CHRONICITY AMONG OLDER PSYCHIATRIC INPATIENTS

by

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ABSTRACT

The goal of this dissertation is to examine factors that could relate to length of stay (LOS), latency to readmission, and number of admissions. Length of stay is generally defined as the amount of time an individual stays in the facility; latency to readmission is the amount of time between the last discharge and the most recent admission for each individual. I examined several factors that related to these outcomes, including number of falls, number of assaults, medical diagnoses, psychological diagnoses, frequency of PRN medication, emergency department visits and seclusion/restraints. Structural equation modeling was used to create statistical models incorporating these variables.

Several models were proposed using each variable (LOS, admits, and latency) as outcome variables. Based on these models, integrated models were proposed and analyzed. Results based on these models were discussed and future research projects were proposed.

DEDICATION

This document is dedicated to everyone who helped me through the process of developing my proposal, analyzing the data, and writing this document. In particular, I would like to acknowledge my parents (Kathy and Steve) who have supported me throughout graduate school.

LIST OF ABBREVIATIONS AND SYMBOLS

α	Cronbach's index of internal consistency
df	Degrees of freedom: number of values free to vary after certain restrictions have been placed on the data
M	Mean: the sum of a set of measurements divided by the number of measurements in the set
p	Probability associated with the occurrence under the null hypothesis of a value as extreme as or more extreme than the observed value
SE	Standard error
Y	Independent variable
X	Dependent variable
CFI	Comparative Fit Index
SRMR	Standardized root mean square residual
RMSEA	Root mean square error of approximation
<	Less than
=	Equal to

ACKNOWLEDGEMENTS

I would like to thank my committee chairperson and mentor, Patricia Parmelee, for her continued guidance and support. I would also like to thank the rest of my committee for their helpful suggestions throughout the process of proposing this dissertation. Finally, I would like to express my gratitude toward the staff and patients of the Mary Starke Harper Center.

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INTRODUCTION

According to Manning and Ducharme (2010), approximately 7.7 million individuals will be suffering with dementia by 2030. However, despite the increase in the older adult population and the threat of dementia, nursing homes and other facilities (such as assisted living facilities) may not be equipped to deal with increased demand (Tse, Leung, & Ho, 2011; Sandburg, Lundh, & Nolan, 2001). Serious mental illness (such as schizophrenia, other psychotic disorders, and bipolar disorder) is also becoming increasingly common in older adults, possibly due to the aging of the population (Dobrohotoff & Llewellyn-Jones, 2011). Other psychological conditions, such as depression, also have a significant impact on the older adult population. Depressive symptoms may negatively impact medical diagnoses, including diabetes and dementia (Siegal et al. 2012), and reduce an individual's quality of life (Blazer, 2003; Hoover et al., 2010).

A Brief History of Psychogeriatric Units

Due to the increased recognition of these psychological conditions in older adults, psychogeriatric units (PGUs) have become increasingly prominent (Dobrohotoff & Llewellyn-Jones, 2011). These units are specifically designed to deal with the psychiatric needs of older adults whose problems cannot be managed on an outpatient basis. Patients with a wide variety of psychogeriatric illnesses, including dementia, schizophrenia, bipolar disorder, and depression, may be admitted to such units (Dobrohotoff & Llewllyn-Jones 2011; Grant & Casey, 2000; Haude et al., 2009). There are several advantages to this kind of environment. As noted by Grant and Casey (2000), PGUs provide patients with the opportunity to be treated by staff that

are familiar with possible problems and complications that might impact the older adult population. They further suggested that providing a population-specific program may increase treatment efficacy and provide a safe place for older adults. Group therapy to address social isolation and the involvement of family members were also identified as an important aspect of treatment. Based on these principles, Grant and Casey (2000) reported that 84.2% of the patients in one PGU were either moderately or markedly improved by the time of discharge. Two additional studies, conducted in Germany, also demonstrated positive results (Haude et al., 2009; Maier, Wachtler, & Hofmann, 2007).

On the other hand, a study conducted in Israel found less promising results (Heinik, Barak, Salgenik, & Elizur, 1995). This study also investigated two different hospitals with different approaches to the treatment of older adults over the course of one year by medical chart review. One hospital used primarily generalized wards while the other had a specialized geriatric unit. The authors found no differences in terms of length of stay, death rates, status at discharge, and placement location between the two hospitals. However, the authors noted that the specialized unit was relatively new in terms of staff training and program development (Heinik, Barak, Salgenik, & Elizur, 1995). Admission rates were higher for the specialized unit, although the authors attributed this to greater public awareness of the hospital and the specialized unit.

Using data from a psychogeriatric hospital located within the state of Alabama, I examined how certain variables impact the chronicity of patients. In this context, chronicity includes length of stay (LOS), the number of previous admissions, and the time to readmission (if any, such that a longer time between readmissions indicates lower chronicity). Specifically, I examined variables related to medical comorbidity, “pro re nata” (PRN) medications, psychiatric

diagnoses, and adverse incidents (such as falls) to determine if they have any impact patient chronicity. In the following pages, I will briefly review the literature for each of these constructs, as well as my hypotheses and visual models.

Medical Comorbidity

Medical comorbidity is common in the older adult population and has a significant impact on diagnosis and management of both medical and psychological disorders (Adams & Ball, 2000). Physical illnesses are also commonplace among older adults admitted to psychiatric institutions. Adams and Ball (2000), in a study utilizing retrospective case review, demonstrated that psychiatric disorders are highly associated with medical diagnoses. Individuals diagnosed with mood disorders suffered more from hypertension and cardiovascular disease than those with an organic disorder (such as dementia) or schizophrenia. Individuals with schizophrenia were more likely to be diagnosed with diabetes and endocrine illnesses than the organic group. Finally, individuals with an organic disorder were less likely to be diagnosed with diabetes or an endocrine-related illness. The authors concluded that medical specialists should be aware of the high level of comorbidity between medical and psychiatric diagnoses, particularly when working with individuals diagnosed with depression or schizophrenia (Adams & Ball, 2000).

Due to this high comorbidity, Inventor and colleagues (2005) note the importance of adapting geriatric psychiatry units to fit the needs of older adults. Specifically, the authors point out that medically complex patients are becoming the norm due to frailty, delirium, and polypharmacy (Inventor et al., 2005).

PRN Usage

Polypharmacy may result from a variety of sources, including overmedication, reliance on medication as an effective intervention, the focus of treatment on specific symptoms, and inappropriate combinations of medications (Inventor et al., 2005). The use of PRN medications to address behavior may be a particularly important contributor to polypharmacy in PGUs. Haw and Wolstencroft (2014) note that the use of PRN medications to address behavior, particularly psychotropic medications, is controversial in older adult patients as the drugs may impair cognition and lead to falls (Aisen & Deluca, 1992). To address this controversy, Haw and Wolstencroft (2014) conducted a cross-sectional survey of PRN usage across seven wards in the United Kingdom. In this survey, the researchers compared older adult patients to patients of working age. The data came from a variety of locations, including one open unit, three locked units, two low security units, and one medium security unit. The use of PRNs with older patients was common: 61% had received at least one dose, and 27% had received one or more doses within the previous two weeks. Benzodiazepines were used more often than antipsychotics, and the most common antecedent to a PRN was threatened or actual violence by a patient. Agitation was also a common reason for PRN use. However, older adults received PRN medications less frequently than working age adults; when older adults did receive PRNs, the dose was often lower. Additionally, no difference in PRN use was found between patients diagnosed with psychiatric illnesses and those diagnosed with medical disorders (Haw & Wolstencroft, 2014).

