisational drum circle. The results of the study are reported for the following research questions:

1. What is the nature of attunement over the course of the drum circle, as evidenced by perceptual data?
2. What is the nature of attunement during the ‘Improvisation with Eyes Closed’ phase of the drum circle, as evidenced by perceptual, physiological, behavioral, and audio data?
3. What is the context of attunement during a specific period of heightened synchronization within the ‘Improvisation with Eyes Closed’ phase of the drum circle, as evidenced by physiological, behavioral, and audio data?

Participants

Participants in this study consisted of six master’s level counseling students in their first semester of a cohort model counselor education program within a large, public, Southeastern university. Potential participants were offered several time slots for participation, and the researcher chose to offer the drumming experience during time slots in which six or more
participants indicated availability. Though more than six students indicated willingness to participate, only one time slot met the criteria for offering the drumming experience. A more detailed description of recruitment procedures can be found in the Methods section of this document. Given its small size, this sample is not representative of a wider population of master’s level counseling students. Results cannot be generalized beyond the specific group of students that participated in this study.

Description of the Sample

A variety of information regarding personal characteristics and previous musical experience was gathered from responses to the information questionnaire, which is provided in Appendix H. To protect confidentiality, some descriptive data is presented generally or in the form of ranges within this section.

All participants identified as women (n = 6). Participant ages ranged from 22 to 47 years. Of all participants (n = 6), four identified as White, one as Hispanic/Latina, and one as Asian/Pacific Islander. The majority of participants identified as heterosexual (n = 5), and one participant identified as bisexual. One participant did not respond to two questions on the information questionnaire regarding previous musical experience. Of those that responded, only one participant reported previous experience in group music making. All other participants (n = 4) indicated no prior involvement but interest in group music making. Of those participants that responded to a question regarding prior experience with group drumming, one participant reported “little experience” while all others (n = 4) reported no prior involvement.

An additional personal characteristic gathered for this sample included level of trait mindfulness, as indicated by the Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003). Possible scores on the MAAS range from 1 to 6, with higher scores indicating higher
levels of trait mindfulness. Participant scores on the MAAS ($n = 6$) ranged from 3.60 to 5.20.
The average performance was 72.5% of scale maximum ($M = 4.36$, $SD = 0.59$). The median score was 4.37. Performance for this sample was only slightly lower than mean scores determined by a recent study involving mental health counselors ($n = 213$, $M = 4.58$, $SD = 0.84$; Thompson, Amatea, & Thompson, 2014).

**Findings**

This section provides the results of the study based on each research question.

Implications and discussion of the results are provided in Chapter Five.

**Research Question 1: What is the nature of attunement over the course of the drum circle, as evidenced by perceptual data?**

The self-report instruments used to determine perceptions of attunement across the drum circle included a modified version of the Inclusion of Community in Self Scale (ICS; Mashek, Cannaday, & Tangney, 2007) and an interpersonal connection measure. Participant sense of oneness with the group was measured by the ICS, which is displayed in Appendix F. The modified version of the ICS used for this study is a pictorial measure consisting of six sets of circles overlapping to various degrees, whereby the circles with the greatest overlap denote higher sense of oneness with the group. To report results of the measure, the overlapping sets of circles were assigned numerical rankings from one to six, with higher ratings denoting greater sense of oneness with the group. For example, the first set of circles contains no overlap and was assigned a ranking of one, while the sixth set of circles, containing the greatest overlap, was assigned a ranking of six. Individual participant ratings for sense of oneness during each phase of the drum circle are presented in Table 1 along with total ratings for each phase and mean and
Table 1

Participant Sense of Oneness During Phases of Drum Circle

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Allegra</td>
<td>6</td>
<td>2</td>
<td>6</td>
<td>6</td>
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<td>6</td>
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<td>6</td>
<td>5.00</td>
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<tr>
<td>Carol</td>
<td>4</td>
<td>5</td>
<td>3</td>
<td>4</td>
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<td>6</td>
<td>6</td>
<td>6</td>
<td>4.50</td>
<td>4.50</td>
</tr>
<tr>
<td>Demi</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>6</td>
<td>5</td>
<td>6</td>
<td>6</td>
<td>4.38</td>
<td>4.50</td>
</tr>
<tr>
<td>Harmony</td>
<td>4</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>4</td>
<td>6</td>
<td>5.13</td>
<td>5.50</td>
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<tr>
<td>Lyra</td>
<td>5</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>4</td>
<td>6</td>
<td>6</td>
<td>5.00</td>
<td>5.00</td>
</tr>
<tr>
<td>Ottava</td>
<td>6</td>
<td>6</td>
<td>5</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>5.88</td>
<td>6.00</td>
</tr>
<tr>
<td>Total</td>
<td>26</td>
<td>26</td>
<td>28</td>
<td>30</td>
<td>33</td>
<td>30</td>
<td>30</td>
<td>36</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. Full phase descriptions corresponding to phase numbers can be found in Appendix I. Phase 7 corresponds to the ‘Improvisation with Eyes Closed’ phase of the drum circle.

As can be seen in Table 1, participants generally indicated a higher sense of oneness at the end of the experience versus the beginning. For example, ratings for sense of oneness were relatively low during the first two phases of the drum circle, including the experimentation with instruments phase \((M = 4.33, SD = 1.70)\) and the initial breathing exercise phase \((M = 4.33; SD = 1.49)\).
However, by the final phase, which consisted of the closing breathing exercise, all participants indicated the highest possible sense of oneness ($M = 6, SD = 0$). A Spearman’s rank order correlation test was completed to determine the relationship between phase of the drum circle and sense of oneness. There was a weak, positive monotonic relationship between phase of the drum circle and sense of oneness ($r_s = 0.36, p < 0.05$), indicating that as phases of the drum circle progressed, sense of oneness generally increased.

Table 2

Summary of Means, Standard Deviations, and Medians for Participant Sense of Oneness During Phases of Drum Circle

<table>
<thead>
<tr>
<th>Phase</th>
<th>$M$</th>
<th>$SD$</th>
<th>$Mdn$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Experimenting</td>
<td>4.33</td>
<td>1.70</td>
<td>4.50</td>
</tr>
<tr>
<td>2. Initial Breathing</td>
<td>4.33</td>
<td>1.49</td>
<td>4.50</td>
</tr>
<tr>
<td>3. ‘Let’s all Play’ Warm-up</td>
<td>4.67</td>
<td>1.11</td>
<td>4.50</td>
</tr>
<tr>
<td>4. Rumble Warm-up</td>
<td>5.00</td>
<td>1.15</td>
<td>5.50</td>
</tr>
<tr>
<td>5. Entrainment</td>
<td>5.50</td>
<td>0.76</td>
<td>6.00</td>
</tr>
<tr>
<td>6. Improv with Eyes Opened</td>
<td>5.00</td>
<td>0.82</td>
<td>5.00</td>
</tr>
<tr>
<td>7. Improv with Eyes Closed</td>
<td>5.00</td>
<td>1.53</td>
<td>6.00</td>
</tr>
<tr>
<td>8. Final Breathing</td>
<td>6.00</td>
<td>0.00</td>
<td>6.00</td>
</tr>
</tbody>
</table>

Note. Full phase descriptions corresponding to phase numbers can be found in Appendix I. Phase 7 corresponds to the ‘Improvisation with Eyes Closed’ phase of the drum circle.

Other than the closing breathing exercise, the phase during which participants felt the highest sense of oneness on average was phase 5, which consisted of the entrainment experience ($M = 5.50, SD = .76$). During phase 7, which was the experiment phase in which participants improvised with their eyes closed, participants still felt highly connected ($M = 5, SD = 1.53$), with four out of six participants rating their sense of oneness during this phase at the highest possible level. During the experiment phase, Allegra was the group member who experienced the lowest sense of oneness, although Harmony also indicated a lower sense of oneness than the group average.
Individual experiences of oneness with the group across the drum circle varied. Some participants felt a high sense of oneness during most phases of the experience. For example, Ottava felt the highest possible sense of oneness during seven out of eight phases of the drum circle \((M = 5.88)\), and Allegra felt the highest possible sense of connection during six out of eight phases \((M = 5.00)\). Other participants’ ratings were less consistent. For example, Carol rated her sense of oneness during the initial breathing phase as a five but chose a rating of three for the latter two “warm up” phases. Carol’s ratings then progressively increased across the final phases of the experience. Of all participants, Demi felt the lowest sense of oneness overall \((M = 4.38)\). However, Demi’s sense of oneness increased during the experience, and she rated her sense of oneness as a six during each the final two phases.

Participant sense of connection with specific members of the drum circle across the duration of the drumming experience was measured through use of the interpersonal connection measure developed for this study. This instrument can be found in Appendix G. Participants were asked to rate those members of the drum circle to whom they felt “most connected” and “least connected” during the drumming experience. Participant ratings for this measure along with total number of ratings for “most connected” and “least connected” by participant are displayed in Table 3. As can be seen in Table 3, most participants rated the researcher as a group member to whom they felt “most connected” during the experience. All participants rated Harmony as a group member to whom they felt “most connected” during the experience. All participants rated Demi as a participant to whom they felt “least connected” during the experience. Three participants rated Ottava as someone to whom they felt “least connected” during the experience. Ratings for other participants were mixed. Every participant indicated at
least one group member to whom she felt most and least connected. Most participants felt a
sense of connection to or disconnection from multiple participants.

Table 3

*Sense of Interpersonal Connection Ratings and Totals by Participant*

<table>
<thead>
<tr>
<th>Rater</th>
<th>Allegra</th>
<th>Carol</th>
<th>Demi</th>
<th>Harmony</th>
<th>Lyra</th>
<th>Ottava</th>
<th>Researcher</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allegra</td>
<td>L</td>
<td>L</td>
<td>M</td>
<td>M</td>
<td>L</td>
<td>M</td>
<td></td>
</tr>
<tr>
<td>Carol</td>
<td></td>
<td>L</td>
<td>M</td>
<td>M</td>
<td>L</td>
<td>M</td>
<td></td>
</tr>
<tr>
<td>Demi</td>
<td>L</td>
<td></td>
<td>M</td>
<td>M</td>
<td>L</td>
<td>M</td>
<td></td>
</tr>
<tr>
<td>Harmony</td>
<td>L</td>
<td>M</td>
<td></td>
<td></td>
<td>M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lyra</td>
<td></td>
<td>L</td>
<td>M</td>
<td></td>
<td>M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ottava</td>
<td>M</td>
<td>L</td>
<td>L</td>
<td></td>
<td>L</td>
<td></td>
<td>M</td>
</tr>
<tr>
<td><strong>Total M</strong></td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>5</td>
<td>2</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total L</strong></td>
<td>2</td>
<td>1</td>
<td>5</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>

*Note.* Shaded areas within this matrix denote that participants were instructed not to rate sense of connection with themselves. Total M = number of ratings for “most connected.” Total L = number of ratings for “least connected”.

**Research Question 2:** What is the nature of attunement during the ‘Improvisation with Eyes Closed’ phase of the drum circle, as evidenced by perceptual, physiological, behavioral, observational, and audio data?

