



UH 4504: Final Report

*Analyzing the Presence of Unmet Need and
Depressive Symptoms in Older Adults*

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ABSTRACT

This paper works to examine and determine a relationship or association between unmet need from disability and depressive symptoms in older adults. The older adult population is extremely vulnerable to deteriorating quality of life in the presence of unmet need or disability. Older adults are significant members of the population and deserve the right to a healthy, positive quality of life. Data from the National Health and Aging Trends Study (NHATS) provided quantitative data for both unmet need and depressive symptoms for beneficiaries of Medicare. The data was processed using descriptive statistics and basic statistical analysis. Dividing up data into subpopulations based on their unmet need and depressive symptoms across time points allowed the team to understand how the behaviors of the participants changed over time. The results of this analysis showed that those with a higher unmet need due to disability score also show more depressive symptoms. The data suggest that depressive symptoms and disability in adults are closely associated. Currently, there are several forms of governance helping this population out with basic needs, but there is substantial room for improvement. The results of this study have the potential to spread awareness and amend government policies to provide older adults with the services they need.

INTRODUCTION

Medicare is an important part of older adults' lives. Over 59 million Americans were beneficiaries of Medicare as of 2018 ("Total"). Medicare funding pays for medical needs such as hospital visits, regular doctor visits, nursing facilities, and home healthcare services, with \$17.7 million being paid out of the system on home health services alone in 2017 ("Does Medicare Cover"). Using data from the National Health and Aging Trends Study (NHATS), we analyzed data based on 1593 of these beneficiaries. This study includes an annual survey extended to older adults

using Medicare services. The study contains direct, objective questions that allow the researcher to analyze the data with minimal bias. Because the study is taken every year, researchers can follow the history of this population. In addition to the frequency, the questions also allow for a thorough investigation of the individuals with over twenty questions in categories such as hospital visits, health conditions, unmet needs, chronic conditions and depressive symptoms. The survey style allows the participant to rank their symptoms giving quantitative data to qualitative symptoms. It is imperative that these results are processed and acknowledged because older adults are a specifically vulnerable population who deserve a high quality of life.

A cursory look at the data shows that many older adults who are Medicare beneficiaries are not able to complete activities of daily living (ADL) due to disability and unmet need in the administration of proper care. Many of the disabilities that result in unmet need restrict older adults' mobility and adequate care is not always provided to ensure that ADL functions are completed. According to the United Nations, around 46% of older adults suffer from at least one form of disability (UN 2015). The inability to perform routine self-care practices is extremely frustrating and discouraging. The presence of persistent unmet need can be extremely detrimental to older adults, especially if it is coupled with a disability. The lack of necessary care has the potential to contribute to more disability thus repeating the cycle.

In recent years, mental health has become increasingly more relevant in schools and among the general population. This has been an exceptional movement as it raises awareness for treatment and reduces the stigma around the topic. This has been a very beneficial movement for the younger generations. Unfortunately, there are an estimated 6.5 million people aged 65 and older in the United States that suffer from symptoms of depression (Duckworth 2009). Depression is a chronic and extremely debilitating mental illness. The NHATS study investigates this

population by asking direct questions about the topic. Depressive symptoms can be a result of any number of life events or genetic traits. Common among all sufferers is the negative impact it has on the patient's quality of life. Due to the alarming population of older adults suffering from these symptoms, this is a population that cannot be ignored.

There are several pieces of legislation that attempt to serve the needs of older adults, such as the Older Americans Act which provides meals, job training, health promotion and transportation for older adults (Pub 2018). However, there may be further recommendations to be made in serving the population that could supplement them, especially in regard to the correlation between unmet need in fulfilling ADL and the incidence of depressive symptoms.

In our study, we have attempted to find out if there is an association between the incidence of unmet need, as caused primarily by disability, and the incidence of depressive symptoms in our population. The establishment of association does not imply causation. Association only notices a behavior in the presence of another behavior. We have also attempted to gain a better understanding of how these issues relate to one another through the body of scholarly literature on the subject, including the recommendations for dealing with these issues and have applied this knowledge to the information we have gained through the NHATS data.