LOS in General Hospital Settings

Numerous studies have examined the variables associated with LOS in general medical settings, such as public hospitals. In a general hospital setting, age, sex, complex comorbidities, the behavioral symptoms associated with dementia, complications of treatment, and difficulty

arranging community placement have all been associated with increased LOS (Ismail et al., 2015; Connolly & O'Shea, 2014; Chung et al., 2010; Cho et al., 2006). Studies conducted in Ireland (Connolly & O'Shea, 2014), Australia (Snowden, 1993), South Korea (Chung et al., 2010), Taiwan (Liu, Li, Liu, & Tu, 2012), and Massachusetts (Blais et al., 2003) have demonstrated that dementia is associated with increased hospital LOS. Another study conducted in Australia by Draper and colleagues (2011) found that individuals over the age of 50 diagnosed with dementia had a mean stay of 16.5 days in public hospitals. However, individuals without dementia had a mean stay of 8.9 days.

The behavioral disturbances of dementia (such as agitation, aggression, wandering, and sleep disturbance) may contribute to an individual's length of stay. Such disturbances are relatively common and are associated with the severity of cognitive impairment (Hwang, Yang, Tsai, & Liu, 1997). The recognition of these disturbances is very important, since behavioral disturbances are more easily treated than cognitive impairments per se (Hwang, Yang, Tsai, & Liu, 1997).

Psychiatric diagnoses and psychiatric symptoms also make a major contribution to an individual's LOS in general medical hospitals. Anderson and colleagues (2004) used the Brief Psychiatric Rating Scale (BPRS-E) to assess several factors related to inpatient LOS; they found that depression, anxiety, and apathy were significantly correlated with an extended hospital stay. Gluyas and colleagues (2011) found that the severity of hallucinations and/or delusions was associated with a longer LOS; however, self-harm and substance use were associated with decreased LOS. A diagnosis of schizophrenia, a diagnosis associated with hallucinations and delusions, also contributes to increased LOS (Liu, Li, Liu, & Tu, 2012).

Psychiatric Settings

A LOS study conducted by Ismail and colleagues (2015) is unique in that it included a specialized geropsychiatric inpatient ward as well as general hospital settings. A higher number of medical diagnoses was associated with decreased LOS but only for individuals diagnosed with dementia; a higher pain score at admission was also associated with decreased LOS (Ismail et al., 2015). The authors suggested that treatments designed to alleviate pain or the burden of medical comorbidity may have been the cause of the reduced LOS. On the other hand, functional incapacity and positive psychotic symptoms predicted an increased LOS (Ismail et al., 2015).

Several studies have attempted to characterize patients who stay in psychiatric facilities for long periods of time. In a comparison of older and younger patients, Soni and Mallick (1993) found that both groups demonstrated a high frequency of negative symptoms and disorganization. However, the authors also noted that aging may change the presentation of schizophrenia as well as response to treatment. Specifically, older patients may experience a reduction in paranoia, a reduction in the liver's ability to handle antipsychotics, and a reduction of dopamine receptors in the brain (Soni & Mallick, 1993). As a result, older adults tend to have less severe positive symptoms than younger adults but more severe negative symptoms and cognitive impairment (Davidson et al., 1995). White and colleagues (1997) hypothesized that severe psychotic symptoms, dangerous behaviors, and cognitive impairment were associated with the retention of older patients in state psychiatric hospitals. Using data collected over the course of several years, the authors concluded that it is behavioral disturbance rather than psychosis, medical diagnoses, or cognitive impairment that truly drive increased LOS in geropsychiatric facilities.

Other researchers have examined what variables are associated with readmission to psychiatric facilities. Several factors have previously been associated with frequent readmission, including sex, shortened LOS at previous visit, comorbid depression and dementia (Kales et al., 1999), physical health, and a diagnosis of bipolar disorder (Mercer et al., 1999; Bartels et al., 1999). Woo and colleagues (2006) used data obtained from 424 patients at the University of California, San Diego's Senior Behavioral Health Unit to examine significant predictors of readmission. The authors determined that a diagnosis of bipolar disorder, single relationship status, and male sex were associated with readmission. Notably, they were unable to replicate the previous finding that comorbid depression and dementia is associated with readmission to a psychiatric hospital (Kales et al., 1999; Woo et al., 2006). However, several variables were not examined in this study, such as the presence of comorbid medical disorders, suicidal behaviors, or global functioning. The authors suggested that future studies should examine these variables and work to identify strategies that might be used to decrease the frequency of admission (Woo et al., 2006). Such strategies might include intensive outpatient programs, specialized services, and psychological treatments (Woo et al., 2006).

Finally, chronic pain has also been shown to be common among patients in geriatric psychiatry units (Meeks et al., 2008). Approximately 62% of the patients in a university-based unit were diagnosed with some form of self-reported chronic pain (Meeks et al., 2008). Medical burden, suicidal ideation, decreased sleep, and the diagnosis of a personality disorder were associated with chronic pain. However, comorbid chronic pain did not influence LOS in this study (Meeks et al., 2008). Osteoporosis has been associated with increased LOS (Stubbs, Zapato-Bravo, & Haw, 2009), and the disease is more prevalent among individuals diagnosed with an affective disorder or schizophrenia (Meyer & Lehman, 2006). Pain, although not

directly measured in this study, was examined using information related to PRN analgesics. As discussed earlier, PRN medications are often used for general pain and to reduce psychiatric symptoms.

Falls in Hospitalized Older Adults

Falls also have a significant influence on the chronicity and associated outcomes of older adults. The falls literature is quite extensive, so this review will focus primarily on hospitalized older adults. The potential casual factors will be discussed first, followed by the relationship between falls and chronicity. Blair and Gruman (2005) concluded that the incidence rate of falls in psychiatric facilities is higher than in general hospitals due to the presence of more cognitively impaired individuals and the associated behavioral disturbances. Fallers were on average 3 years older than nonfallers, although the sex distribution was approximately equal. Greater medication use was the most significant predictor of falls; patients taking more than 3 medications had the greatest risk of falling (Blair & Gruman, 2005). Although the authors of this study did not differentiate between psychotropic medications and medications used for other purposes, other research has indicated that the use of antipsychotic medication is associated with higher fracture rates in nursing homes (Rigler et al., 2013). Hypnotics, benzodiazepines, cardiovascular medications, and antidepressants have been associated with an increased risk of falls (Joo et al., 2002; Monane & Avorn, 1996). Additionally, Blair and Gruman theorized that the prevalence of falls among psychiatric patients may be because the patients are encouraged to be active by attending group exercise classes and therapy (Blair & Gruman, 2005).

Gait instability, confusion, urinary incontinence, and a history of previous falls have also emerged as risk factors for falls (Nanda et al., 2011). Of more interest for the current work, psychological conditions such as delirium, delusions, and depression may also be related to fall

risk. One study found that delirium and delusions are associated with a higher risk of falls due to the agitation associated with these conditions (Nanda et al., 2011). On the other hand, depression was associated with a decreased risk of falls due to decreased mobility (Nanda et al., 2011). However, many other studies have demonstrated that depression is highly predictive of recurrent falls in a variety of settings (Grenier et al., 2014; Guzman, 2013; Kao et al., 2012; Kvelde et al., 2013; Kwan, Lin, Close, & Lord, 2012).

Greene and colleagues (2001) examined the influence of falls on LOS in a geropsychiatric unit. The authors found that neither cognitive impairment nor medical illnesses predicted LOS, but the number of falls was a significant predictor. Recurrent falls were associated with increased LOS. These findings led the authors to conclude that an assessment of fall risk at admission might help to identify patients who are at risk for increased LOS. Once identified, procedures could be put in place to reduce falls for at-risk patients and decrease LOS (Greene et al., 2001).