To explore the phenomenon of attunement in greater depth, the researcher focused on a specific period of interest during this study. This period consisted of the phase of drumming during which participants were invited to improvise with their eyes closed. As noted in the Study Procedures, which are outlined in Appendix I, this was the seventh phase of the overall drumming experience.

Once all data was synchronized, the researcher used Audacity software and the audio data to identify the time stamp corresponding to the facilitator’s verbal request for participants to
close their eyes. The researcher then noted the time stamp corresponding to the end of a ‘rumble’ event, which was facilitated at the end of phase seven of the drum circle. The duration of time between time stamps was 3 minutes and 43 seconds. Data corresponding to this period of the drumming experience was extracted from the overall video, audio, physiological, and motion capture data for further analysis.

**Movement Synchronization Findings.** Synchronization of movement during the experiment was visualized in multiple ways, using PLV values as an index of synchronization. Please see the Synchronization Calculation section of Chapter Three for more details on analysis procedures and PLV calculations. The temporal dynamics of synchronization of individual movement with other group members were examined through creation of a heat map. Figure 1 illustrates pairwise PLV over time using a 5 second moving window. Possible PLV values range from zero to one, with values closer to one indicating greater synchrony. Within this heat map, warmer colors indicate higher PLV, cooler colors indicate lower PLV, and bright yellow colors denote PLV values approaching perfect synchrony. This figure elucidates occurrences during which individual participant movement is synchronized or unsynchronized compared to specific group members. The abundance of bright yellow and other shades of warm colors within this figure indicate high levels of synchronization between individual group members throughout the experience. Specific occurrences of unsynchronized behavior, as indicated by shades of blue, are also evident.

Degree of synchronization of individual movement with movement of other participants was also calculated across the ‘Improvisation with Eyes Closed’ phase as a whole. This was accomplished by averaging PLV values across this phase for each pair of participants. Because the researcher was primarily interested in exploring synchronization during the periodic
Figure 1. Pairwise PLV of head movement over time in seconds during the ‘Improvisation with Eyes Closed’ phase. R = Researcher.
drumming portions of this phase, comparisons during the ‘rumble’ event were not included in these averages. Figure 2 is a heat map of average pairwise comparisons of movement synchronization across the ‘Improvisation with Eyes Closed’ phase.

![Figure 2. Average pairwise PLV of head movement across the ‘Improvisation with Eyes Closed’ phase. R = Researcher.](image)

As can be seen in Figure 2, certain pairs of participants experienced greater movement synchronization than others. For example, Carol and Allegra were more synchronized throughout the ‘Improvisation with Eyes Closed’ phase than Harmony and Demi. Additionally, it is clear that certain participants were less synchronized with the group on average. For example, the blue colors of squares denoting Ottava’s level of movement synchronization with other participants indicate that Ottava was generally unsynchronized with other participants. Based on the relatively cooler colors denoting degree of synchronization between the researcher and other
group members, the researcher was also less synchronized with the group than most other members. This was expected, as the researcher purposefully attempted to shift the group rhythm during certain points in the experiment.

The temporal dynamics of group movement synchronization were explored through creation of an index of group synchrony over time, which is displayed in Figure 3 as a line graph. The index was calculated as the median of pairwise PLV values at each

![Figure 3](Image.png)

*Figure 3.* Median PLV of head movement over time during the ‘Improvisation with Eyes Closed’ phase. Given the high sampling rate for the movement data, individual data points are not denoted.
frame of data across the time domain. Median PLV was deemed a superior measure of central
tendency given the small sample size and presence of outliers in the PLV data. Figure 3 shows
that group PLV varied over time, generally ranging between values of 0.7 and 1.0. From the
beginning of the ‘Improvisation with Eyes Closed’ phase to the start of the ‘rumble’ event, the
overall group PLV was fairly high ($M = 0.93, SD = 0.07$), though specific periods of less
synchronized movement are also apparent. A notable and expected period of unsynchronized
movement occurs toward the end of the experience, coinciding with the ‘rumble’ event.

**Heart Rate Synchronization Findings.** Synchronization of heart rate during the
experiment was visualized in multiple ways, using PLV values as an index of synchronization.
Please see the Synchronization Calculation section in Chapter Three for more details on analysis
procedures and PLV calculations, which were used as the measure of heart rate synchronization.
The temporal dynamics of degree of synchronization of individual heart rate compared to other
group members were examined through creation of a heat map. Figure 4 illustrates pairwise PLV
over time using a 5 second moving window. Possible PLV values range from zero to one, with
values closer to one indicating greater synchrony. Within this heat map, warmer colors indicate
higher PLV, cooler colors indicate lower PLV, and bright yellow colors denote PLV values
approaching perfect synchrony. This figure elucidates occurrences during which the heart rate of
an individual participant is synchronized or unsynchronized compared to specific group
members. Occurrences of unsynchronized heart rate between pairs of individuals and between
individuals and the group as a whole are clearly visible. The greater number of blue squares in
this heat map compared to those in the heat map of pairwise PLV of movement, (Figure 1),
indicates there were more incidents of unsynchronized heart rate versus movement during the
Figure 4. Pairwise PLV of participant heart rate over time in seconds during the ‘Improvisation with Eyes Closed’ phase. R = Researcher.

However, PLV for heart rate was still fairly high from the beginning of the ‘Improvisation with Eyes Closed’ phase to just before the ‘rumble’ event ($M = 0.88, SD = 0.07$).
For each pair of participants, average PLV of heart rate was calculated across the ‘Improvisation with Eyes Closed’ phase leading up to the ‘rumble’ event at the end. The researcher was primarily interested in exploring synchronization during the periodic drumming portions of the ‘Improvisation with Eyes Closed’ phase. Thus, PLV values during the ‘rumble’ event were not included in these averages. Figure 5 illustrates average individual heart rate synchronization with specific group members and the group as a whole across this phase.

![Figure 5. Average pairwise PLV of heart rate across the ‘Improvisation with Eyes Closed’ phase. R = Researcher.](image)

Based on the abundance of cooler shades in Figure 5, pairwise average PLVs of heart rate across the experiment were fairly low. Some participants experienced greater heart rate synchronization than others. As evidenced by the darker shades of blue denoting low levels of
heart rate synchronization between Carol and other group members, Carol experienced lower levels of heart rate synchronization than other group members during the experiment.

The temporal dynamics of group heart rate synchronization were also explored. An index of overall group synchrony, displayed as a line graph in Figure 6, was calculated as the median of pairwise PLV values at each frame across the time domain.

Figure 6. Median PLV of participant heart rate over time during the ‘Improvisation with Eyes Closed’ phase.
Median PLV was deemed a superior measure of central tendency given the small sample size and presence of outliers in the PLV data. As can be seen in Figure 6, degree of heart rate synchronization generally varied between 0.6 and 1.0. Leading up to the ‘rumble’ event at the end of the ‘Improvisation with Eyes Closed’ phase, the mean group PLV of heart rate was 0.88 ($SD = 0.07$). There were occasional periods of very high synchronization and one period of high, sustained synchronization toward the end of the experiment.

**Tempo Analysis.** Tempo was calculated across the ‘Improvisation with Eyes Closed’ phase via MIRtoolbox (Lartillot & Toiviainen, 2007) in Matlab software. Procedures for this calculation can be found the Data Analysis section with Chapter Three. As displayed in Figure 7, tempo was plotted over time to show shifts in the group pulse, including periods of synchrony and asynchrony (lack of consistent pulse). From listening to the audio data, the researcher observed that the plot of tempo data distinguished between periods of synchrony and asynchrony, with smoother lines in the data indicating greater rhythmic synchrony. As can be seen in Figure 7, relative rhythmic synchrony is notable during a couple of periods of the experiment, including between 160 and 174 seconds and 193 and 200 seconds. Rhythmic asynchrony is visible many times during the experiment, as indicated by vertical lines on the graph. As expected, the most notable period of asynchrony occurs at the end of the experiment during the ‘rumble’ event. Another prominent period of asynchrony occurs from approximately 184 to 190 seconds. Tempo increased progressively from the beginning of the experiment to the beginning of the ‘rumble’ event at the end of the experiment and ranged from 86.44 to 135.81 Beats Per Minute (BPM), ($M = 106.14$, $SD = 13.87$).
Figure 7. Tempo over time during the ‘Improvisation with Eyes Closed’ phase. BPM = Beats Per Minute

Observational Data. For contextual purposes, the researcher noted the drumming behavior of individual participants during the ‘Improvisation with Eyes Closed’ phase of the drum circle. While watching the video and listening to the audio from the experiment, the researcher identified any periods during which individual participants were ‘off beat’ from the predominant group
pulse. For each of these periods, the researcher also noted the second during which the participant came ‘back on beat’ with the group pulse. Noticeable shifts in posture and movement pattern were also documented as were changes in style of playing or rhythm. These behavioral observations are provided in Table J1 of Appendix J.

Based on this observational data and general observations of participant style and approach to playing during the experiment, descriptions of individual approach to playing were produced. These descriptions, which are provided in Table 4, focus on discernable elements of approach, including volume of playing, willingness to try different rhythms and styles of playing, and expressivity of movement. Participant choice of instrument is also included in this table. Participants exercised a variety of approaches to playing during the experiment. Volume of playing varied between participants as did tendency to try different styles of playing and different rhythms. Degree of expressivity, as evidenced by observable physical movement to the underlying pulse, also varied widely. Of all participants, the researcher/facilitator was the most expressive in physical movement. The researcher, Harmony, and Ottava could all be easily heard throughout the experiment. Other participants tended to play more softly, though Lyra and Allegra occasionally increased their volume so that their rhythm was discernable via the audio data. Of all participants, Allegra changed her rhythm and style of playing most frequently. She also tended to temporarily increase her volume after making a rhythmic change. Her volume of playing was typically low prior to making a change. The researcher purposefully did not change her rhythm or alter her style of playing until the end of the experiment.
<table>
<thead>
<tr>
<th>Participant</th>
<th>Instrument</th>
<th>Description of Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allegra</td>
<td>small djembe</td>
<td>Volume varied. Frequently changed style of playing and rhythm. Utilized more complex rhythms. Did not move body visibly.</td>
</tr>
<tr>
<td>Carol</td>
<td>hand drum and mallet</td>
<td>Played softly. Generally used a simple rhythm but did produce a more complex rhythm once during the experience. Did not move body visibly.</td>
</tr>
<tr>
<td>Demi</td>
<td>large timbua</td>
<td>Played very softly. Utilized the same, simple rhythm and style of playing throughout the experience. Did not visibly move body.</td>
</tr>
<tr>
<td>Harmony</td>
<td>large djembe</td>
<td>Played a simple rhythm at a high volume. Moved noticeably to the pulse, occasionally swaying side to side. Did not alter rhythm or style of playing. Was occasionally off beat. Smiled frequently.</td>
</tr>
<tr>
<td>Lyra</td>
<td>large tubano</td>
<td>Played softly. Rhythm involved a soft, swishing sound produced by sweeping hand or finger across the drum head. Occasionally altered rhythm or style of playing slightly. Occasionally moved body to the beat. Playing was continuously synchronized with underlying pulse. At one point, swayed visibly side to side with the beat.</td>
</tr>
<tr>
<td>Ottava</td>
<td>hand drum and mallet</td>
<td>Played at a high volume. Often tapped or bounced foot and visibly nodded head to the underlying beat. On a couple of occasions, suddenly shifted forward in seat. Was occasionally well behind the dominant pulse. Produced a simple rhythm and did not alter her style of playing or rhythm often.</td>
</tr>
<tr>
<td>Researcher</td>
<td>bass drum and mallet</td>
<td>Played at high volume. Frequently tapped or bounced foot and visibly nodded head to the underlying beat. Occasionally moved drum and body side to side with the beat. Appeared well synchronized with the group beat until the end of the experiment, at which point she facilitated changes in rhythm and the start of the ‘rumble’ event.</td>
</tr>
</tbody>
</table>
Research Question 3: What is the context of attunement during a specific period of heightened synchronization within the ‘Improvisation with Eyes Closed’ phase of the drum circle, as evidenced by physiological, behavioral, observational, and audio data?