METHODS

In order to determine whether or not a relationship exists between unmet need and depressive symptoms, we looked through the NHATS data provided by our client and determined which variables we were going to use. This data was a result of an annual survey sent to individuals on Medicare. Within this particular data set, the population size was 1593 individuals. Due to the magnitude of people suffering from unmet need due to disability and depressive symptoms, the team was confident in choosing these variables. Therefore, we specifically chose to look at four

depressive symptoms variables and seven disability/unmet need variables. These variables were based on the individual responses for the following questions from two different time points, with a year of time separating the two. For depressive symptoms the questions were the questions from the PHQ-4 (Lowe et al. 2010) listed as follows:

- Over the last month, how often have you had little interest or pleasure in doing things?
- Over the last month, how often have you felt down, depressed, or hopeless?
- Over the last month, how often have you felt nervous, anxious, or on edge?
- Over the last month, how often have you been unable to stop or control worrying?

The possible responses to these questions were “not at all”, “several days”, “more than half the days”, and “nearly every day”. These were scored 1, 2, 3, and 4 respectively. The unmet need due to disability variables were based on the responses for whether or not the individuals experienced disability/difficulty in the following seven ways:

- getting around outside
- getting around inside
- getting out of bed
- eating
- bathing
- toileting
- dressing

The responses to these questions were simply “yes” or “no” with “yes” receiving a numerical score of one and “no” zero.

We first separated our data into smaller subpopulations based on time point and whether the individuals were classified as having unmet need due to disability (yes/no) or as expressing

depressive symptoms (yes/no). This was determined by finding a cutoff for each. Based on the literature provided by the NHATS regarding the survey questions asked, we were able to determine the summation of seven as our cutoff for depressive symptoms. This depressive symptom score was determined by the summation of the scaled, individual responses to questions listed previously regarding their mood and feelings throughout the past month. Making seven our cutoff for depressive symptoms allowed for us to include mild (7-9), moderate (10-12), and severe (13-16) and exclude normal (4-6). The classification of these symptoms was determined by the PHQ-4 (Lowe et al. 2010). For disability-based unmet need, we determined a cutoff of four. This cutoff was determined based on the sum of individuals' scores of the seven unmet need categories. Four was selected as the cutoff because it represented persistent unmet need.

After these cutoffs had been determined, we went through the data and removed individuals who had a null value under one or any of these variables, these were shown as negative numbers in the data set or marked "#NULL". Because of the size of the data set, we found that removing these individuals would likely not skew the results. We felt more confident removing them entirely than deciding to place them under "yes" or "no" for any of the variables. We removed 34 of the 1593 individuals from the data set because of this. Once these individuals were removed, we were able to split up our populations based on these determinants (Tables 1 and 2).

We were able to use these subpopulations to run tests, create plots, and find associations. We began by looking at depressive symptoms as a whole across the two time points to determine if there was a significant change within the subpopulations. This was determined by looking at the change in populations across both times. Once this was found, we needed to determine significance and view changes between individual subpopulations. This process was iterated for the symptoms

of disability. Next, the results of the two analyses were compiled to show a trend between depressive symptoms and symptoms of disability.

Table 1. Subpopulations of unmet need based on disability. This shows the way that subpopulations were determined. “No” means that they did not have unmet need based on disability, because their score was below the cutoff of 4 and “yes” means that they did have unmet need based on disability because their score was 4 or greater or above the cutoff.

	Time Point 1	Time Point 2
No unmet need	No	No
Development of unmet need	No	Yes
Unresolved unmet need	Yes	Yes
Resolved unmet need	Yes	No

Table 2. Subpopulations of Depressive Symptoms. This shows the way the subpopulations were determined. “No” means they did not show depressive symptoms, because their score was below the cutoff of 7 and “yes” means they did show depressive symptoms because their score was 7 or greater, or above the cutoff.