Anderson's Health Care Utilization Model

Few theories have been developed to explain chronicity in the geropsychiatric population, but one likely candidate is the health care utilization model originally theorized by Anderson in the 1960s (Anderson, 1968; Anderson, 1995). The original model contained three factors that contribute to how an individual determines if services are needed: predisposing, enabling, and need factors (Anderson 1968; Anderson, 1995). The predisposing factor refers to the characteristics that may influence an individual to seek health care (demographics, societal beliefs), and the enabling factor refers to an individual's ability to secure available services. The need factor, or illness level, involves the perception of illness and the recognition that services are needed (Anderson 1968; Anderson, 1995). This model has changed significantly since its

original conception as additional researchers have attempted to apply Anderson's theory to their research interests. For example, Aday and Anderson (1974) expanded the model to include variables related to healthcare policy, characteristics of the system, and consumer satisfaction. While the model has gone through several iterations, Anderson's original model will be used for the present study because it provides the best match to the available study data. Specifically, the lack of consumer satisfaction and policy related information limits the application of Anderson's expanded model to the current data. Therefore, predisposing, enabling, and need factors will be emphasized within a gerospsychiatric context.

Several studies have attempted to use this model to track the healthcare behaviors of older adults. For example, Cully and colleagues (2005) examined the usage of emergency care services among older adults with psychiatric diagnoses. Cognitive, psychotic, and bipolar disorders were associated with a higher rate of hospital admissions; meanwhile, depression, substance use, and anxiety were associated with a lower number of admissions (Cully et al., 2005). The researchers also found a difference based on race/ethnicity. Specifically, African Americans were more likely to be admitted to the hospital and Caucasians were more likely to be given a diagnosis of substance abuse (Cully et al., 2005). Racial/ethnic differences exist for other parts of the healthcare system as well, including mental health. De Guzman, Woods-Giscombe, and Beeber (2014) identified several barriers that prevent older Hispanic adults from seeking treatment. The researchers indicated that issues related to accessibility, availability, and acceptability often plague this population (De Guzman, Woods-Giscombe, & Beeber, 2014). Additionally, African Americans have higher rates of dementia and schizophrenia compared to Caucasians, who are more likely to be diagnosed with depression or anxiety (Husaini et al.,

2002). Compared to women, men of either race demonstrated higher rates of emergency and inpatient service use and lower rates of outpatient care (Husaini et al., 2002).

Generally, a diagnosis of depression or dysthymia has been associated with increased use of psychiatric services, additional psychiatric diagnoses, and mortality (Djernes, Gulmann, Foldager, Oleson, & Munk-Jorgenson, 2011). Patients with depression were also more likely to visit their general practitioner compared to older adults without a psychiatric diagnosis or with less severe depressive symptoms (Djernes, Gulmann, Foldager, Oleson, & Munk-Jorgenson, 2011; Press, Tandeter, Romem, Hazzan, & Farkash, 2012). No differences were observed in the usage of general hospital care (Djernes, Gulmann, Foldager, Oleson, & Munk-Jorgenson, 2011). However, Hendrie and colleagues found that patients with serious mental illnesses (defined as schizophrenia, bipolar disorder, and major depression) were more likely to visit the emergency department and stay longer in the hospital. The rate of falls, substance abuse, and alcoholism were also higher in the seriously mentally ill (Hendrie et al., 2013). On the other hand, the impact of schizophrenia on the healthcare system may differ based on the age of the patient. Jin and colleagues (2003) found that hospitalization, emergency care, and day treatment use was highest among younger patients. The use of these services decreased with age, although older adults were more likely to use case management services (Jin et al., 2003).

Individuals with dual diagnoses may not follow this trend. Prigerson, Desai, and Rosenheck (2001) examined the utilization patterns among older adults within Veterans Affairs (VA) hospitals. The rate of dual diagnosis (defined as having diagnoses of psychiatric and substance use disorders) decreased with age; however older adults who fit this criterion demonstrated increased utilization of inpatient and outpatient services for substance abuse.

Furthermore, these older adults were more likely to utilize general outpatient psychiatric services (Prigerson, Desai, & Rosenheck, 2001).

The perception of need may also impact an older adult's willingness to seek services for mental health needs. A survey of patients with psychiatric disorders indicated that 47.1% of older adults indicated that they did not perceive the need for professional mental health services (Mackenzie, Pagura, & Sareen, 2010). Those older adults who perceived a need for such services had a greater number of psychiatric diagnoses and suicidal behaviors (Mackenzie, Pagura, & Sareen, 2010). Common barriers to service use included the desire to handle problems on one's own, residence in a rural area, greater functional impairment, cost, and the belief that seeking services was too time consuming (Mackenzie, Pagura, & Sareen, 2010; Li, Proctor, & Morrow-Howell, 2005). Frailty may also impact how an older adult utilizes health care services. For example, frailty has been found to increase the use of primary and hospital services (Ilinca & Calciolari, 2015). Since the prevalence of frailty among older adults is likely to increase, the utilization services may increase in the years to come (Ilinca & Calciolari, 2015).

Study Goals and Hypotheses

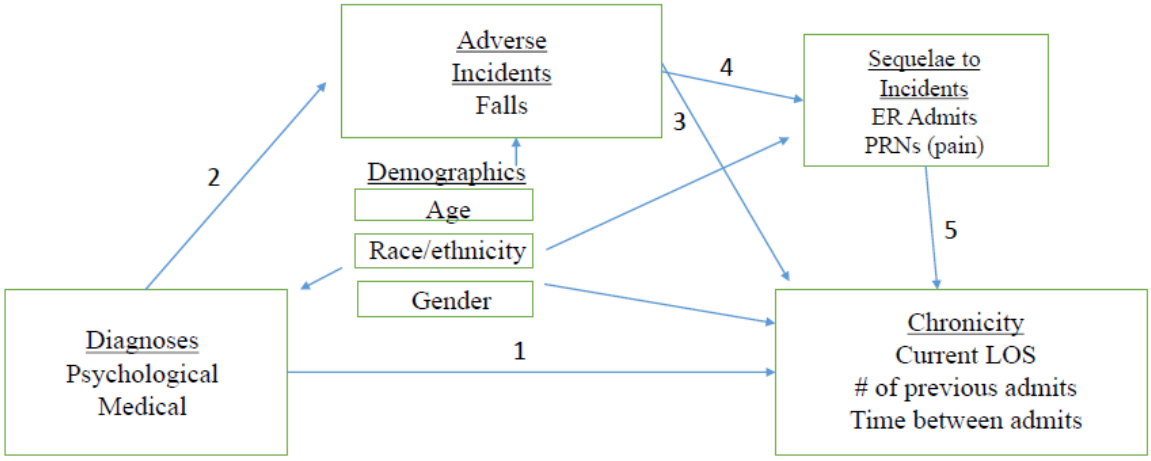
The current study applied Anderson's model to psychiatric chronicity among older adults to create two comprehensive models. Specifically, Anderson's model was used in an attempt to answer questions related to the predictors of chronicity in this population. In accordance with Anderson's model, variables related to predisposing characteristics, enabling resources, and need will be examined. Predisposing variables included in the present model include diagnoses (psychological and medical), age, race/ethnicity, and sex. Enabling resources, which typically include both community and family components, will be examined using treatment attendance. Finally, falls, assaults, PRNs, seclusions, and ED visits will serve as indicators of need since

increases in these variables potentially indicate chronicity. To achieve the goals of the current study, several hypotheses were examined, and two models were proposed relating to common events in geropsychiatric environments (falls and assaults).

Not only are these events common within this population, but, as research reviewed earlier documented, both falls and assaults have been previously associated with the proposed components of chronicity. Furthermore, these two incidents have been given emphasis in the present models due to their potential to influence other need related variables. For example, more falls may lead to more PRN medications for pain and a greater number of ER visits; the increase in these variables may also influence an individual's chronicity. Additionally, a greater number of assaults may lead to more seclusions or psychological PRNs. Like pain PRNs and ER visits, seclusions and psychological PRNs may indicate an increased need for specialized care. In this way, falls and assaults may be "gateway" variables that increases other indicators of need. The models provided below include numbers to identify each hypothesized relationship.