As described in the Methods section of this document, attunement was operationally defined as a period greater than 5 seconds during which participants experienced simultaneous heightened synchronization of heart rate and movement. To identify such a period, the researcher compared line graphs of median PLV of movement, median PLV of heart rate, and tempo over time. These line graphs are displayed concurrently in Figure 8. Based on observation of Figure 8, there were several times during the experiment when PLV of either heart rate or movement neared a value of 1, indicating near perfect synchronization. However, there was one period during which group movement and heart rate simultaneously shifted, with both movement and heart rate approaching near perfect synchronization. This period of attunement was sustained until the beginning of the ‘rumble’ event, which occurred at approximately 210 seconds. The period of attunement occurred between 184 and 209 seconds from the start of the ‘Improvisation with Eyes Closed’ phase. This period was examined in greater depth to shed light on the phenomenon of interest. Events preceding, during, and following this period of attunement were identified through examination of the tempo data, heat maps of pairwise PLV of movement and heart rate over time, as well as behavioral observations from the video data.

Observation of the tempo data from Figure 8 reveals a period of asynchrony in pulse from approximately 184 to 190 seconds ($M = 123.94$, $SD = 3.92$). Tempo data during this period jumps from higher to lower values, with a range of 12.31 BPMs, indicating lack of discernable pulse. Following this period, the tempo increased suddenly from 122.53 BPM at approximately
**Figure 8.** PLV of movement, PLV of heart rate, and normalized tempo over time. Tempo normalized to zero mean. Individual data points not visible for PLV of movement due to high sampling rate.
192 seconds to 129.47 BPM at 193 seconds. The tempo data is then relatively smooth from 193 to 200 seconds ($M = 130.09, SD = 0.65$), with a range of only 2.16 BPMs.

The heat map of pairwise PLV of movement over time was inspected for any discernable asynchrony in movement either immediately preceding or coinciding with the onset of attunement. From Figure 1, blue squares during the 5 second moving window from 181 to 186 seconds denote that the researcher’s movement was out of sync with other group members at the beginning of the period of rhythmic asynchrony. Relatively warmer colors denoting pairwise PLV of movement between other group members indicate that the researcher was a primary source of movement asynchrony during the period coinciding with the onset of attunement.

The heat map of pairwise PLV of heart rate over time (Figure 3), was also inspected for discernable asynchrony in heart rate either immediately preceding or coinciding with the onset of attunement. Within this heat map, dark blue colors occurring between 176 and 181 seconds indicate that Carol’s heart rate was unsynchronized with other group members. Blue squares occurring between 181 and 186 seconds indicate that Ottava’s heart rate was out of sync with other group members at the onset of attunement. However, these were the final notable pairwise asynchronies in heart rate that occurred for the remainder of the experiment.

To identify events immediately preceding, occurring concordantly with, or following the period of attunement, individual behavior surrounding the period of attunement was noted. Table 5 illustrates an excerpt of coded drumming behavior data from the overall experiment phase of the drum circle. Within this table, periods during which participants are off beat with the group pulse are colored blue. For each of these periods, the second during which the participant comes back into sync with the group beat is denoted with the color yellow. Physical movement and postural changes are denoted with the color green, and rhythmic pattern and style changes are
denoted with the color pink. As can be seen from the drumming behavior data, Carol was off beat from the group pulse during the seconds preceding the attunement event, between 171 and 174 seconds, just before the period in which her heart rate was unsynchronized with other group members. Allegra shifted to a simpler style of playing at approximately 175 seconds, preceding the period of attunement. Ottava was off beat from the overall group pulse from approximately 173 to 183 seconds and came back into the group beat at the same time as the researcher introduced a new rhythm. The new rhythm, introduced at 184 seconds, coincides with the onset of the period of attunement. From listening to the audio data and watching the video file, the researcher played the same rhythm for the majority of the experiment. This simple rhythm involved alternating between playing the center of the drum head and the side of the drum with a mallet on alternating down beats and playing the center of the drum head on alternating half beats. The rhythm produced both bass sounds and wood sounds, which occurred when the side of the drum was played with the wooden mallet. At approximately 184 seconds, the researcher purposefully introduced a new rhythm, which involved eliminating the wood sounds completely and resulted in bass sounds resembling the rhythm of a heartbeat. When introducing the new rhythm, the researcher played loudly and also increased expressivity of movement, bouncing her heel to the beat and swaying her drum from side to side on down beats. At 195 seconds, the researcher changed the rhythm yet again, playing a single note in the center of the drum head on every down beat. The researcher played this rhythm loudly, eventually increasing its tempo and using it as a way to call the group to a ‘rumble.’ Allegra also changed her style of playing at 195 seconds, introducing a more complex, syncopated rhythm. Around 206 seconds, Allegra shifted back to a simple rhythm, eliminating the use of syncopation. Though the researcher intentionally began trying to increase the group tempo around 201 seconds, the researcher did not introduce a
Table 5

*Individual Drumming Behavior Immediately Preceding and During Period of Synchronization*

<table>
<thead>
<tr>
<th>Participant</th>
<th>Time (s)</th>
<th>Allegra</th>
<th>Carol</th>
<th>Demi</th>
<th>Harmony</th>
<th>Lyra</th>
<th>Ottava</th>
<th>Researcher</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>171</td>
<td></td>
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Rhythmic pattern/style change
Out of sync with group pulse
Back in sync with group pulse
Movement or postural change

Note. Group ‘rumble’ continues for several seconds. More complex = more complex rhythmic pattern; simpler = simpler rhythmic pattern; new rhythm = new rhythmic pattern; calls ‘rumble’ = facilitator speeds up beat to signal beginning of ‘rumble’; sways drum = sways drum side to side with the beat
purposeful rhythmic asynchrony as a way to indicate the ‘rumble’ event until approximately 209
seconds.

Several techniques were used to illustrate differences between the specific period of
attunement and the remainder of the ‘Improvisation with Eyes Closed’ phase, including
inspection of differences between PLV of movement during the entire ‘Improvisation with Eyes
Closed’ phase versus the period of heightened synchronization. Figure 9 provides a comparison
of average pairwise PLV of movement during these two periods. Data from the ‘rumble’ event
was not included in either heat map. Upon visual inspection of the two heat maps, averages of
pairwise PLV of movement during the attunement period appear higher than those of the overall
experiment. Additionally, while Ottava’s movement remained unsynchronized with the rest of
the group during the attunement period, she was less unsynchronized during the attunement
period versus the broader experiment.

Differences between PLV of heart rate during the entire ‘Improvisation with Eyes
Closed’ phase versus the period of heightened synchronization were also explored. Figure 10
provides a comparison of averages of pairwise PLV of heart rate during these two periods. Data
from the ‘rumble’ event was not included in either heat map. As can be seen from the much
warmer colors of the heat map for the period of attunement, averages of pairwise PLVs of heart
rate were higher during the period of attunement versus the overall experiment. Even Carol,
whose heart rate was visibly unsynchronized with the group during the overall experiment, came
into closer heart rate synchronization with other group members during the period of attunement.

Tests of significance were also completed to determine differences in synchronization
between the attunement period and the broader experiment. Paired-samples \( t \)-tests were
computed to determine whether PLV values for heart rate and movement over the 25 seconds of
Figure 9. Comparison heat maps of pairwise PLV of movement across the ‘Improvisation with Eyes Closed’ phase (a) and the period of heightened synchronization (b). R = Researcher.

Figure 10. Comparison heat maps of pairwise PLV of heart rate across the ‘Improvisation with Eyes Closed’ phase (a) and the period of heightened synchronization (b). R = Researcher.
heightened synchronization were significantly different from PLV values from the 25 seconds immediately preceding the period. An alpha of 0.05 was used for both tests. Results indicated that PLV values were significantly higher for heart rate between the period of synchronization ($M = 0.96, SD = 0.02$) and the preceding 25 seconds ($M = 0.85, SD = 0.12$), $t(25) = -4.71, p < 0.001$). PLV of movement was also significantly higher during the period of synchronization ($M = 0.95, SD = 0.03$) versus the preceding 25 seconds ($M = 0.92, SD = 0.08$), $t(1559) = -16.64, p < 0.001$.

**Summary**

Several important findings related to phenomenon of attunement emerged from this study. Even among this group of relative novice musicians, none of whom had a great deal of experience participating in group drumming, a sense of oneness and connection to other group members was achieved during this drum circle. Sense of oneness with the group generally increased as the drumming process progressed, though participants had different experiences of oneness during different phases of the experience. Participants felt more connected and less connected to specific group members during the overall process.

While engaging in improvisational drumming with their eyes closed, participants did experience specific periods of heightened heart rate and movement synchronization. They also experienced times of asynchrony in heart rate and movement. While participants’ movements were fairly well synchronized across the experiment, heart rates were slightly less synchronized overall. The tempo of the drumming increased progressively across the ‘Improvisation with Eyes Closed’ phase, and periods of synchrony and asynchrony were both visibly and audibly evident. Participants each had a different approach to playing during the ‘Improvisation with Eyes Closed’ phase.
Closed’ phase, with levels of volume, degree of physical expressivity, and tendency to alter style or rhythm of playing varying widely.

A period of attunement, defined operationally as a period lasting longer than 5 seconds during which participants experienced heightened synchronization of both heart rate and movement, did occur during the ‘Improvisation with Eyes Closed’ phase. PLV values for both movement and heart rate were statistically significantly higher during this period versus the preceding period. The period of attunement, which was sustained for approximately 25 seconds, occurred concurrently with the researcher’s introduction of a new rhythmic pattern. The researcher’s initial introduction of a new rhythmic pattern was visible in the movement data, in which pairwise comparisons depicted the researcher as being temporarily out of sync with the group. The tempo data also displayed a temporary asynchrony occurring at the onset of the new rhythmic pattern. Following the temporary period of rhythmic asynchrony and during the greater period of attunement, the tempo suddenly increased dramatically and remained at a relatively consistent level for several seconds. The period of rhythmic and movement synchronization ended as the researcher began purposefully increasing the group tempo, leading up to the ‘rumble’ event at the end of the experiment. Heart rate remained highly synchronized for the duration of the ‘Improvisation with Eyes Closed’ phase.
CHAPTER FIVE

DISCUSSION

Within this chapter, key findings of the study are discussed. First, an overview of the study, including the rationale for the study, is provided. Results of the study are then discussed based on the research questions that guided the study. Implications are provided for counselor educators, counselors, and other stakeholder groups. Limitations of the study and recommendations for future research are also offered.