	Time Point 1	Time Point 2
No depressive symptoms	No	No
Development of depressive symptoms	No	Yes
Unresolved depressive symptoms	Yes	Yes
Resolved depressive symptoms	Yes	No

RESULTS

Subpopulations for Depressive Symptoms

By applying the cutoff for depressive symptoms for each of the two time points, we were able to establish four subpopulations defined as “no depressive symptoms” for individuals who did not possess a score meeting the cutoff for either time point, “development of depressive

“symptoms” for individuals who did not possess a score meeting the cutoff at time point 1 but the score did meet the cutoff at time point 2, “unresolved depressive symptoms” for those whose score met the cut off at both time points, and “resolved depressive symptoms” for those who possessed a score equal to or above the cutoff at time point 1, but below the cutoff at time point 2 (Table 1).

Initially, we determined 10 to be our cutoff for the sum of depressive symptoms, based on the study by Lowe et al. that explains the PHQ-4 survey (2010). Using 10 as the cutoff meant that individuals with moderate and severe depressive symptoms would fall under “yes” whereas those with mild and normal symptoms would fall under “no” for both time points. Upon reading more in depth into the literature and discussing potential outcomes with the client, we determined that changing our cutoff to 7 in order to include those with mild symptoms under “yes” made more sense and was a more realistic explanation of those with depressive symptoms.

After dividing the data into subpopulations, we calculated the sizes of each subpopulation and then figured out the percentage in order to understand the distribution of the population as a whole. The largest portion of the population (37.0%) fell within the “unresolved depressive symptoms” subpopulation, which indicated that just over one-third of the population showed depressive symptoms at both time points (Figure 1). The second-largest group was the “no depressive symptoms” group where 29.3% of the population were individuals who did not express having depressive symptoms at either of the time points. The smallest proportion of 14.3% fell within the “resolved depressive symptoms” subpopulation, which means that individuals indicating depressive symptoms at the first time point saw resolution of those symptoms by the second time point. Lastly, 19.4% fell under the subpopulation of “development of depressive symptoms”, which means that these individuals did not indicate depressive symptoms at the first time point, but had developed these symptoms by the second time point. An important factor to

note is that the unresolved symptoms population makes up a substantial portion of the population. Another feature to note is that of the two populations that changed, the developed symptoms group (no/yes) was more representative than the resolved symptoms category. This signifies that more people are developing depressive symptoms than finding ways to resolve them.

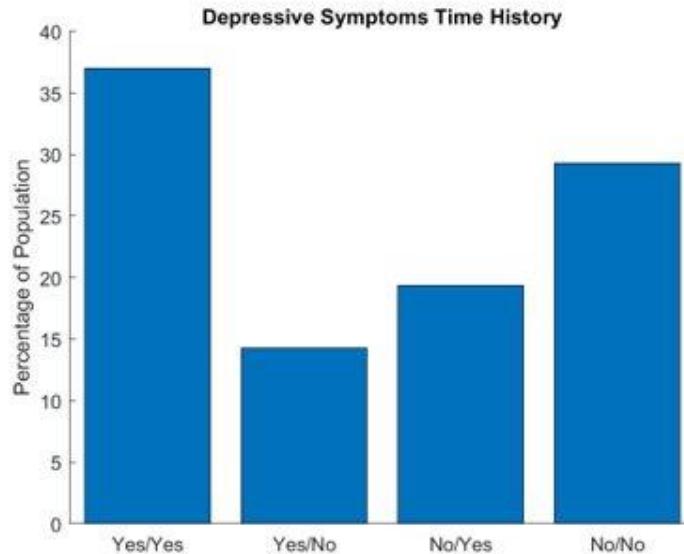


Figure 1. Subpopulations of Depressive Symptoms. The filtered population of respondents n=1593 was divided into subpopulations of, from left to right, “unresolved depressive symptoms” or “Yes/Yes” (37.0%), “resolved depressive symptoms” or “Yes/No” (14.3%), “development of depressive symptoms” or “No/Yes” (19.4%), and “no depressive symptoms” or “No/No” (29.3%) based on meeting or exceeding the cutoff for depressive symptoms score at the first and second time points. The first identifier applies to time point 1, while the second after the forward-slash (/) corresponds to time point 2.