Falls

Figure 1. Falls model with numbered hypothesis arrows.



The first model (above) addresses the relationship among demographics, diagnoses, falls, sequelae, and chronicity. Previous work conducted with this data found that African American race and number of assaults predicted an individual's LOS (DiNapoli, Regier, McPherron, Mundy, Sabastian, Doss, & Parmelee, 2015). However, the authors did not address how falls might impact an individual's stay in a geropsychiatric hospital. Furthermore, the current study conducted a complex set of analyses using a statistical procedure known as structural equation modeling (SEM). Using this method, it is possible to see how several variables relate to one another simultaneously. These variables are described below.

Demographics hypotheses

Age (Seitz et al., 2012), sex (Azad, Bugami, & Loy-English, 2007), and race/ethnicity (Cabassa et al., 2013; Nguyen, Huang, Arganza, & Liao, 2007; Perlman et al., 2015) have previously been associated with psychiatric and medical diagnoses. It is hypothesized that age, male sex, and African-American race will be associated with a diagnosis of a psychotic disorder or dementia and a greater number of chronic health conditions. Furthermore, it is hypothesized that non-Hispanic White (NHW) race will be more associated with major depression. The racial composition of the population is largely NHW or African-American (AA), so these two ethnicities will be emphasized in the present study. Based on research cited above, it is hypothesized that these variables may also affect the other variables in the model. Therefore, all these variables will serve as covariates in the model.

Hypothesis 1

It is hypothesized that a diagnosis of a psychotic or manic illness (as opposed to dementia or depression) and low medical severity will result in greater patient chronicity. For example, bipolar disorder and psychosis (diagnoses associated with psychotic or manic states) have been

associated with increased LOS (Mercer et al., 1999; Bartels et al., 1999; Blais et al., 2003; Draper et al., 2011). Rehospitalization is also high in this population, possibly due to medication noncompliance (Pratt, Mueser, Driscoll, Wolfe, & Bartels, 2006).

Hypothesis 2

Psychosis, bipolar disorder, dementia, and high medical severity are hypothesized to be associated with an increase in falls. These diagnoses are typically associated with activation or agitation on the part of the patient and may lead to more falls due to an increase in physical activity. Previous research has indicated that both psychological and medical conditions are associated with patient falls and LOS (Nanda et al., 2011; Grenier et al., 2014; Guzman, 2013; Ismail et al., 2015; Connolly & O'Shea, 2014; Chung et al., 2010).

Hypothesis 3A/3B

(A) It is hypothesized that a greater number of falls will be significantly associated with increased chronicity. This option is consistent the literature cited earlier. Alternatively, (B) it is possible that a greater number of falls will be significantly associated with a reduced chronicity due to the patient's transfer to an outside facility (nursing home, assisted living facility, etc.). However, these patients may eventually be returned to Harper (readmitted) if their psychological concerns continue after their medical issues are addressed. If so, hypothesis 3A would be supported due to the inclusion of patient recidivism in the model.

Hypothesis 4

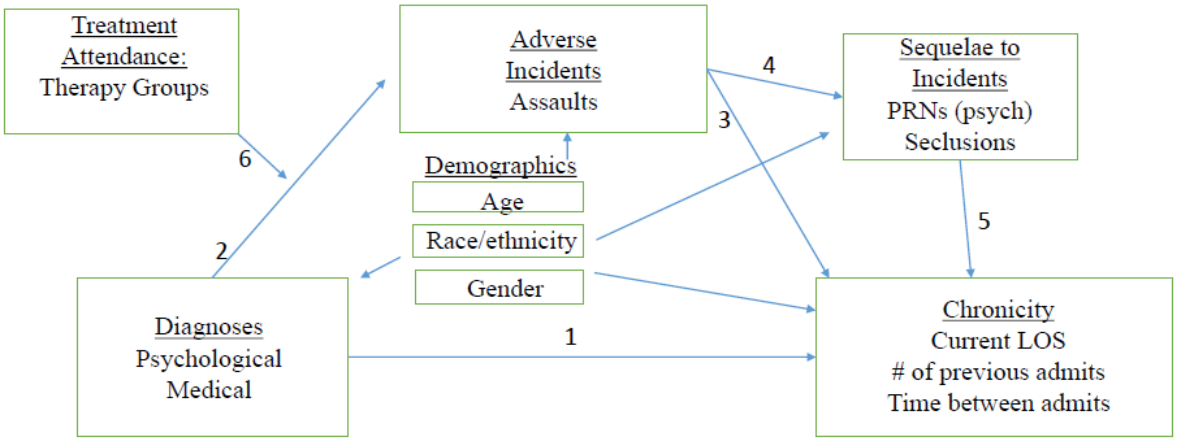
It is hypothesized that a greater number of falls will be associated with more ER admissions and pain PRNs due to medical necessity.

Hypothesis 5A/5B

This hypothesis is like hypothesis 3 in that a greater number of ED visits may be associated with increased chronicity due to placement difficulties (5A) or with decreased chronicity due to client transfer to an outside facility (5B). It is also hypothesized that pain PRNs will be associated increased chronicity. Either way, ED visits or pain PRNs may serve as mediators for the hypothesized direct relationship between falls and chronicity.

Assaults

Figure 2. Assaults model with numbered hypothesis arrows.



Demographics hypothesis

The hypothesis related to this model are the same for the model related to falls.

Hypothesis 1

Same as hypothesis 1 for the fall model above.

Hypothesis 2

Patients with certain disorders may be less easily controlled by the staff members at various locations and may have more aggressive episodes during psychotic or manic episodes. Therefore, psychosis, bipolar disorder, dementia, and low medical severity are hypothesized to be related to the number of assaults.

Hypothesis 3

It is hypothesized that adverse incidents will be significantly related to patient chronicity due to difficulties related to medical treatment and community placement. Therefore, a greater number of assaults is expected to be related to increased chronicity.

Hypothesis 4

It is hypothesized that the number of assaults will be significantly associated with psychological PRNs and seclusions. Both of these events are used by staff in response to negative behaviors, such as assaults, within the patient population.

Hypothesis 5

The use of more PRNs is potentially related to patient chronicity since PRNs serve as an indication of the severity of a patient's psychiatric or medical symptoms. It is hypothesized that PRNs used for psychological reasons, rather than PRNs used for pain or other health conditions, will be more associated with patient chronicity. I hypothesize that seclusions will also be associated with chronicity, as removal from the environment often occurs due to disruptive or aggressive behavior. In summary, a greater number of psychological PRNs and seclusions will be associated with increased chronicity.

Hypothesis 6

This arrow demonstrates a hypothesized moderating variable, specifically psychological treatment attendance. It is hypothesized that increased attendance and exposure to staff members and patients will decrease the relationship between presenting diagnoses and adverse incidents. On the other hand, decreased attendance will potentially result in a strengthened relationship between diagnoses and incidents.

METHOD

The data for this study were collected from the Mary Starke Harper Center (hereafter referred to as the Harper Center or simply Harper), a geropsychiatric hospital currently located on the campus of the University of Alabama in Tuscaloosa. The Harper Center first opened in 1996 and was designed to hold 96 beds. This facility serves older adults (65 and older) from across the state of Alabama. All admissions to the Harper Center are court-ordered. Patients may be diagnosed with a variety of disorders, such as dementia, schizophrenia, bipolar disorder, depression, obsessive-compulsive disorder, and hoarding disorder. Once the individual has been stabilized, he or she is released to home, the home of a family member, a nursing facility, or an assisted living facility.