Overview of Study

Counselors require relational abilities and creativity in order to work effectively with diverse clients and adapt to the complexities of their work (Gladding, 2013). Experiences of attunement, a deeply felt and embodied state of consciousness that results from ‘tuning in’ to oneself, others, events, energies, and the environment (Kossak, 2009), have been described as foundational to the development of relational and creative capacities. Despite its relevance to counselor education, the phenomenon of attunement has not yet been studied comprehensively within the field. The immediate purpose of this study was to introduce the construct of attunement within the field of counselor education in a comprehensive manner. It is hoped that by providing empirical evidence for the existence of attuned states as well as documentation of the context in which attunement occurs, experiences of attunement may be successfully integrated within counselor training, leading to the development of more effective counselors.

Some literature suggests that attunement may most easily be fostered through expressive arts experiences (e.g., Kossak, 2015). Group music making has been shown to be a particularly effective intervention for fostering attuned states (e.g., Kossak, 2008a). As an accessible and inclusive intervention, group drumming was chosen as the intervention through which to foster
attuned states for this study. The present research explored the phenomenon of attunement as it occurred among a group of master’s level counselors-in-training participating in group, improvisational music making.

To provide a comprehensive description of the phenomenon, the study utilized a single case research design (e.g., Morgan & Morgan, 2009) that involved multiple measures intended to capture and describe attunement as it occurred on perceptual, behavioral, and physiological levels. Perceptual experiences of attunement were illustrated via self-report measures, including an interpersonal connection survey and an adapted version of the Inclusion of Self in Community scale (Mashek, Cannaday, & Tangney, 2007). The study took place at a research facility within the university in which participants were enrolled. This facility was equipped with a Qualisys Motion Capture system, which enabled the researcher to track participants’ head movements as they engaged in the drumming intervention. Behavioral aspects of attunement were operationalized as the phase synchronization of the pitch of participants’ head movements as they engaged in the drumming intervention. Physiological aspects of attunement were acquired through a Zephyr™ team-based performance monitoring system and operationalized as the phase synchronization of participants’ heart rates throughout the intervention. The use of a high definition video recorder allowed the researcher to track participants’ drumming behavior. The calculation of drumming tempo over time allowed the researcher to further contextualize the development of attuned states.

Participants engaged in a group drumming experience that lasted approximately 32 minutes. A variety of rhythm instruments was provided, and participants were invited to switch instruments as they saw fit. The researcher facilitated the experience based on a semi-structured protocol involving eight distinct phases, which reflected the balance of safety versus risk-taking
described by Kossak (2015) as being important to the development of attuned states. In keeping with literature suggesting the need for lesser structure during latter stages of a drum circle, the facilitator provided progressively less structure during each phase of the drumming experience. Please see Appendix I for a description of the drumming protocol.

In order to provide a richer description of the phenomenon of attunement, analysis of physiological, behavioral, and audio data focused on Phase 7, the ‘Improvisation with Eyes Closed’ phase, of the drumming experience. During this phase, the facilitator invited participants to close their eyes and improvise by changing their rhythm or style of playing as they felt inclined to do so. Attunement was operationally defined as a period lasting longer than 5 seconds during which participants simultaneously experienced heightened synchronization of heart rate and head movement. Degree of synchronization was measured through creation of a continuous index of group synchronization, which was calculated as the median of pairwise Phase Locking Values (PLVs) across the ‘Improvisation with Eyes Closed’ phase. Please see the Synchronization Calculation section with Chapter Three for more information on calculation of PLV.

To provide a richer description of the phenomenon, the researcher contextualized a specific period of attunement through a measure of drumming tempo and by describing individual drumming behavior that immediately preceded, occurred concurrently with, or followed the period of attunement (see Table 5 of Chapter Four). An overall description of individual drumming approach was also offered (see Table 4 of Chapter Four).

**Participants**

Participants were six master’s level counselors in their first semester of a cohort model Counselor Education program within a large, public university in the Southeastern United States.
An information questionnaire was administered immediately prior to the drumming experience to gather demographic and descriptive information about the participants. The Mindful Attention Awareness Scale (Brown & Ryan, 2003) was also administered to provide a baseline measure of each participant’s level of trait mindfulness, which has been suggested as a variable influencing the ability to attune with others (Davis & Hayes, 2011).

Of the six participants, four identified as White, one as Hispanic/Latino(a), and one as Asian/Pacific Islander. All participants identified as women ($n = 6$). Five participants identified as heterosexual, and one participant identified as bisexual. Participant ages ranged from 22 to 47 years. Five out of six participants responded to questions regarding previous musical experience. Of those that responded, the majority ($n = 4$) reported no previous group music making experience. One participant reported previous group music making experience. The majority of participants ($n = 4$) reported no prior experience with group drumming, and one participant reported having a “little experience” with group drumming. Descriptive data indicates this group was fairly homogenous in terms of gender identity. The group was slightly more heterogeneous in terms of race/ethnicity and age. Based on reports of previous group music making experience, group members were generally novice musicians with little prior experience with the drum circle intervention used for the study.

Scores on the MAAS ($n = 6$) ranged from 3.60 to 5.20. Mean performance was 72.5% of scale maximum ($M = 4.36, SD = 0.59$), and the median of scores was 4.37. These scores were only slightly lower than mean scores resulting from a recent study of mental health counselors ($n = 213, M = 4.58, SD = 0.84$; Thompson, Amatea, & Thompson, 2014). Participants were likely fairly representative of the wider population of first semester master’s level counselors-in-training in their degree of trait mindfulness.
Discussion

Within this section, key findings of the study are discussed. Among these are the different experiences and approaches to drumming exhibited by participants, the occurrence of a specific period of attunement, and the context in which that period occurred.

Individual Experiences and Approaches

Findings from the study indicate that while participants shared certain experiences during the drum circle, they also had different perceptions regarding sense of oneness with the group and sense of interpersonal connection to specific group members. Participants also exhibited different approaches to drumming and differing levels of synchronization in movement and heart rate during Phase 7, the ‘Improvisation with Eyes Closed phase.’

Perceptions of Oneness. A variety of measures were used to gather participants’ perceptions of attunement during the drumming experience. Using a modified version of the Inclusion of Community in Self Scale (ICS; Mashek, Cannaday, & Tangney, 2007), participants were asked to rate their sense of oneness during each phase of the drumming protocol. Please see Appendix I for a description of each phase and an outline of the drumming protocol. Ratings for sense of oneness were higher by the closing breathing exercise at the end of the drum circle ($M = 6, SD = 0$), than during the initial breathing exercise at the start of the drum circle ($M = 4.33, SD = 1.70$). In fact, by the final phase of the drum circle, all participants indicated they had achieved the highest sense of oneness possible. Results from a Spearman’s rank order correlation test indicate that sense of oneness generally increased as the drum circle progressed ($r_s = 0.36, p < 0.05$). These findings provide evidence that participation in the drum circle fostered sense of oneness among group members and support prior research showing that group drumming
produces immediate positive effects (Mungas & Silverman, 2014) and builds sense of community (Camilleri, 2002).

Individual perceptions of attunement during earlier phases of the drum circle varied. For example, Allegra rated her sense of oneness during Phase 2, consisting of experimentation with instruments, as a two, indicating a relatively low sense of oneness. However, Harmony rated her sense of oneness during the same phase as a six. Differences in ratings during specific phases are likely due to differences in individual preferences regarding each intervention and its associated degree of structure. Other than the final phase of the drum circle, mean ratings for sense of oneness were highest during Phase 5, the entrainment exercise ($M = 5.50, SD = 0.76$). In fact, ratings for this phase were even higher than those for the experiment phase, that of ‘Improvisation with Eyes Closed’ ($M = 5.00, SD = 1.53$). Sense of oneness may have been higher during the entrainment phase due to the balance of structure and freedom the intervention entailed (e.g., Ierardi, 2011; Kossak, 2015). For this relatively novice group of drum circle participants, the greater degree of facilitation provided during this phase may have fostered a higher sense of safety, which translated to a greater sense of connection among the group. It is also possible that the facilitation provided during this phase led to more frequent rhythmic synchronies, which influenced participants’ perceptions of oneness.

While Phase 7, the ‘Improvisation with Eyes Closed’ phase, was not the most highly rated phase of the drum circle, sense of oneness was still quite high for the period. The majority of participants rated their sense of oneness during the phase as a six, indicating they felt the highest sense of oneness possible ($n = 4$). However, Allegra and Harmony had different experiences of oneness from the rest of the group during the phase. While Allegra rated most other phases of the drum circle highly ($M = 5$), she rated her sense of oneness during the
‘Improvisation with Eyes Closed’ phase as a two. Based on the fact that this was the only phase in which participants were invited to close their eyes, this finding indicates that Allegra may have felt higher oneness during phases in which she was able to connect visually with other participants. In fact, prior research indicates that interpersonal coordination may be enhanced by the ability to connect visually with others (Richardson, Marsh, Isenhower, Goodman, & Schmidt, 2007). On the other hand, Harmony rated her experience during both improvisational phases, including ‘improvisation with eyes open’ (rating of 4) and ‘Improvisation with Eyes Closed’ (rating of 4), less highly than most other phases of the drum circle ($M = 5.13$). This data indicates that Harmony may have felt more connected to other participants when a higher degree of structure was provided. Overall, variations in perception of attunement, as measured by responses to the adapted version of the ICS, were likely the result of individual differences in personality, preference, and comfort level with the degree of structure provided during different phases of the drumming experience.

**Different Approaches to Drumming.** In addition to gathering perceptions of oneness during the drumming experience, the researcher elucidated individual differences in approach to drumming by coding individual drumming behavior during the ‘Improvisation with Eyes Closed’ phase. The drumming behavior data for this entire phase is provided in Table J1 of Appendix J. This data led to the identification of events during the ‘Improvisation with Eyes Closed’ phase, such as periods when participants were ‘off beat,’ as well as the development of descriptions of individual approach to drumming. Observations of audio and video data also contributed to developing descriptions of individual approach, aspects of which include volume of playing, complexity of rhythm, tendency to change rhythm or style of playing, and expressivity of movement, as evidenced by visible movement of the participant’s body to the underlying beat.
These descriptions are provided in Table 4 of Chapter Four. Findings revealed differences between each group member in approach to playing. For example, Allegra was occasionally slightly off the predominant group beat. However, she took risks by altering the complexity of her rhythm and the volume of her playing. On the other hand, Carol rarely changed her rhythm and played at a relatively low volume for the entirety of the ‘Improvisation with Eyes Closed’ phase. Harmony frequently moved visibly to the underlying beat, did not change her rhythm or style of playing, and played at a loud volume. Similarly, Demi did not change her rhythm for the duration of the ‘Improvisation with Eyes Closed’ phase. However, she played softly and did not move visibly to the beat. These differences in approach to drumming further indicate the influence of personality, preference, and comfort with degree of structure on the drumming experience. Findings regarding drumming approach provide support for the drum circle as a metaphor for diversity and inclusion, in which differences in approach enrich the overall drumming experience (Stevens, 2003). Additionally, results support use of the drum circle as an accessible intervention that can be adapted to meet the varying needs of individual participants (Stevens, 2003).