Analysis of Depressive Symptoms Subpopulations

After determining the subpopulations and sizes within each of these groups, we decided to look more closely at the potential associations between the subpopulations. We calculated the descriptive statistics for the subpopulations, which included determining the average score, minimum score, maximum score, and standard deviation for each group (Figure 2). By comparing

these values, we were able to determine that there is a significant difference between the “unresolved depressive symptoms” and the “no depressive symptoms” subpopulations as there is no overlap of the standard deviation region for them.

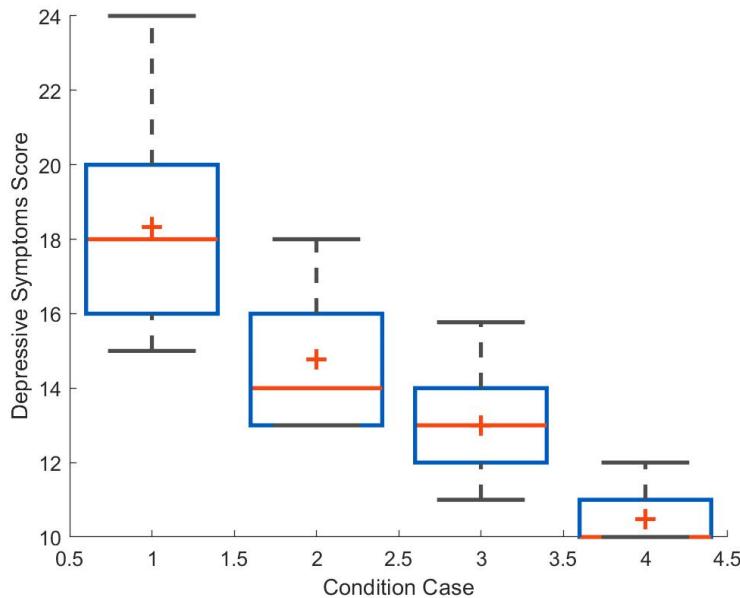


Figure 2. Range of depressive symptoms scores for the subpopulations. Where condition cases from left to right, these subpopulations are, “unresolved depressive symptoms”, “resolved depressive symptoms”, “development of depressive symptoms” and “no depressive symptoms”.

Subpopulations of Unmet Need due to Disability

As had been done with the data of the depressive symptoms, we chose to divide the unmet need due to disability data into similar subpopulations. These were “no unmet need”, “development of unmet need”, “unresolved unmet need”, and “resolved unmet need”. Originally, we used a cutoff of one to determine these subpopulations. This means that if the sum of the scores of an individual’s unmet need due to disability is greater than or equal to one then they fall under the “yes” category and if it is less than one then they fall under the “no” category. We thought that

if an individual has even one form of unmet need, it still counts and means that the disability is causing a lack in the individual's life.

After looking at the data with the cutoff of one, we realized that almost the entire data set would fall under the "yes" category for both time points. Since the majority of our population would fall above the cutoff of one, we determined a new cutoff of four. The new value shows persistent unmet need, as a score of four is over half of the symptoms, highlighting individuals who truly need additional help. This means that an individual with a sum of unmet need due to disability that is greater than or equal to four would fall under the "yes" group and those with a sum less than four would be in the "no" group. This new cutoff showed that the majority (41.2%) of individuals were in the "unresolved unmet need" subpopulation and then the next largest group (29.6%) fell under the "no unmet need" group (Figure 3). 16.7 of the population made up the third-largest group which was the "development of unmet need" group and the smallest group (12.5%) is the subpopulation of "resolved unmet need".