For risk management purposes, staff collected data pertaining to patient health and behavior during the patient's stay at the Harper Center. The data were collected from the medical record and entered into a computer database. Due to the nature of medical records, the data comes from several sources including nursing staff, psychology staff, social workers, and physicians. However, psychiatric and medical diagnoses are provided by a small number of physicians. Specifically, Harper has been staffed by three psychiatrists (for psychiatric diagnoses) and one internist (for medical diagnoses) throughout the course of data collection. Other information, such as group attendance, PRNs, ER admits, etc., may be recorded by different employees depending on the work shift in question. While this is inconvenient for reliability, it is not uncommon in data originally collected for administrative purposes. Data are periodically reported to the National Association of Mental Health Program Director's Research

Institute (NRI), who later forwards the information to the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) and the Center for Medicaid and Medicare Services (CMS). In 2009 the NRI completed an integrity and reliability test of the data used for the present study. The results of this analysis indicated 100% agreement between the medical records and the electronic data. Reliability analyses have not been conducted since this time, but the procedure for collection has not changed and the data may be considered reliable.

Demographics, hospitalization, LOS, assault, and fall data were collected and entered into the Centralized Alabama Recipient Eligibility System (CARES) program. This program contains information regarding each patient that enters into the mental health system within the state of Alabama. When discrepancies were found between the Harper data and CARES, Harper staff members contacted the CARES administrators to correct potential errors. The data in the current set were collected after 2003, however admission dates and LOS data may be available for some patients prior to that date.

Measures

Demographics

Data were collected regarding each individual's age, race (coded 1 for African-American (AA), 2 for Non-Hispanic White (NHW)), and sex (coded 1 for female, 2 for male).

Chronicity

An individual's date of current admission was recorded along with all dates of previous admissions. These variables were used to construct the primary outcome variables in the present study. Three specific variables were used to represent patient chronicity. Admissions information was used to determine (1) an individual's current or most recent length of stay (LOS; in months), (2) the number of previous admissions, and (3) for persons with a previous

admission, the time (in months) between the current and previous stay ("latency to readmission"). Latency for patients with no return date was calculated by subtracting their date of discharge from the date of data collection. LOS and latency were measured in months to account for extremely large variances that made initial analyses with this variable difficult. Admission information was collected until the end of April 2015, at which point the dataset was pulled for analysis. It is important to note that some patients had already left the facility and therefore their most recent admission period was used in the analyses. Other patients were currently housed in the Harper Center at the end of data collection.

Medical Diagnoses

Primary and secondary medical diagnoses were recorded for each patient. It is important to note that this is not comprehensive; only two diagnoses were recorded for each patient. Examples of such diagnoses include diabetes, cancer, osteoarthritis, osteoporosis, and chronic obstructive pulmonary disease (COPD). Using these diagnoses, a modified version of the Charlson Comorbidity Index (CCI; Needham, Scales, Laupacis, & Pronovost, 2004) score was calculated for each patient. The CCI is used to assess severity and mortality when multiple diagnoses are present. Points are given to each medical condition based on the mortality risk associated with each diagnosis; higher scores are associated with increased severity and reduced survival. This measure is commonly used for analyses based on administrative data (Ghali, Hall, Rosen, Ash, & Moskowitz, 1996; Lix, Quail, Teare, & Acan, 2011; Needham, Scales, Laupacis, & Pronovost, 2004; Southern, Quan, & Ghali, 2004).

Psychological Diagnoses

The Harper center also recorded primary and secondary psychological diagnosis for each patient. Based on preliminary analysis of the data, schizophrenia, dementia, bipolar disorder,

and depression were the most commonly given diagnoses. Diagnoses were coded into four categories: any depression, any dementia, any psychosis, and any bipolar disorder. All these variables were scored dichotomously: 1 indicates that the individual does not have a diagnosis of that kind, while 2 indicates a diagnosis. These categories are broad and therefore indicate the presence (either as a primary or secondary diagnosis) of a related disorder. For example, patients with schizophrenia or schizoaffective disorder received a 2 in psychosis. Similarly, if a patient had dementia for any reason (Alzheimer's disease, Lewy body, Parkinson's, etc.) he or she was given a 2 on the dementia variable.

Assaults

An assault is defined as an incident of physical aggression against another resident or staff member. Available data includes the date of the assault, the severity of the assault, and type of assault. For the purposes of this study, the total number of assaults during the index stay was calculated for each patient and used in the analyses. To adjust for varying LOS among patients, the number of assaults was multiplied by the number of days in a year (365) and then divided by the individual's LOS. This adjustment annualized the variable so that observed occurrences are extrapolated to represent the number of incidents per year.

Falls

The total number of falls was calculated for each patient for the current stay, multiplied by the number of days in a year (365), and then this number will be divided by current LOS. For patients with multiple admissions, falls per day index was only calculated for the most recent admission. Using this procedure controlled for the differences between short and long stay residents, since residents who stay for longer periods have more exposure to potential falls. It also annualized the variable and placed all patients on the same scale of measurement.

PRN Medications

This includes medications given to patients irregularly, as the situation requires it. The date, type of PRN, and the name of the drug are included in the database. The date of the administered PRN will be used to calculate the number of total PRNs for each patient. Furthermore, the PRN variable was originally divided into three distinct subtypes: pain, other medical, and psychological. The pain subtype indicates the PRN was used for pain or discomfort, usually associated with a certain bodily area. Medical PRNs were typically used for conditions such as hypertension, indigestion, or constipation. Finally, psychological PRNs were used for incidents of agitation, aggression, delusions, and intrusive behaviors. As explained above, the pain and psychological subtypes were the focus in the current analyses. The totals for these two subtypes were calculated and included in the relevant models. These variables were adjusted for LOS by multiplying the number of PRNs by the number of days in a year and then dividing by the individual's LOS.

Seclusions

Seclusion procedures are typically used when a patient is agitated, aggressive, difficult to redirect, or refuses to comply with treatment. This action is designed to de-escalate agitated patients and to encourage them to comply with treatment. The date and reason was recorded for each seclusion order. For the purposes of this study, the dates of seclusion were used to compute the total number of seclusion events. The LOS adjustment described for the previous variables was also applied to seclusions.

ED visits

The dates, times, and reasons behind ED visits are included within the database. For the purposes of this study, the total number of ED visits was calculated for each patient using the dates provided. The previously described LOS adjustment was also used for this variable.

Psychotherapeutic Interactions

This section pertains to the number of scheduled group sessions and activities and the number of group therapy sessions and activities actually attended. For the purposes of this study, an adherence ratio was calculated using the attended and scheduled values. Specifically, the number of attended sessions was be divided by the number of scheduled sessions to obtain the ratio.

Data Analysis and Preparation

Originally contained in Microsoft Access, the data were converted to Excel and completely deidentified before being transferred to SPSS for analysis. The patient ID number was used as the connecting variable for all the data upon its transfer to Excel and eventually SPSS. Patient ID numbers, assigned for this project only, were used so that it would be impossible to link information to a specific patient. The data were further de-identified by a Harper Center staff member prior to analysis. Specifically, all names were removed from the database, including the names of patients and staff members. The data contains a mix of current and previous patients.

Once the variables were moved into SPSS from Excel, descriptive statistics were obtained for age, race/ethnicity, sex, falls, diagnoses, assaults, PRNs, and psychotherapeutic interactions. Descriptive statistics were also obtained for the variables contained within the

chronicity construct. For all numerical values, mean, standard deviation, skewness, and kurtosis were calculated.

Afterward, structural equation modeling (SEM) was used to examine the models described above. The technique provides a general framework in which numerous procedures exist, including regression, factor analysis, and discriminant analysis (Hox & Bechger, 1998). SEM is used to determine if theoretical models adequately explain empirical data by attempting to determine the relationships among latent constructs (Lei & Wu, 2007). These latent constructs are composed of multiple observed measurements (Lei & Wu, 2007; Hox & Bechger, 1998). After constructs are established, path analysis can be used to test the relationships amongst them. As conducted in SEM, path analysis is an advanced form of multiple regression in which several equations are tested simultaneously (Lei & Wu, 2007). For the purposes of this study, SEM was used to determine the validity of the latent constructs and their hypothesized paths.