**Sense of Interpersonal Connection.** Participants were also provided with an interpersonal connection measure and asked to rate those group members to whom they felt least connected and most connected during the ‘Improvisation with Eyes Closed’ phase of the drum circle. The participants to whom most group members felt ‘most connected’ were the researcher \( n = 5 \) and Harmony \( n = 5 \). Connection to the researcher was to be expected, given that the researcher facilitated the majority of the drum circle. Participants had likely grown accustomed to ‘tuning in’ to the researcher throughout the drumming experience. The researcher also tended to play a simple, steady rhythm at a loud volume throughout the ‘Improvisation with Eyes
Closed’ phase. This approach to playing may have increased group members’ ability to track the researcher’s rhythm. The finding that all participants felt ‘most connected’ to Harmony is more surprising. Based on data from the coding of drumming behavior during the ‘Improvisation with Eyes Closed’ phase of the drum circle, though Harmony was occasionally ‘off beat’ from the overall group rhythm, she maintained the same, simple rhythm and played at a high volume throughout the phase. It is possible that the high volume of her playing and the simple rhythm she produced increased group members’ ability to ‘tune in’ to her playing. Harmony was also observed via the video data to move visibly with the underlying beat and occasionally smile while playing. Nonverbal and affective cues have long been associated with the interpersonal attunement process (e.g., Stern, 1985). Harmony’s expressivity of movement and tendency to smile while playing, indicating a sense of comfort or enjoyment with the experience, may have increased other group members’ sense of connection to her.

Equally surprising to the finding that all group members felt ‘most connected’ to a specific participant was the finding that all participants felt ‘least connected’ to a single participant. All participants rated Demi as a participant to whom they felt ‘least connected’ during the experience. Based on the drumming coding data from the ‘Improvisation with Eyes Closed’ phase of the drum circle, Demi played softly and did not alter her rhythm or style of playing during the experiment. Further, Demi’s expressivity of movement was low. Other group members may have had difficulty connecting with her due to an inability to hear her. The limited nature of her physical movement to the music may have similarly decreased participants’ ability to feel connected with Demi during earlier phases of the drum circle. Ottava was another participant with whom multiple group members felt ‘least connected’ \((n = 3)\). Though Ottava visibly moved her body to the music and played at a loud volume, she frequently played ‘off
beat.’ The asynchronies of her playing may have led group members to feel disconnected from her.

Interpersonal connection ratings for other participants were mixed and may reflect individual preference regarding style of playing, expressivity, physical proximity, and other factors. Every participant indicated at least one group member to whom she felt most and least connected, and most participants felt a sense of connection to or disconnection from multiple participants. This finding suggests that participants were able to pick up on subtle, nonverbal cues during the experience, and these cues did influence their ability to attune with specific group members. This result supports prior research on attunement, such as studies involving mother-infant dyads (e.g., Stern, 1985), in which nonverbal behavioral cues were found to impact attunement. It is also likely that sense of connection during the drumming experience was mediated by relational factors that had developed prior to the beginning of the study. Literature suggests that interpersonal bonds may impact experience in a group context (e.g., Harpine, 2011). Within this study, group members were acquainted with one another prior to the study, which was not designed to capture prior sense of connection.

**Differences in Individual Synchronization with the Group.** Degree of synchronization between specific group members during the ‘Improvisation with Eyes Closed’ phase of the drum circle was also explored. Heat maps displaying average pairwise PLV of heart rate and movement across the ‘Improvisation with Eyes Closed’ phase are displayed in Chapter Four as Figure 5 and Figure 2, respectively. The relatively cooler colors associated with specific participants indicates that certain individuals were less synchronized with the group than others. As can be seen in Figure 5, Carol was less synchronized in heart rate than other group members. As can be seen in Figure 2, Ottava was generally unsynchronized with other group members in
her movement. In conjunction with drumming behavior data from Table J1 of Appendix J, which shows that Ottava was frequently off beat in her drumming, this finding suggests that, just as certain individuals may have greater difficulty cultivating interpersonal relationships (e.g., Bajaj & Crawford, 2010), certain individuals may have more difficulty achieving interpersonal attunement than others.

**Occurrence of Attunement**

In order to identify an occurrence of attunement and provide a richer description of its context, the research focused analysis of movement, heart rate, and audio data on Phase 7 of the drum circle during which participants were invited to improvise with their eyes closed. Attunement was operationally defined as a period during which the group experienced heightened synchronization of head movement and heightened synchronization of heart rate, as evidenced by median PLV values for both measures approaching a value of one for a duration of greater than 5 seconds. Visual inspection of median PLV of movement and heart rate over time (see Figure 8 with Chapter Four) indicates that attunement did occur during this phase of the drum circle. Though other instances of heightened synchronization are apparent, the period of simultaneous synchronization that visually stands out occurred between 184 and 209 seconds from the start of the phase. This period lasted for approximately 25 seconds, or until the beginning of the ‘rumble’ intervention at the end of the phase. The line graphs of median PLV of movement and heart rate displayed in Figure 8 indicate the development of attunement during this period was an emergent phenomenon, whereby heart rate and movement came into synchronization almost simultaneously following a period of asynchrony within both measures.

Overall difference in degree of synchronization during the period of attunement and the ‘Improvisation with Eyes Closed’ phase as a whole were examined through creation of heat
maps. Figures 9 and 10 in Chapter Four display heat maps of pairwise PLV of heart rate across the ‘Improvisation with Eyes Closed’ phase and during the period of attunement for head movement and heart rate, respectively. Visual inspection of these figures reveals brighter colors within the heat maps for both movement and heart rate during the period of attunement, indicating increased synchronization between group members. These figures also illustrate that even those group members who were relatively unsynchronized during the overall ‘Improvisation with Eyes Closed’ phase became more synchronized during the period of attunement. In particular, Ottava and Carol became more synchronized in movement and heart rate, respectively. Findings thus suggest that all participants were affected by or contributed to the period of attunement, despite ability or overall tendency to synchronize with the group.

Paired samples $t$-tests ($p < 0.05$) were completed to determine whether a statistically significant difference exists between median PLV values for movement and heart rate during the period of attunement (184 – 209 seconds) and the previous 25 seconds (159 – 183 seconds) of the ‘Improvisation with Eyes Closed’ phase. PLV values were found to be significantly higher for median PLV of heart rate during the period of attunement ($M = 0.96; SD = 0.02$) versus the prior 25 seconds ($M = 0.85, SD = 0.12$), $t(25) = -4.71, p < 0.001$. Median PLV of movement was also significantly higher during the period of attunement ($M = 0.95, SD = 0.03$) versus the previous 25 seconds of the phase ($M = 0.92, SD = 0.08$), $t(1559) = -16.64, p < 0.001$. This finding provides empirical evidence of the existence of group attunement in the context of group improvisational drumming in support of Kossak’s (2008a) earlier qualitative study of attunement during a group music making experience. Perceptual data via participant ratings of sense of oneness during the ‘Improvisation with Eyes Closed’ phase of the drum circle strengthen this finding. Four out of six participants rated experiencing the highest possible sense of oneness with
the group during the ‘Improvisation with Eyes Closed’ phase of the drum circle. Thus, perceptual, behavioral, and physiological data all indicate that attunement did occur during the ‘Improvisation with Eyes Closed’ phase of the drum circle. Further, in keeping with Kossak’s (2009) definition of attunement, these results provide support for the idea that interpersonal attunement occurs on multiple levels, including psychological, affective, and somatic.

**Context of Attunement**

**Periods of Synchrony and Asynchrony.** To provide a richer description of the phenomenon of interest, the researcher examined the broader context in which attunement occurred during the ‘Improvisation with Eyes Closed’ phase of the drum circle. This involved inspecting median PLV of movement and heart rate data as well as tempo data over time during the phase. Visual inspection of Figure 8 in Chapter Four shows periods of both relatively high and relatively low degree of group synchronization of movement and heart rate across the phase. There were many times during the phase in which data points for median PLV of movement and median PLV of heart rate were close to a value of 1.0, indicating near perfect synchrony. However, there were also many times when data points for each measure dipped near or below 0.8, indicating asynchrony. The line graph of tempo data within Figure 8 also displays fluctuations in rhythmic synchrony, with a smoother line between data points indicating a period of relative synchrony and broken or vertical lines between data points indicating relative asynchrony. These findings indicate that attunement during group drumming occurs in the broader context of fluctuations between periods of synchrony and asynchrony of behavior, physiology, and rhythm. As discussed by Kossak (2015), when embraced, periods of asynchrony are natural aspects of the ‘tuning in’ process that can contribute to the development of attuned states.
Rhythmic Change and Attunement. In order to identify potential factors contributing to or resulting from attuned states, the researcher elucidated events that occurred immediately preceding, during, or following the specific period of attunement. Within Figure 8, the line graph of median PLV of movement portrays a dip in movement synchrony. The researcher attempted to identify the source of the lowered synchrony by visual inspection of the heat map of pairwise PLV of movement over time (Figure 1 in Chapter Four). This heat map showed the researcher’s movement as asynchronous with the rest of the group between 181 and 186 seconds after the start of the ‘Improvisation with Eyes Closed’ phase. Individual drumming behavior around the period of attunement was also explored. Based on the coded drumming behavior data (Table 5 of Chapter Four), the researcher purposefully introduced a new rhythm at approximately 184 seconds. The researcher played loudly and increased her physical movement to the underlying beat when introducing the new rhythm, which mimicked the sound of a heartbeat. The researcher changed rhythm again at 195 seconds, playing a single note in the center of the drum head on every down beat. This rhythm was eventually increased in tempo and used as a way to call the group to a ‘rumble,’ which began around 210 seconds. Other than these rhythmic changes, the researcher had not altered her rhythm previously during the phase of interest.

Both the median PLV of movement data and the coded drumming behavior data show that the researcher’s change of rhythm at approximately 184 seconds coincided with the start of the period of attunement. Based on these results, it is likely that the researcher’s purposeful change in rhythm was an impetus for the period of attunement. These findings provide support for a recent study in which the neural activity of dyads dancing to music became synchronized following tempo changes in the music (Schmidt, Schmidt, & Henrich, 2014). Within their study, Henrich, Schmidt, & Schmidt (2014) concluded that neural synchronization was not due to the
tempo change itself but rather the need for motoric re-programming to adapt to the dancing partner. In terms of the current study, it is likely that the rhythmic change stimulated adaptive synchronization behavior.

Synchronization may be not only a function of adaption but also the product of purposeful listening. As Lutzker (2014) argues, in order to enter another person’s experience, we must practice deep and attentive listening. Within this study, the rhythm introduced by the researcher was likely not the direct source of attunement but rather the impetus for participants to listen more closely, in effect ‘tuning in’ to one another and adapting to a new rhythm. While focusing more intently on one another’s rhythms, participants synchronized in heart rate and movement. It is also possible that the type of rhythm introduced, which resembled the sound of a heartbeat, was a further catalyst of attunement. The rhythm of the heart is one to which all humans can easily relate on biological and intuitive levels (e.g., Stevens, 2003).