Analysis of Depressive Symptoms and Unmet Need

As our goal was to determine associations between depressive symptoms and unmet need, we next looked at the unmet need due to disability scores of the subpopulations based on depressive symptoms. We wanted to look at where the unmet need means fell for each depressive symptom subpopulation and how they compared to each other. We used a box and whisker plot to show this. The plot shows that those who had "unresolved depressive symptoms" also had higher unmet need based on disability (Figure 4). Those within the "resolved depressive symptoms" subpopulation also had a high number of unmet need, whereas those within the "no depressive symptoms" group and those in the "development of depressive symptoms" had smaller numbers of unmet need compared to the previously mentioned groups.

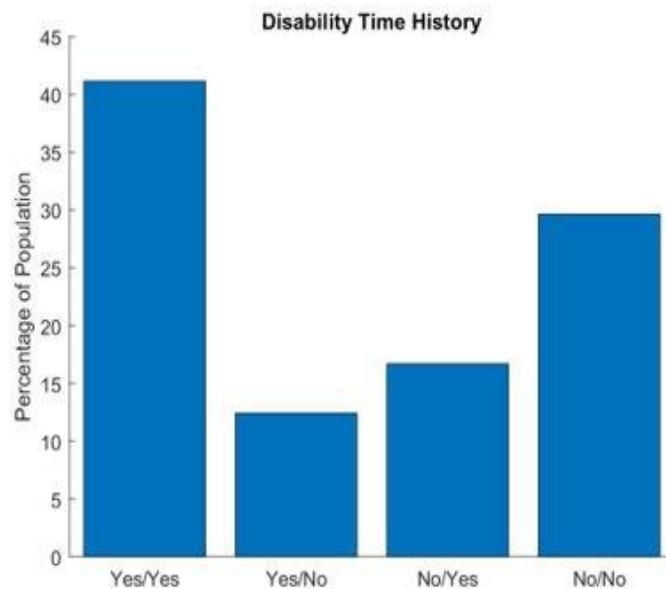


Figure 3. Disability Symptoms Breakdown According to Score Cutoff of 4. The filtered population of respondents n=1593 was divided into subpopulations of, from left to right, “unresolved unmet need” or “Yes/Yes” (41.2%), “resolved unmet need” or “Yes/No” (12.5%), “development of unmet need” or “No/Yes” (16.7%), and “no unmet need” or “No/No” (29.6%) based on meeting or exceeding the cutoff for the unmet need due to disability score at the first and second time points. The first identifier applies to time point 1, while the second after the forward-slash (/) corresponds to time point 2.

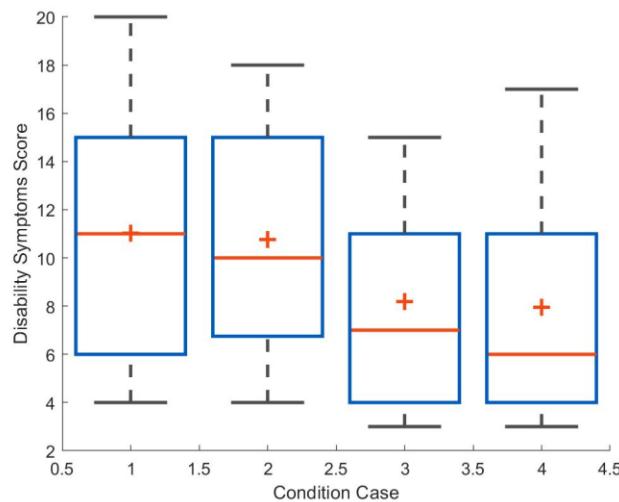


Figure 4. Box and Whisker Plot Showcasing Total Disability Symptoms over Time 1 and 2 of the Depressive Symptom Subpopulations. From left to right, the subpopulations of depressive symptoms are yes/yes, yes/no, no/yes, and no/no.