In the evaluation of these models, mediation and moderation analyses were conducted. Mediation involves both direct and indirect effects. Specifically, there is a hypothesized direct effect between an independent and dependent variable (Baron & Kenny, 1986; Gunzler, Chen, Wu, & Zhang, 2013). Indirect effects refer to the relationship between the IV and DV that flows through the mediator. If the mediation is significant, the relationship between the independent and dependent variables is weakened (Baron & Kenny, 1986; Gunzler, Chen, Wu, & Zhang, 2013). Theoretically, the mediation variable is used to explain (at least partially) the relationship between the other two variables (Baron & Kenny, 1986).

Mediation analyses are relevant to several parts of the proposed model. Specifically, both falls and assaults were hypothesized mediators of the relationship between diagnoses and chronicity. The sequelae variables (ER admits, PRNs, seclusions) are also proposed mediators of

the relationship between an adverse event (falls or assaults) and chronicity. These sequelae variables were all entered as summary variables.

Moderation was also used in one of the proposed models. This technique implies a situation in which one variable impacts the relationship between two other variables. This third variable, known as the moderator, may increase or decrease the direct relationship by affecting the correlation between variables (Baron & Kenny, 1986). Unlike mediation, moderation does not form a pathway between the independent and dependent variables. It is generally considered `an interaction in that the direction or strength of the IV-DV relationship depends on the moderator. Therefore, an interaction term is created and entered the analysis with the independent and dependent variables. Statistical significance may also be determined by looking directly at the significance of the interaction variable. Since it is often difficult to determine the nature of the moderation without looking at a graph of the regression lines, one will be produced for the moderation in the current study. Treatment attendance was the only proposed moderating variable in either of the proposed models. As shown above, it was hypothesized that this variable will moderate the relationship between diagnoses and assaults.

RESULTS

Several modifications to the above models occurred during the data analysis phase. First, the variables predicted to be part of chronicity (LOS, number of admits, and latency) did not come together as a latent construct (a=0.06). Therefore, each of these variables entered the analyses as observed variables. Each chronicity variable (falls, assaults) was modeled individually before the construction of two final models. The results of these integrated model are discussed last in this section.

Second, treatment attendance for group therapy was removed from the models related to assaults. As shown in the descriptive table below (Table 1), this variable was only available for 185 patients. This is likely an underestimation of the group therapy attendance within the facility and most likely reflects a lack of data for this specific variable. Potentially due to the lack of data, interaction variables created for this analysis were not significant. Therefore, treatment attendance was removed from the analyses.

Finally, all the models discussed below include additional pathways that were suggested by the modification indices. These added pathways will be discussed in the section relevant to the analyses in which they are included. The descriptive statistics will be presented first, followed by the analyses for falls and assaults for each individual chronicity variable, then the combined chronicity model will be presented last.

Descriptive statistics

Descriptive statistics, including means and standard deviations, are presented in Table 1. A total of 2268 participants were included in this study, although some patients did not have information for certain variables. The mean age was 74.06 (SD=6.79) and 69% of the sample was identified as NHW. Additionally, 48.5% of the sample was male. Skewness and kurtosis were also computed for each variable and can be seen in Table 2. Finally, Table 3 includes the correlations among all the major variables.

As seen in Table 2, many variables were skewed in either the positive or negative direction. A positive skew indicates that many of the values for that variable are clustered at the low end of the distribution; a negative skew indicates that the values are clustered toward the high end. Additionally, many of these variables also violated the assumption of kurtosis. Ideally, the value of kurtosis for each variable would be 0; however, all of the values in this study were either positive or negative. A positive kurtosis indicates that the values are clustered at the center of the distribution; a negative value indicates that the distribution is flat. However, because this study utilized a relatively large sample, the skewness and kurtosis of the sample may not heavily impact the overall results (Tabachnick & Fidell, 2007).

Table 1
Descriptive characteristics

Variable	N	Minimum	Maximum	Mean or %	SD
Age	2268	61	98	74.06	6.79
Race/Ethnicity	2268	1*	2*	69% NHW	N/A
Sex	2268	1**	2**	48.5% Male	N/A
Assaults	2268	0	78.21	1.03	3.72
ED visits	2268	0	91.3	4.71	8.47
Falls	2268	0	182.5	3.05	7.59
Pain PRNs	2268	0	681.3	24.25	61.14
Psych PRNs	2268	0	286.8	7.91	21.38

Seclusions	2268	0	91.25	0.14	2.07
Psychosis Dx	2268	1	2	1.32	0.47
Depression Dx	2268	1	2	1.07	0.26
Dementia Dx	2268	1	2	1.54	0.50
Bipolar Dx	2268	1	2	1.11	0.31
Charlson Score	2268	0	3	0.27	0.50
Length of Stay (LOS)	2150	0.033	102.9	4.3	60.6
# of Admissions	2107	1	10	1.39	0.89
Latency to Readmit	2267	0	162.4	61.08	1668.1

*1 is coded for AA, 2 for NHW

**1 is coded for female, 2 is coded for male

Note. Assaults, ED visits, Falls, PRNs, and Seclusions are annualized.

Table 2
Skewness and kurtosis results

Variable	Skewness	Skewness Std. Error	Kurtosis	Kurtosis Std. Error
Age	0.693	0.051	-0.308	0.103
Assaults	7.587	0.047	97.686	0.094
ED visits	3.481	0.047	19.472	0.094
Falls	9.130	0.047	166.144	0.094
Pain PRNs	4.763	0.047	29.388	0.094
Psych PRNs	5.379	0.047	42.691	0.094
Seclusions	33.794	0.047	1403.542	0.094
Psychosis Dx	0.736	0.047	-1.459	0.094
Depression Dx	3.328	0.047	9.080	0.094
Dementia Dx	-0.174	0.047	-1.971	0.094
Bipolar Dx	2.527	0.047	4.391	0.094
Charlson Score	1.67	0.047	2.021	0.094
Length of Stay (LOS)	6.421	0.048	55.84	0.096
# of Admissions	3.564	0.050	18.084	0.100
Latency to Readmit	-0.083	0.047	-1.273	0.094

Table 3

Correlations among all variables

Measure	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. Age	1																	
2. Race	.08*	1																
3. Gender	-.01	-.02	1															
4. Assaults	.01	-.03	.04	1														
5. ED visits	.03	.00	-.00	.65*	1													
6. Falls	.02	.02	.01	.44*	.62*	1												
7. Holds/Restraints	-.01	-.04*	.02	.21*	.15*	.28*	1											
8. Pain PRNs	-.05*	.05*	-.09*	.06*	.11*	.13*	.08*	1										
9. Psych PRNs	-.00	.00	-.01	.35*	.37*	.43*	.35*	.23*	1									
10. Seclusions	-.03	-.03	.04*	.20*	.13*	.25*	.76*	.04	.3*	1								
11. Psychosis Dx	-.28*	-.22*	-.19*	.00	.01	-.00	.02	.03	.03	.01	1							
12. Depression Dx	-.06*	.13*	-.03	-.06*	-.05*	-.04	-.03	.06*	-.05*	-.02	-.15*	1						
13. Dementia Dx	.31*	.00	.17*	.06*	.05*	.07*	-.02	-.1*	.01	-.05*	-.42*	-.18*	1					
14. Bipolar Dx	-.14*	.09*	-.06*	-.02	-.02	-.01	.05*	.09*	.02	.10*	-.19*	-.09*	-.25*	1				
15. Charlson Score	-.07*	-.05*	.01	.02	.04*	.02	.01	.03	-.00	.03	.01	-.02	.01	.04*	1			
16. LOS	-.07*	-.08*	.01	.05*	.05*	.06*	-.00	-.08*	.00	-.01	.10*	-.06*	-.00	-.07*	-.02	1		
17. # of Admits	.02	-.07*	-.11*	.26*	.25*	.22*	.15*	.21*	.23*	.13*	.22*	-.08*	-.1*	.06*	.09*	.11*	1	
18. Latency	-.22*	.03	.13*	.12*	.13*	.11*	.04	.06	.08	.01	-.08	-.04	.09*	-.07	-.05	.04	.09*	1