**Balance of Safety and Risk Taking.** Findings from this study provide preliminary support for the balance between risk taking and sense of safety cited by Kossak (2015) as being necessary to achieve attunement. The idea of periodic musical changes leading to attunement suggests the importance of risk taking as a means for fostering attuned states. Improvisation, which was demonstrated by the researcher at the beginning of the period of attunement, represents a risk in terms of embracing the unknown (e.g., Kossak, 2008b, 2015). Yet, as indicated by results of the interpersonal connection measure, the majority of participants felt ‘most connected’ to the researcher during the ‘Improvisation with Eyes Closed’ phase of the drum circle. Participants’ sense of connection with the researcher may have resulted in a greater sense of safety among participants when the rhythmic change was introduced, thus producing a stronger effect of the researcher’s rhythmic change.
The decision of another group member to improvise during the period of attunement further suggests the importance of a balance of safety and risk taking while ‘tuning in.’ The drumming behavior data (Table 5 of Chapter Four) shows that Allegra introduced a more complex, syncopated rhythm at 195 seconds, which occurred during the period of attunement in the context of rhythmic synchrony, which is visible in the tempo data (Figure 8 of Chapter Four) and discussed in greater detail in the following paragraph. Allegra’s willingness to improvise during the period of rhythmic synchrony suggests that she was able to perceive the state of synchrony and provides further evidence for the sense of safety that is necessary to take risks during expressive arts processes (Kossak, 2015).

**Embracing Uncertainty.** Observation of tempo data offers additional insights into the development of attuned states during this study. Figure 8 in Chapter Four shows that a period of rhythmic asynchrony occurred from approximately 184 to 190 seconds from the start of the ‘Improvisation with Eyes Closed’ phase ($M = 123.94$, $SD = 3.92$). However, from approximately 192 to 193 seconds, the tempo suddenly increased from 122.53 BPM to 129.47 BPM then remained steady from 193 to 200 seconds ($M = 130.09$, $SD = 0.65$), reflecting relative rhythmic synchrony. These observations show that the group experienced initial rhythmic asynchrony while adjusting to the new rhythm introduced by the researcher. Group members then collectively increased their tempo and experienced a sustained period of rhythmic synchrony. It is thus possible that the group’s experience of attunement led to more synchronous drumming via group members’ intentional act of ‘tuning in’ and adapting. Blades and Bester (2013) discuss the value of experiencing vulnerability while ‘tuning in’ with others. Similarly, Kossak (2015) points out the need to hold uncertainty during expressive arts experiences in order to achieve attunement. These findings provide support for those ideas on the basis that group members did
experience asynchrony yet continued to play, eventually adapting to the new rhythm. Findings also provide support the idea that rhythmic synchrony is an external indication of entrainment during musical experiences (e.g., Schneck & Berger, 2006).

**Implications**

Within this section, implications of the current study are reported. These are focused toward key stakeholder groups, including counselor educators, counselors, expressive arts educators, and expressive arts therapists.

**For Counselor Educators**

A process of ‘tuning in’ and the attuned states that may result from that process have been cited as factors that enhance creative and relational qualities (e.g., Kossak, 2015). Findings from this study provide evidence for both a process of ‘tuning in’ and the occurrence of attunement among a group of master’s level counselors-in-training. Counselor educators may integrate interventions that foster attunement into the classroom to enhance the development of qualities counselors require to become effective practitioners. The expressive arts may be ideal interventions for promoting attunement and thus the development of relational and creative capacities within counselor education.

The improvisational nature of expressive arts based experiences may play a key role in fostering creative and relational capacities amongst counselors-in-training. Results of this study demonstrated that counselors-in-training experienced attunement shortly after a period of rhythmic, movement, and heart rate asynchrony. This period of asynchrony may be considered a period of misattunement. Periods of misattunement, often labeled as mistakes, are to be expected within arts based experiences (Kossak, 2015). In fact, within this study, a period of misattunement may have led to attuned states by necessitating a “deeper tuning-in process that
[resulted] in a deepening of the relational connection to self, other, and the material being used” (Kossak, 2015, p. 147). Learning to embrace so-called mistakes and periods of uncertainty is an important aspect of adjusting to the complexities and ambiguity of the work of counseling (Gladding, 2013).

This study provides empirical evidence of the occurrence of attunement during a group expressive arts process. Attuned states have been presented as experiences that cultivate relational capacities such as compassion, deep understanding, and empathy (e.g., Siegel, 2007). By engaging in group expressive arts interventions, counselors-in-training may have opportunities to realize these relational capacities, which are critical to developing a strong therapeutic alliance and relating to clients of diverse social, cultural, political, and intellectual backgrounds (e.g., Duffey, Haberstroh, & Trepal, 2009). Whereas group discussions may bring up cognitive defenses among students, expressive arts practices may build empathy through shared experience and bottom-up processing, whereby students discover connection and commonality through embodied experience.

Drum circles in particular are experiences counselor educators may offer as a way to promote attunement amongst counselors-in-training. During this study, counselors-in-training exhibited distinct and different approaches to drumming, which may have stemmed from differences in personality, preference, and/or level of comfort with improvisation. These results support the drum circle as a metaphor for inclusivity and community building, bringing participants together across differences. In fact, the drum circle can be viewed as an experience that benefits from a variety of contributions and diversity in approach. Counselor educators may thus integrate group drumming in their classrooms as a metaphor for community and connection, a way to practice ‘tuning in,’ and an experience of attunement. When doing so, counselor
educators should be mindful of individual preferences and approaches as well as the fact that certain students may have greater difficulty achieving attunement than others. These students may require a greater degree of support in order to fully realize the interpersonal benefits of the experience.

**For Counselors**

The creative and relational capacities promoted through practices of attunement are not only important for counselors but for human beings in general. All people possess innate creative capacities that allow them to innovate beyond obstacles, express internal experiences, and adapt to changing circumstances (Kossak, 2015; Rogers, 1993). Unfortunately, within many social, political, and cultural contexts, efficiency and productivity are currently valued over creativity, leaving many individuals shut down to their innate creative capacities from an early age (Lutzker, 2014; Kossak, 2015).

The current study demonstrates how the expressive arts, and group drumming in particular, can foster creativity, even amongst a group of adults with limited musical experience. Participants demonstrated their ability to respond spontaneously to changing conditions, improvise, and tolerate states of uncertainty, ultimately leading to the development of an attuned state. Counselors may similarly assist their clients in realizing their own capacities for openness, adaptability, and tolerance of ambiguity, through expressive arts processes. Findings also support the idea that misattunements are a natural part of the therapeutic process, which, if held rather than avoided, can contribute to the development of attunement and the strengthening of the therapeutic alliance (Kossak, 2015; Nolan, 2012).

In addition to being innately creative, humans are designed for connection (e.g, Gallese, 2001). Studies of attunement between parent-infant dyads demonstrate this fact on a biological
level (e.g., Feldman, Magori-Cohen, Galili, Singer, & Louzoun, 2011). The existence of ‘mirror neurons’ (e.g., Gallese, Eagle, & Migone, 2007) suggests neural underpinnings of interpersonal connection. Unfortunately, despite our predisposition to human connection, many individuals in today’s society struggle in their ability to relate to themselves and one another (e.g., Bajaj & Crawford, 2010). Intrapersonally, clients may be disconnected from their bodies, leading to a lack of awareness of physical experience or a sense of being ungrounded from their physical realities. Interpersonally, clients may lack a sense of connection to other individuals, their communities, or the world at large.

Findings from this study demonstrate how the expressive arts may enhance the mind-body connection, through the adaptation of physical movement and physiological response while ‘tuning in’ to rhythm. Results also provide evidence for the power of the arts to foster interpersonal connection through a collective experience of improvisation (Kossak, 2008b, 2015). While engaging in the drum circle, participants practiced relational skills, such as openness, trust, and vulnerability.

The perceptual, physiological, and behavioral data from this study all indicate that participants actually experienced a state of attunement. Experiences of attunement are foundational to the development of understanding, compassion, and empathy (e.g., Siegel, 2007). Additionally, the embodied aspects of synchronization that were captured in this study have been described as the building blocks of interpersonal bonds (Feldman, 2012). Not only did participants in this study experience attunement during the drum circle, but through their experience of attunement, they acted as one, collectively shifting the tempo of their rhythm upward and creating a synchronous rhythm that was sustained for several seconds. This finding speaks to the power of the arts to enhance cooperation and coordination and suggests the
potential for counselors to use the arts in their communities as a way to affect positive change. Indeed, group art making experiences have been cited as tools for collective transformation and social change (Rogers, 2011).

When introducing group expressive arts processes with clients, counselors should be aware of individual preferences, personality, and comfort level. Doing so may aid in structuring the experiences toward their greatest positive effect, especially in consideration of those who may have more difficulty attuning with others.

For Expressive Arts Instructors

For those who instruct on the expressive arts therapies or expressive arts techniques in counseling, this study provides evidence for the value of arts as therapy, the arts in therapy, and the arts in education. Findings support Kossak’s earlier study of group music making and attunement (2008a) in providing preliminary evidence for a theory of the arts as vehicles for fostering attunement. Expressive arts educators may enhance learning for their students by elucidating the process of ‘tuning in’ that is required to engage in expressive arts interventions as well as the multileveled state of interpersonal attunement that may result from collective expressive arts experiences.

For Expressive Arts Therapists

This study did not involve the delivery of the expressive arts as therapy but rather an expressive arts-based intervention in the context of counselor education. However, findings from this study provide further evidence of the power of the arts as forms of therapy that promote affective and somatic experiences in a manner that talk therapy alone cannot (e.g., Rogers, 1993, 2011). Results provide support for Kossak’s (2015) theory of attunement in expressive arts, including a process of ‘tuning in’ that involves a balance of safety and risk taking and a flow
between states of misattunement and attunement. This study is particularly relevant in elucidating the therapeutic value of the arts in group settings as a means for fostering interpersonal attunement. Drum circles in particular are highlighted as interventions that promote attunement, and rhythmic shifts are suggested as catalysts for attunement when introduced under certain circumstances. Additionally, the novel methods employed provide new ways to study and advocate for the arts as therapeutic interventions.

**Limitations and Future Research**

The many limitations of this study suggest the need for future research related to attunement and the expressive arts. One of the primary limitations of the study is the small, relatively homogeneous sample of participants. Results cannot be generalized beyond the group of participants that engaged in this experience. Future research could involve a larger pool of participants or several trials of participants across different university settings. A further limitation to generalizability is the specific intervention utilized for this study. The specific drumming protocol used for this study fostered attunement. However, it remains unclear as to whether other group expressive arts interventions would promote attunement in a similar manner. Studies of attunement during different expressive arts experiences would greatly enhance understanding of the phenomenon of attunement in the context of arts-based interventions.

This study was not designed to identify a specific cause or effect of attunement. Based on the study’s findings, it is likely that a rhythmic change during the drum circle was the catalyst for development of attuned states. It is also likely that the state of attunement led to a period of rhythmic synchrony. However, a clear relationship between cause and effect cannot be determined from this study’s findings. Results suggest the value of future research in which
rhythmic changes are purposefully introduced into a drumming experience to establish a causal relationship.