Analysis of Change in Status over Time

Two of our subpopulations that we wanted to look at in a more in-depth manner were the two subpopulations where a change in depressive symptoms status occurred between time point 1 and time point 2. We reviewed the depressive symptoms category where these individuals either developed depressive symptoms or resolved depressive symptoms. Next, the groups were assessed to see if their unmet need due to disability score changed as well, where individuals either developed unmet need potentially due to an increase in depressive symptoms score or saw their unmet need resolved and an associated decrease in depressive symptoms score. We began by looking at the means of the sum of the disability score from both time points within the “development of depressive symptoms” subpopulations at each time point. We also wanted to see where the majority of the individuals within these subpopulations fell regarding unmet need. We did this analysis with a box and whisker plot. At time point 1, the average of the group fell under the unmet need cutoff of four (Figure 5). However, at time point 2, when the group had developed depressive symptoms, they also met the unmet need cutoff. This shows that as unmet need due to disability increases, so do depressive symptoms. The disability score increased by just over a point. The upper quartile also moved up significantly from a disability score of five to seven. This is a substantial increase. Another important factor is that the lower quartile did not shift. This means that this population of people neither improved or deteriorated.

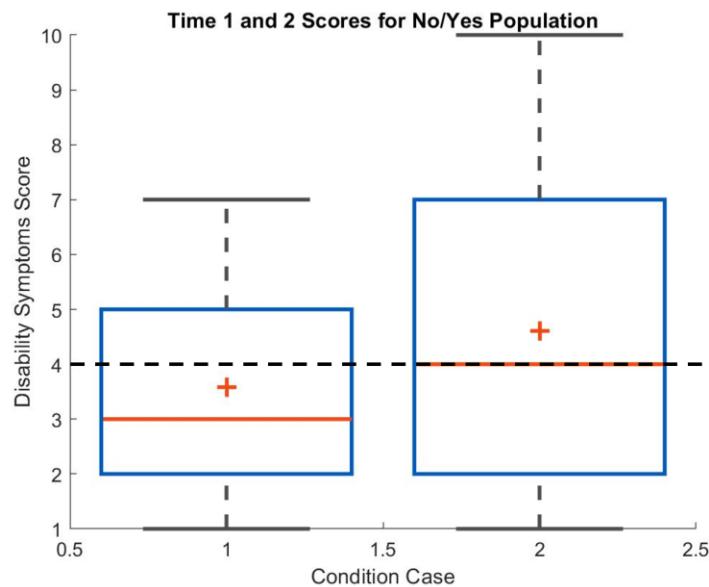


Figure 5. Times 1 and 2 for the Development Depressive Symptom Population. From left to right, the “development of depressive symptoms” subpopulation at time point 1 and the “development of depressive symptoms” subpopulation at time point 2.

Next, we did the same thing with the “resolved depressive symptoms” subpopulation as we did with the “development of depressive symptoms” group. Again we wanted to look at the means of the sum of the disability scores at both time points for unmet need and where the data fell for this “resolved depressive symptoms” group at both time points. We did this in order to assess a potential association between the two variables. We did this analysis with a box and whiskers plot. The data showed us that the mean disability score went up, but not drastically or significantly (Figure 6). Similar to the previous plot, the lower quartile bounds did not change. The upper quartile changed from a value of seven to eight. While these numbers are higher than the previous population, the change over time is less.