Results for Falls Model with LOS

This model tested the statistical relationships proposed in the falls model previously discussed with LOS serving as the outcome variable. See Table 4 (below) for the complete output for this model, depicted graphically in Figure 1. A Comparative Fit Index (CFI) of 0.95 or greater, a Standardized Root Mean Square Residual (SRMR) of less than 0.05, and/or a Root Mean Square Error of Approximation (RMSEA) of less than 0.05 indicate good fit of a model to the available data. The original model failed to reach convergence due to the large magnitudes of LOS for some patients. Therefore, the variable was converted to months instead of days. After this change, the model was entered into Mplus and demonstrated poor fit (CFI=0.546, RMSEA=0.163, SRMR=0.053). The model indices function of Mplus suggested the addition of covariances for all of the diagnostic variables. With this addition, the model reached convergence and demonstrated good fit on several statistical indices (CFI=0.994, RMSEA= 0.023, SRMR= 0.011). Age and NHW race were both positively associated with annualized rate of falls. Any diagnosis of psychosis was negatively associated with rate of falls; meanwhile, any diagnosis of dementia was positively associated with rate of falls. This partially supports hypothesis 2 of the falls model, which predicted a relationship between psychosis and falls, as well as between dementia and falls.

Several variables were associated with the use of pain PRN medications. Pain PRNs was also hypothesized as a predictor of LOS, but this pathway was not significant. Greater age, male sex, and diagnosis of dementia were negatively associated with use of PRN medications. NHW race, any diagnosis of depression, and any diagnosis of bipolar disorder were positively associated with rate of pain PRN medications. Emergency department (ED) visits also demonstrated several significant relationships. Specifically, greater age, white race, male sex and

a higher rate of falls were positively associated with rate of ED visits. Since the relationship between pain PRNs and falls was not significant, the relationship between ED visits and falls partially confirms hypothesis 4 from the falls model.

Finally, several variables were related to LOS itself. Any form of psychosis and a higher rate of ED visits were positively associated with LOS. This confirms hypothesis 5A and partially confirms hypothesis 1. Higher age, NHW race, bipolar-related diagnoses, and a higher rate of pain medications were all negatively associated with LOS. This indicates that as these variables increase (or if the patient is NHW) the LOS decreases. The relationship between falls and LOS was not significant, disconfirming hypotheses 3A and 3B.

Figure 3. Diagram of significant pathways for falls model with LOS

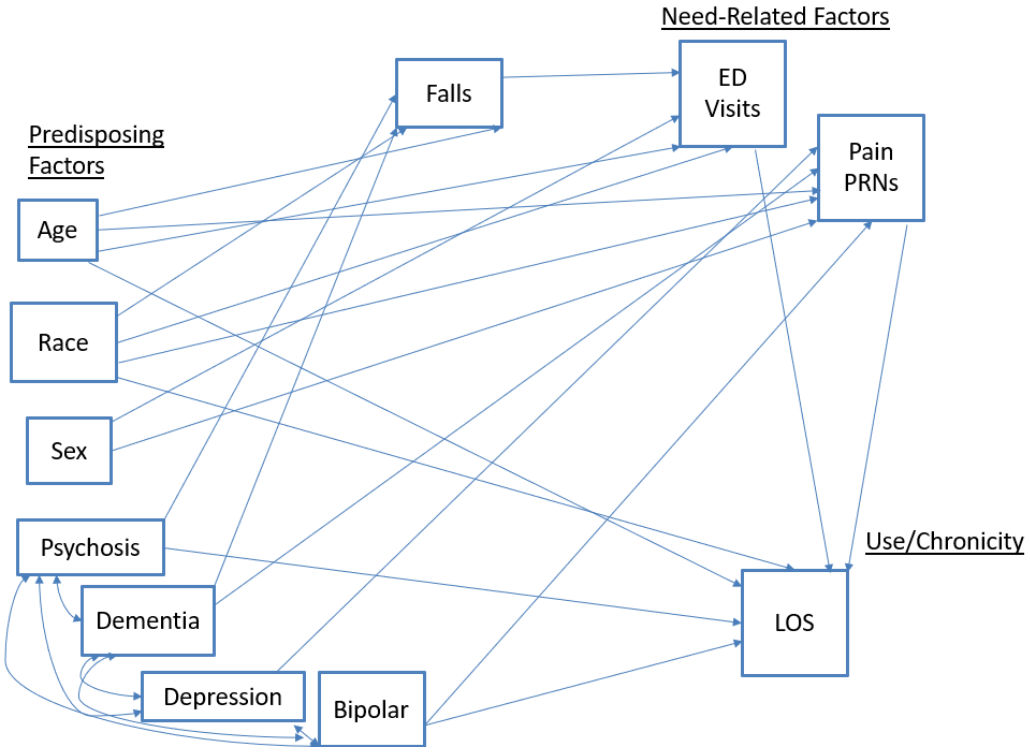


Table 4
Model results for falls and LOS

Pathway	Estimate	SE	Est./SE	P-value (2-tailed)
The path from:				
Age to Psychosis	-0.266	0.019	-14.240	0.000
Race to Psychosis	-0.207	0.019	-10.894	0.000
Sex to Psychosis	-0.197	0,019	-10.398	0.000
Age to Depression	-0.071	0.021	-3.435	0.001
Race to Depression	0.143	0.021	6.921	0.000
Sex to Depression	-0.029	0.021	-1.414	0.157
Age to Dementia	0.308	0.019	16.422	0.000
Race to Dementia	-0.015	0.020	-0.759	0.448
Sex to Dementia	0.177	0.019	9.115	0.000
Age to Bipolar	-0.152	0.020	-7.406	0.000
Race to Bipolar	0.092	0.021	4.453	0.000
Sex to Bipolar	-0.061	0.021	-2.969	0.003
Age to Charlson Score	-0.066	0.021	-3.141	0.002
Race to Charlson Score	-0.035	0.021	-1.657	0.098
Sex to Charlson Score	0.008	0.021	0.393	0.694
Age to Falls	0.048	0.023	2.117	0.034
Race to Falls	0.042	0.021	1.976	0.048
Sex to Falls	-0.004	0.021	-0.189	0.850
Psychosis to Falls	-0.075	0.027	-2.754	0.006
Depression to Falls	-0.020	0.023	-0.885	0.376
Dementia to Falls	0.094	0.026	3.550	0.000
Bipolar to Falls	-0.027	0.024	-1.144	0.253
Charlson Score to Falls	0.009	0.021	0.458	0.647
Pain PRN to Falls	0.032	0.021	1.498	0.134
Age to Pain PRN	-0.045	0.022	-2.056	0.040
Race to Pain PRN	0.063	0.021	3.004	0.003
Sex to Pain PRN	-0.047	0.021	-2.231	0.026
Depression to Pain PRN	0.118	0.021	5.566	0.000
Dementia to Pain PRN	-0.064	0.023	-2.799	0.005
Bipolar to Pain PRN	0.076	0.022	3.530	0.000