Though many different measures were utilized in this study to capture and contextualize a period of attunement, it is possible that the measures chosen did not fully elucidate the phenomenon, given its complex and multileveled nature. Further, there are currently no agreed upon methods for measuring the synchronization of physiological and movement processes (Ellamil, Berson, & Margulies, 2016) or the phenomenon of attunement. The construct of attunement was operationally defined as the heightened synchronization of head movement and heart rate over a period greater than 5 seconds. This definition may not accurately or fully represent the phenomenon. Additionally, the researcher made a choice to focus on a specific period of attunement during the ‘Improvisation with Eyes Closed’ phase to more deeply contextualize the phenomenon. Thus, trends over the course of the drum circle were not identified. Further study of attunement in the context of expressive arts experiences and group drumming in particular will shed additional light on the phenomenon and its measurement.

One of the threats to data-evaluation validity in single case research is mechanical error (Kazdin, 2011). This study relied on technology, which was subject to mechanical and user error. Additional threats to data-evaluation validity in single case research are differences among subjects and changes within individuals (Kazdin, 2011). These factors assuredly affected the outcome of the study, though the researcher attempted to describe differences in drumming approach and changes within individuals during the experiment via multiple methods. However, these descriptions were necessarily limited by the need to focus on a specific phase of the experiment to provide a richer characterization of the phenomenon of interest. It is likely that individual differences and changes over the course of the drumming experience influenced
outcomes during the ‘Improvisation with Eyes Closed’ phase. It is also likely that relational factors that had developed prior to the study, such as friendships between specific cohort members, influenced study outcomes.

**Conclusions**

The purpose of this quantitative study was to explore the phenomenon of attunement as it occurred among a group of master’s level counselors-in-training engaging in improvisational group music making. The researcher used a single case research design to capture attunement and contextualize its occurrence via multiple overlapping methods. One of the primary findings of the study was that attunement did occur among the group of student participants while they improvised with their eyes closed during a drum circle led by the researcher/facilitator. As indicated by responses to an adapted version of the Inclusion of Community in Self scale (Mashek, Cannaday, & Tangney, 2007), by the end of the drum circle, all participants perceived themselves as having achieved the highest possible sense of oneness with the group. Within the ‘Improvisation with Eyes Closed’ phase of the drum circle, a specific period of attunement was identified via physiological and movement data. This period occurred as the researcher introduced a new rhythm, which resembled that of a heartbeat. The group experienced initial asynchrony in heart rate, head movement, and rhythm before experiencing heightened synchronization of all three measures.

Additional findings related to the broader process of ‘tuning in’ that occurred during the ‘Improvisation with Eyes Closed’ phase of the drum circle. Attunement developed in the context of alternating periods of synchrony and asynchrony in heart rate, movement, and rhythm. Participants exhibited different approaches to drumming during the ‘Improvisation with Eyes Closed’ phase. Certain participants were less synchronized with the group than others.
Additionally, participants felt ‘most connected’ and ‘least connected’ to specific group members. Perceptions of oneness also differed across most phases of drum circle experience.

The results of this study provide preliminary support for Kossak’s (2015) theory of attunement in expressive arts therapy, including the balance of safety and risk taking that is necessary to achieve attuned states and the flow between misattunement and attunement that naturally occurs during improvisational experiences. The importance of embracing uncertainty and so-called ‘mistakes’ was also noted as an important aspect of developing attunement.

Drum circles are inclusive, accessible interventions that may be easily utilized within the counselor education classroom. Findings from this study suggest that drum circles and other expressive arts interventions may be integrated within counselor education to foster attunement among counselors-in-training. By engaging students in a process of ‘tuning in’ and providing opportunities to develop attuned states, these experiences may assist in the development of counselors with the creative and relational capacities necessary to be effective practitioners. Similarly, counselors may use expressive arts interventions to foster creativity, relational skills, and sense of intrapersonal and interpersonal connection among clients and within their communities. For expressive arts instructors and expressive arts therapists, this study provides additional support for the value of the arts as therapy, the arts in therapy, and the arts in education. New ways for studying the arts are also presented.

Opportunities for future research include exploring attunement in the context of different expressive arts interventions and among different groups of counselors-in-training. This study provides evidence of attunement during a drum circle but does not establish clear causes or effects of the phenomenon. Future studies should focus on aspects of arts-based interventions that promote attunement as well as distinct effects of the phenomenon.
In conclusion, this study provides the first empirical evidence of the occurrence of group attunement via physiological and movement synchronization during an expressive arts experience. Implications of this line of research are wide ranging. However, the fields of counselor education, counseling, and expressive arts therapy would benefit from more focused study of the phenomenon of attunement in order to enhance the application and delivery of arts-based experiences in service to students, clients, and communities.
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Appendix A:

**Figure 1.** Conceptual diagram of attunement during group improvisational music making. Music acts as a vehicle for synchronization, whereby rhythmic aspects both inform and are informed by participants’ responses. Intrapersonal attunement occurs when cognitive, affective, and physiological processes within an individual synchronize. Interpersonal attunement occurs when cognitive, affective, and physiological processes synchronize between individuals.
Appendix B:

Recruitment Script

For my dissertation research, I am conducting a study on attunement in counselor education. Attunement is an experience of connectedness that may occur when individuals tune in to themselves and one another during a shared process. Experiences of attunement are important to the development and work of counselors. As a counselor-in-training, your experiences of attunement in the classroom setting are particularly relevant to better understanding this phenomenon in the field of counselor education.

Participation in this study involves completing a few brief questionnaires and surveys about your background and experiences of attunement during the group process involved in this study. The study will occur at a research facility on Virginia Tech’s Blacksburg campus. Participants will engage in a group drumming process that requires no prior musical experience and is designed to foster connection among participants. Participation may involve wearing non-invasive wearable technology, including a helmet affixed with motion sensors and a wristband designed to capture heart rate data. The total time commitment required for this study will be no more than 75 minutes.

You will receive a $15 gift card in appreciation for your participation. Participation is completely voluntary, and you may withdraw from the study at any time without penalty. A decision not to participate will not have any negative repercussions on your university, program, or course evaluations.

I am happy to answer any questions you may have about the study at this time. You are also welcome to e-mail me at kbiddle@vt.edu or call me at 540-682-4153.
Appendix C:

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY
Informed Consent for Participants
in Research Projects Involving Human Subjects

Title of Project: An Exploration of Attunement in Counselor Education

Investigator(s):

<table>
<thead>
<tr>
<th>Name</th>
<th>E-mail / Phone number</th>
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</thead>
<tbody>
<tr>
<td>Laura Welfare</td>
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<td>Katherine Biddle</td>
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<td>Tanner Upthegrove</td>
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<td>Nicole Abaid</td>
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</tbody>
</table>

I. Purpose of this Research Project

The purpose of this study is to explore attunement, the process by which individuals tune in to one another, as it occurs between master’s level counselors-in-training participating in group, improvisational music making. Though literature indicates that attunement contributes to the development of relational qualities critical to providing effective counseling, the phenomenon of attunement has not been studied comprehensively in the field of counselor education. It is hoped that findings from this study will elucidate the context and conditions through which attunement occurs so that the process may be fostered within counselor education programs.

This study is being conducted as part of Katherine Biddle’s dissertation research. Results may be published in scholarly journals and presented at professional conferences. Master’s level counselors-in-training are invited to participate in this project.

II. Procedures

Those who agree to participate in this study will meet at a research facility on Virginia Tech’s Blacksburg campus where the study will be conducted. Several time slots will be offered for participation. Each participant will be fitted with a plastic hat equipped with reflective sensors, designed to capture motion of the head. Some participants will be randomly selected to wear a chest strap monitor designed to capture physiological data, including heart rate and respiration. Participants will complete a brief informational questionnaire and initial survey. Participants will then engage in approximately 30 minutes of group music making, facilitated by Katherine Biddle. No musical experience is necessary to participate in the intervention. The group experience will be videotaped. Audio recording software will also be utilized. Two brief surveys
will then be administered. The entire experience should last no longer than 75 minutes.

Any personal identifying information obtained during data collection will be recoded with participant numbers. For reporting findings, pseudonyms will be used for all participants.

Participation is this study is completely voluntary, and participants may withdraw at any time without risk of repercussions. A decision not to participate will not have any effect on university, program, or course evaluations. Data will not be collected or analyzed during a time when any of the researchers are acting as your instructor.

III. Risks

There are minimal risks associated with participation in this study. If you are sensitive to noise, you may experience discomfort during the group music making experience. However, you may end participation at any point during the study. If you have an unpleasant experience with the intervention, you may suffer emotional distress. It is possible that some of the survey questions may cause emotional discomfort. Though the wearable technology is designed to be unobtrusive, you may experience slight physical discomfort while wearing it. You may decline to participate in any portion of the study and you may end participation at any time without penalty.

IV. Benefits

Participation in this group music making experience may increase your sense of connection with your fellow classmates. You will have the opportunity to reflect on your experiences in the group, and you may learn techniques that can be used in working with your future clients. Your participation may also benefit future counseling students and counselor educators by shedding light on the process of attunement and how attunement may be fostered in counselor education.

V. Extent of Anonymity and Confidentiality

All data collected for this study will be handled confidentially. Following the intervention, all data will be coded with a number (the study ID code). These codes will be stored separately from any identifying information behind a locked door and within a locked filing cabinet. Pseudonyms will be used to refer to participants in written documents. Only the researchers will have access to forms, including the consent form, information questionnaire, and surveys that contain any identifying information. Physiological and motion capture data will be streamed wirelessly into a computer. These data streams will not contain any identifying information and will be coded by participant number. Immediately following the study, video and audio files will be transferred to an encrypted zip drive that can only be accessed by the primary researcher. Original video and audio files will be stored behind a locked door within a locked filing cabinet. No identifiable data or results from this study will ever be released to anyone other than the researchers without prior written consent.

The Virginia Tech (VT) Institutional Review Board (IRB) may view the study’s data for auditing purposes. The IRB is responsible for the oversight of the protection of human subjects involved in research.
VI. Compensation

You will receive a $15 gift card for participation in this study.

VII. Freedom to Withdraw

You are free to withdraw from this study at any time without penalty. You are free to participate to the extent to which you feel comfortable. You may skip any survey items or questions or end your participation in the intervention at any time without penalty.

Should you withdraw or otherwise discontinue participation, you will receive full compensation for participation.

VIII. Questions or Concerns

Please contact Laura Welfare (welfare@vt.edu) or Katherine Biddle (kbiddle@vt.edu) with any questions about the study.

Should you have any questions or concerns about the study’s conduct or your rights as a research subject, or need to report a research-related injury or event, you may contact the VT IRB Chair, Dr. David M. Moore at moored@vt.edu or (540) 231-4991.