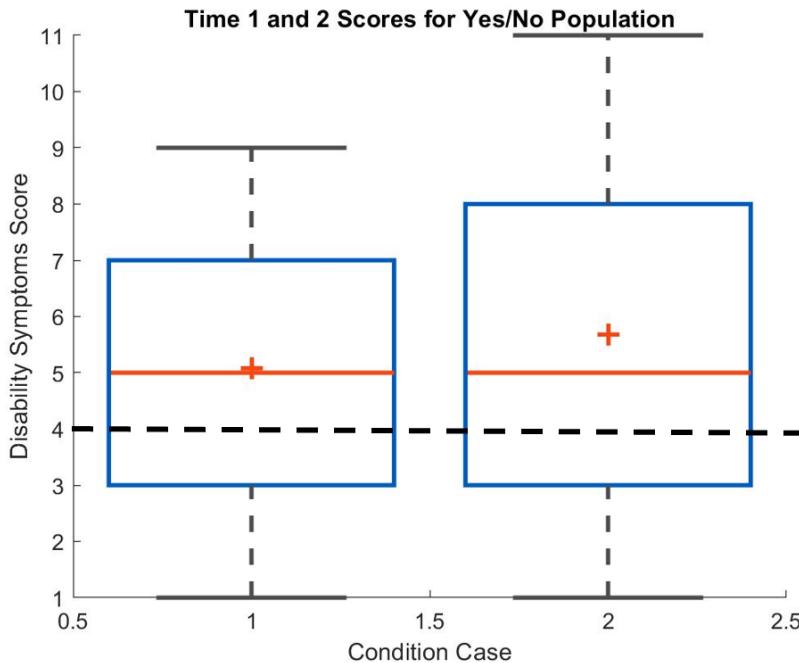


Figure 6. Times 1 and 2 for the Resolved Depressive Symptom Population. From right to left, the “resolved depressive symptoms” population at time point 1 and time point 2. This shows the disability scores of the subpopulation at the two time points.

CONCLUSION

The cursory analysis of the depressive symptoms and unmet need due to disability data for the population of older adults used in this study indicates that there is a potential symmetrical relationship, as well as possibly a reciprocal relationship between depressive symptoms and disability-associated unmet need. The data suggest that an increase in depressive symptoms is associated with an increase in disability score. Because of this, we are able to conclude that there is an association between depressive symptoms and unmet need as they increase. The data showed us a trend where the depressive symptoms scores and disability need scores increase at the same time, however, we did not see the same trend as they decreased. We also saw that over time, the total depressive symptoms score for the population decreased (Supplemental Figure 1), which may be because of a decrease in disability, or spurious variables that we have yet to examine. This

association that we found between these two variables may suggest there is a niche population in need of improvement.

DISCUSSION

As it currently stands, the body of American policy concerning depression and disability among older adults allows states much discretion in how they treat them. The Older Americans Act (OAA) is one of the foremost policies concerning this population. It established the Administration on Aging (AoA) which oversees the many state-level administrations that carry out the Act's mandates. The OAA was designed to provide older adults with critical services, such as providing meals, job training, health promotion, and transportation. In terms of mental healthcare, its provisions are scant and somewhat vague, perhaps to eliminate the need for excessive supervision and bureaucracy. AoA reports from Virginia help illustrate the impact of the discretion the Act provides. The only concrete services that the state's 2019 - 2023 plan proposes to the institution are social activities that older adults may participate in their leisure time. All other goals are less well-defined. They primarily include goals to increase staff training on different mental health conditions (United States).

It has been shown that there are severe racial and ethnic disparities in diagnosing and treating mental health conditions, with whites being diagnosed and treated at much higher rates than other groups (Akincigil et al 1). Additionally, it has also been shown that older adults often do not properly adhere to mental health treatment and it has been recommended that stricter treatment implementation guidelines be imposed to encourage proper adherence (Sirey et al 1). The findings listed above are quite prevalent in the literature, and one might be surprised to find that they have not been properly addressed by the OAA. The OAA is amended often, and perhaps

it should incorporate guidelines for ensuring that older adults of all demographics are properly diagnosed and treated, as well as guidelines for the promotion of treatment adherence.

In improving treatment for older adults, the United States could learn and borrow much from the National Health Service (NHS) in England. Under the NHS, according to the International Commonwealth Fund, the English Secretary of State is required to “promote a comprehensive health service that provides care free of charge, apart from services with charges already in place” (“International Health Care System Profiles.”). This system provides universal healthcare coverage to all English citizens, although private health insurance still exists. As it relates to our research, the NHS *does* cover mental healthcare, as well as some in-house visits by nurses (International Health Care System Profiles: England). Depression is one of the many mental health conditions covered by the NHS, and a range of counseling and psychiatry services, among others, are covered under it (“NHS Choices”). Still, the incidence of mental health conditions is slightly higher in England by about two percent, (“Mental Health Statistics: Older People”) but this could possibly be due to higher rates of diagnoses that result from care being accessible to all.

Mental health disorders are often chronic and require ongoing treatment, thus presenting a long-term financial burden to those who suffer from them. They are also often excluded from insurance schemes in countries that do not provide universal mental healthcare, and thus those who suffer from them often have to pay for treatment out of pocket (Chisholm et al.). America does not currently provide universal coverage for mental healthcare services, and some seniors may be deterred from seeking treatment due to high costs or may have to choose between mental health treatment and other essential health services. It is possible that more mental health conditions will be properly diagnosed under a universal mental healthcare system as well, thus producing statistics on mental health among older adults that are more accurate.

Taking a step towards a system similar to the NHS that provides a range of services for mental health conditions as well as services for disability and unmet need could reduce both the incidence of all the conditions we have discussed herein. Providing this kind of system may help ensure that all demographics of our population are able to access mental healthcare by reducing cost barriers and allowing patient choice in a wide range of treatment options. Better training in racial sensitivity in mental health and promoting better practices for adherence to mental healthcare treatment regimens may be beneficial in ensuring mental health treatment is properly given to all demographics and is carried out properly as well. If these adjustments are made, many of the problems we have discussed here, including the incidence of disability, unmet need, and depression may decrease through care that is arguably more financially accessible, equitable, and thorough.

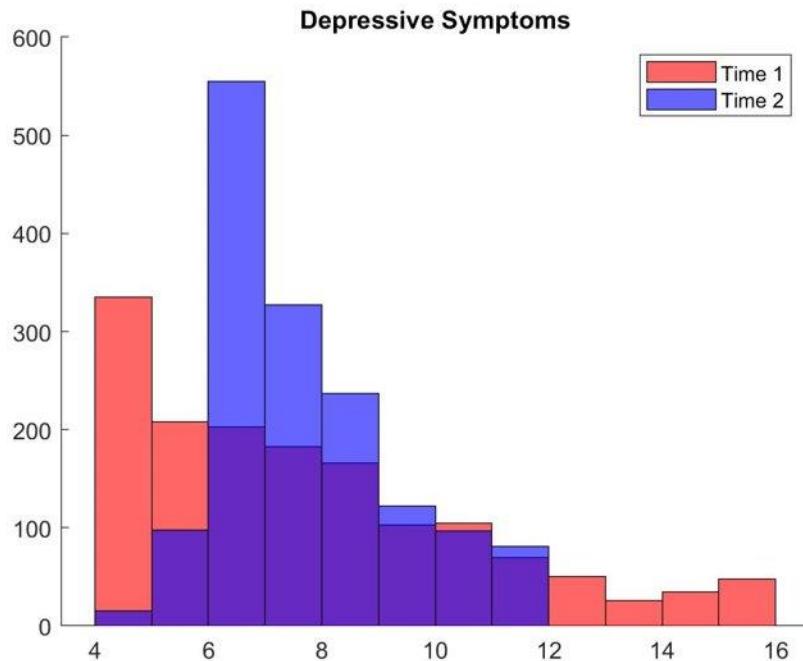
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Supplemental**Supplemental Figure 1. Depressive Symptom Scores Over Time 1 and Time 2**

During Time 2. This shows the distribution of scores of depressive symptoms from time point 1 (pink) and time point 2 (blue).