IX. Subject's Consent

I have read the Consent Form and conditions of this project. I have had all my questions answered. I hereby acknowledge the above and give my voluntary consent:

________________________________________________________________________ Date__________
Subject signature

________________________________________________________________________
Subject printed name
Appendix D: Initial Recruitment Email

Dear [Potential Participant]:

For my dissertation research, I am conducting a study on attunement in counselor education. Attunement is an experience of connectedness that may occur when individuals tune in to themselves and one another during a shared process. Experiences of attunement are important to the development and work of counselors. As a counselor-in-training, your experiences of attunement in the classroom setting are particularly relevant to better understanding this phenomenon in the field of counselor education.

Participation in this study involves completing a few brief questionnaires and surveys about your background and experiences of attunement during the group process involved in this study. The study will occur at a research facility on Virginia Tech’s Blacksburg campus. Participants will engage in a group drumming process that requires no prior musical experience and is designed to foster connection among participants. Participation may involve wearing non-invasive wearable technology, including a helmet affixed with motion sensors and a chest strap monitor designed to capture heart rate and respiration data. The total time commitment required for this study will be no more than 75 minutes.

You will receive a $15 gift card in appreciation for your participation. Participation is completely voluntary, and you may withdraw from the study at any time without penalty. A decision not to participate will not have any negative repercussions on your university, program, or course evaluations.

If you are interested in participating in this study, please complete the survey below, which allows you to indicate your preferences among available time slots for the study:

[Insert link to Qualtrics survey here]

I am happy to answer any questions you may have about the study. You are welcome to e-mail me at kbiddle@vt.edu or call me at [insert phone number here].

Thank you,

Katie Biddle

Follow-up Recruitment Email

Dear [Participant Name],

I recently sent you an email about a research study I am conducting to explore the phenomenon of attunement in counselor education. I know this is a very busy time of year and wanted to reiterate that participation involves engaging in a single group drumming experience that will
last no longer than 75 minutes. Several times are available for participation. If you are interested in participating, please complete a survey regarding your scheduling preferences by clicking on the link below:

[Insert link to Qualtrics scheduling survey]

If you have any questions about this research or would like more information, please email me at kbiddle@vt.edu or call me [insert phone number here].

Many thanks,

Katie
Appendix E:

Mindful Attention Awareness Scale (MAAS)

Below is a collection of statements about your everyday experience. Using the 1-6 scale below, please indicate how frequently or infrequently you currently have each experience. Please circle the number that *really reflects* your experience rather than what you think your experience should be.

1 = *almost always*, 2 = *very frequently*, 3 = *somewhat frequently*, 4 = *somewhat infrequently*, 5 = *very infrequently*, 6 = *almost never*

1. I could be experiencing some emotion and not be conscious of it until some time later.

2. I break or spill things because of carelessness, not paying attention, or thinking of something else.

3. I find it difficult to stay focused on what’s happening in the present.

4. I tend to walk quickly to get where I’m going without paying attention to what I experience along the way.

5. I tend not to notice feelings of physical tension or discomfort until they really grab my attention.

6. I forget a person’s name almost as soon as I’ve been told it for the first time.

7. It seems I am “running on automatic” without much awareness of what I’m doing.

8. I rush through activities without being really attentive to them.
9. I get so focused on the goal I want to achieve that I lose touch with what I am doing right now to get there.

1 2 3 4 5 6

10. I do jobs or tasks automatically, without being aware of what I’m doing.

1 2 3 4 5 6

11. I find myself listening to someone with one ear, doing something else at the same time.

1 2 3 4 5 6

12. I drive places on “automatic pilot” and then wonder why I went there.

1 2 3 4 5 6

13. I find myself preoccupied with the future or the past.

1 2 3 4 5 6


1 2 3 4 5 6

15. I snack without being aware that I’m eating.

1 2 3 4 5 6

This instrument is in the public domain. Original source:

Appendix F:  
Inclusion of Community in Self Scale (ICS) – Modified

Circle the picture that best describes your sense of oneness with the group during each of the following drum circle interventions. (S = Self; G = Group)

1. Experimentation with instruments:

2. Initial breathing exercise:

3. “Let’s all play our drum” warm-up:

4. ‘rumble’ warm-up:

5. Group entrainment exercise:

6. Improvisational music making with eyes opened:

7. Improvisational music making with eyes closed (if applicable):

8. Closing breathing exercise:

Instrument adapted with permission of the author (D. Mashek, personal communication, April 6, 2017).
Appendix G:

The following is a visual depiction of the participants in this drum circle.

Please indicate the person or persons, other than yourself, to whom you felt most connected while improvising with your eyes closed by writing an “M” by the person(s)’ name(s).

Please circle the name of the person or persons, other than yourself, to whom you felt least connected while improvising with your eyes closed by writing an “L” by the person(s)’ name(s).
Appendix H:
Information Questionnaire

Please answer the following questions below about yourself by circling or filling in a response.

1. If you would like, please provide a preferred pseudonym: ________________________

2. What is your age in years: ___________

3. I identify my gender as:
   1. Man
   2. Woman
   3. Trans Male
   4. Trans Female
   3. Non-binary / Genderfluid
   4. I prefer not to disclose

3. I identify my race/ethnicity background as:
   1. African American
   2. Asian/Pacific Islander
   3. Hispanic/Latino(a)
   4. Native American
   5. White (non-Hispanic)
   6. Multi-racial
   7. None of the above categories
   8. I prefer not to disclose

4. I define my sexual orientation as:
   1. Bisexual
   2. Gay
   3. Heterosexual
   4. Lesbian
   5. Other
   6. I prefer not to disclose
5. Experience participating in group music making:
   1. Currently involved
   2. Past involvement
   3. Never involved but interested
   4. Never involved and little interest
### Appendix I:

**Study Procedures**

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Description</th>
<th>Duration (min.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fitting technology and determining seating</td>
<td>As participants arrive, they are fitted with wearable technology. They draw numbers designating where to sit.</td>
<td>20</td>
</tr>
<tr>
<td>Initial measures</td>
<td>Informational questionnaire and MAAS are administered</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td><strong>Drum Circle Protocol</strong></td>
<td></td>
</tr>
<tr>
<td>Introductions</td>
<td>Facilitator introduces the concept of a drum circle, the purpose of drum circles, and the instruments. Each instrument is demonstrated. Participants are able to ask questions about the experience.</td>
<td>8</td>
</tr>
<tr>
<td>Phase 1: Experimentation with instruments</td>
<td>Participants experiment with different instruments, eventually choosing one to begin group play</td>
<td>2</td>
</tr>
<tr>
<td>Phase 2: Initial breathing exercise</td>
<td>Facilitator leads deep breathing exercise</td>
<td>2</td>
</tr>
<tr>
<td>Phase 3: “Let’s all play our drum” warm-up</td>
<td>Participants play their instruments at the same time and all together based on facilitator’s use of a specific phrase</td>
<td>2</td>
</tr>
<tr>
<td>Phase 4: ‘rumble’ warm-up</td>
<td>Facilitator leads a rhythmic activity involving fast play of instruments and introducing different dynamics</td>
<td>3</td>
</tr>
<tr>
<td>Phase 5: Group entrainment exercise</td>
<td>Participants join rhythm at different times. Facilitator encourages changes in dynamics (loud – soft), tempo (slow – fast). Facilitator leads different instruments in play at different times.</td>
<td>7</td>
</tr>
<tr>
<td>Phase 6: Improvisational music making with eyes opened</td>
<td>Participants join rhythm at their own discretion and are invited to shift how they play as they see fit.</td>
<td>3</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Phase 7: Improvisational music making with eyes closed</th>
<th>Participants are invited to close their eyes or choose a focal point within the space and continue improvising as they see fit.</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 8: Final breathing exercise</td>
<td>Facilitator leads a deep breathing exercise</td>
<td>2</td>
</tr>
<tr>
<td>Final measures</td>
<td>ICS and interpersonal connection measure completed</td>
<td>5</td>
</tr>
<tr>
<td>Verbal discussion</td>
<td>Discussion of experiences</td>
<td>5</td>
</tr>
</tbody>
</table>
Appendix J:

Table J1

*Individual Drumming Behavior During ‘Improvisation with Eyes Closed’ Phase of Drum Circle*

<table>
<thead>
<tr>
<th>Time (s)</th>
<th>Allegra</th>
<th>Carol</th>
<th>Demi</th>
<th>Harmony</th>
<th>Lyra</th>
<th>Ottava</th>
<th>Researcher</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td>nods head</td>
<td>sways</td>
<td></td>
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<td></td>
<td>more complex</td>
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</tr>
</tbody>
</table>

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forward shift

more complex

off beat
off beat
off beat
style change
back on beat
rhythm change

shifts in seat
stops bouncing
stops tapping
bouncing heel

stops bouncing
more complex

louder simpler

simpler

off beat
off beat
off beat
back on beat

bouncing heel

stops bouncing

bouncing heel

sits up in seat

bouncing more
sits up taller
single sway

off beat
off beat
off beat
off beat

simpler back on beat

off beat
off beat
off beat
off beat
off beat
off beat
off beat
off beat
off beat
off beat

back on beat new rhythm
bouncing heel
sways drum

stops bouncing
Rhythmic pattern/style change
Out of sync with group pulse
Back in sync with group pulse
Movement or postural change

Note. Group ‘rumble’ continues for several seconds. More complex = more complex rhythmic pattern; simpler = simpler rhythmic pattern; style change = change in style of playing; rhythm change = change to rhythmic pattern of similar complexity; previous style = change to previous style of playing; calls ‘rumble’ = facilitator speeds up beat to signal beginning of ‘rumble’
Appendix K:

Institutional Review Board Approval Letter

MEMORANDUM

DATE: August 15, 2017

TO: Laura Everhart Welfare, Katherine Snead, Robin Marie Queen, Nicole Abaid, Tanner Upthegrove

FROM: Virginia Tech Institutional Review Board (FWA0000572, expires January 29, 2021)

PROTOCOL TITLE: An Exploration of Attunement in Counselor Education

IRB NUMBER: 17-653

Effective August 15, 2017, the Virginia Tech Institution Review Board (IRB) Chair, David M Moore, approved the Amendment 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) 4,6,7
Protocol Approval Date: July 13, 2017
Protocol Expiration Date: July 12, 2018
Continuing Review Due Date*: June 28, 2018

*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.
Appendix L:

Permission to use a modified version of the Inclusion of Community in Self Scale

Debra Mashek <mashek@hmc.edu> 4/6/17

to me  

Hi, Kathie.

Go for it!

Deb

---

On Thu, Apr 6, 2017 at 2:13 PM Katherine Biddle <kbiddle@vt.edu> wrote:

Hi Dr. Mashek,

I am hoping to use the ICS scale that you developed with Lisa Cannaday and June Tangney as part of my dissertation research on attunement in counselor education. I am studying how master's level counselors-in-training tune in with one another in the context of group improvisational music making. The scale would need to be adapted so participants could rate their sense of oneness with the group during each phase of the musical protocol.

I'm wondering if you would be open to an adaptation for this purpose. There really is no other measure that so succinctly and intuitively lends itself to the purpose of gauging participants' perceptions of attunement with the group as a whole over the course of a process.

Thank you in advance for your consideration. I'm happy to answer any questions you might have.

Best Regards,

Katie Biddle

Katherine Snead Biddle
Doctoral Candidate, Counselor Education
Virginia Tech
kbiddle@vt.edu