Age to ED	0.080	0.020	4.023	0.000
Race to ED	0.054	0.020	2.730	0.006
Sex to ED	0.060	0.020	3.047	0.002
Falls to ED	0.295	0.019	15.465	0.000
Age to LOS	-0.062	0.023	-2.658	0.008
Race to LOS	-0.048	0.022	-2.188	0.029
Sex to LOS	0.016	0.022	0.731	0.465
ED to LOS	-0.057	0.022	-2.561	0.010
Pain PRN to LOS	-0.072	0.021	-3.386	0.001
Falls to LOS	0.019	0.022	0.854	0.393
Charlson Score to LOS	-0.017	0.021	-0.806	0.420
Psychosis to LOS	0.065	0.028	2.289	0.022
Depression to LOS	-0.039	0.024	-1.643	0.100
Dementia to LOS	0.017	0.028	0.624	0.533
Bipolar to LOS	-0.048	0.024	-1.976	0.048
Covariances:				
Psychosis with Depression	-0.167	0.020	-8.188	0.000
Dementia with Depression	-0.154	0.021	-7.507	0.000
Bipolar with Depression	-0.118	0.021	-5.723	0.000
Psychosis with Dementia	-0.364	0.018	-19.968	0.000
Bipolar with Dementia	-0.210	0.020	-10.465	0.000
Psychosis with Bipolar	-0.240	0.020	-12.137	0.000

Results for Falls Model with Admits

This model tested the statistical relationships proposed in the falls model previously discussed with number of admissions serving as the outcome variable. See Table 5 (below) for the complete output for this model. Like the model above, the original model demonstrated a poor fit when first entered (CFI=0.545, RMSEA=0.154, SRMR=0.058). The modification indices suggested allowing the various diagnostic variables to covary outside of the path model.

With the addition of these modifications, the model achieved a good fit (CFI= 0.972, SRMR=0.020, RMSEA=0.045). This indicated that greater age, NHW race, and male sex were negatively associated with the likelihood of being diagnosed with psychosis. Age was negatively

associated with depression diagnoses, but race was positively associated; therefore, patients of greater age were less likely to receive these diagnoses and NHW patients were more likely to receive them. However, greater age and male sex were both positively associated with dementia-related diagnoses. Greater age and male sex were negatively associated with a diagnosis of bipolar disorder; meanwhile, NHW race was positively associated. Surprisingly, greater age was negatively associated with Charlson score.

Greater age, NHW race, and any diagnosis of dementia were positively associated with the rate of falls. However, any diagnosis of a psychotic disorder was negatively associated with falls; this relationship partially disconfirms hypothesis 2 and it is not in the predicted direction. Greater age and male sex were negatively associated with the rate of pain PRNs; NHW race was positively associated. Surprisingly, the rate of falls did not significantly predict the rate of pain PRNs as predicted in hypothesis 4. However, the rate of falls did predict the rate of ED visits in a positive direction which partially confirms the hypothesis. Greater age, NHW race, and male sex were also positively associated with rate of ED visits.

Several variables were significantly associated with number of admissions, the main outcome variable in this model. Greater age, higher Charlson score, psychotic diagnoses, and bipolar diagnoses were positively associated with number of admissions. This confirms hypothesis 1, which predicted a relationship between Charlson score, psychosis, bipolar disorder, and chronicity. However, male sex was negatively associated with number of admissions. Hypotheses 5A and 5B were disconfirmed since ED visits demonstrated no association with number of admissions. Hypotheses 3A and 3B were also disconfirmed since fall rate also demonstrated no significant associated with admissions.

Figure 4. Diagram of significant pathways for falls model with admits

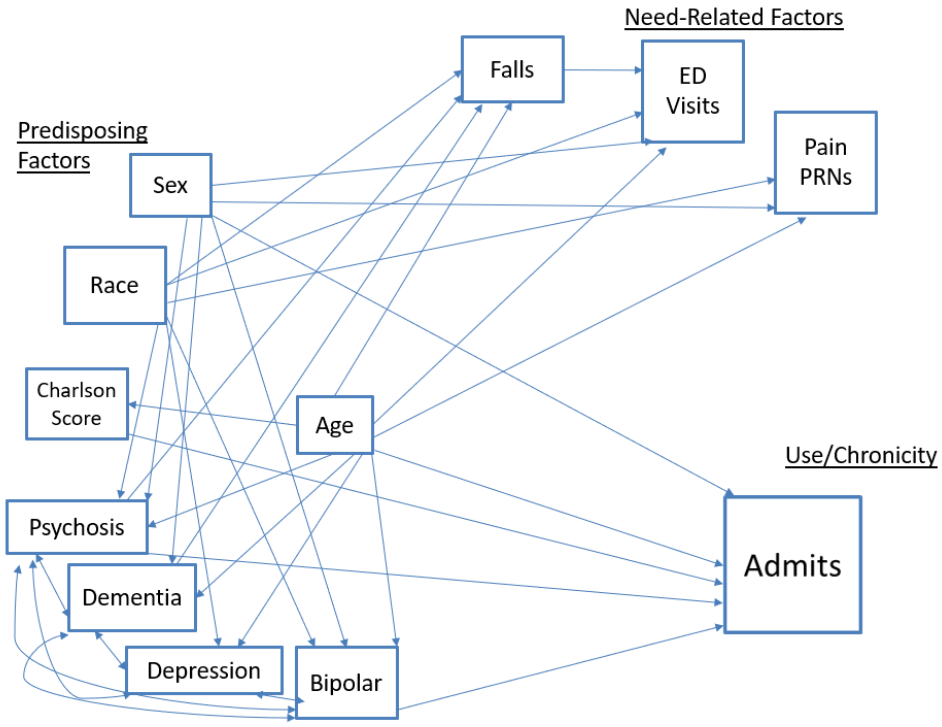


Table 5
Model results for falls and admits

Pathway	Estimate	SE	Est./SE	P-value (2-tailed)
The path from:				
Age to Psychosis	-0.266	0.019	-14.240	0.000
Race to Psychosis	-0.207	0.019	-10.894	0.000
Sex to Psychosis	-0.197	0.019	-10.398	0.000
Age to Depression	-0.071	0.021	-3.435	0.001
Race to Depression	0.143	0.021	6.921	0.000
Sex to Depression	-0.029	0.021	-1.414	0.157
Age to Dementia	0.308	0.019	16.422	0.000
Race to Dementia	-0.015	0.020	-0.759	0.448
Sex to Dementia	0.177	0.019	9.115	0.000
Age to Bipolar	-0.152	0.020	-7.406	0.000

Race to Bipolar	0.092	0.021	4.453	0.000
Sex to Bipolar	-0.061	0.021	-2.969	0.003
Age to Charlson Score	-0.066	0.021	-3.141	0.002
Race to Charlson Score	-0.035	0.021	-1.657	0.098
Sex to Charlson Score	0.008	0.021	0.393	0.694
Age to Falls	0.046	0.023	2.051	0.040
Race to Falls	0.044	0.021	2.068	0.039
Sex to Falls	-0.006	0.021	-0.263	0.793
Psychosis to Falls	-0.075	0.027	-2.777	0.005
Depression to Falls	-0.017	0.023	-0.731	0.465
Dementia to Falls	0.091	0.026	3.465	0.001
Bipolar to Falls	-0.025	0.024	-1.054	0.292
Charlson Score to Falls	0.010	0.021	0.484	0.628
Age to Pain PRN	-0.086	0.021	-4.138	0.000
Race to Pain PRN	0.086	0.021	4.153	0.000
Sex to Pain PRN	-0.067	0.021	-3.206	0.001
Falls to Pain PRN	0.021	0.021	1.001	0.317
Age to ED	0.080	0.020	4.023	0.000
Race to ED	0.054	0.020	2.730	0.006
Sex to ED	0.060	0.020	3.047	0.002
Falls to ED	0.295	0.019	15.465	0.000
Age to Admits	0.110	0.023	4.803	0.000
Race to Admits	-0.022	0.022	-1.030	0.303
Sex to Admits	-0.060	0.022	-2.758	0.006
ED to Admits	-0.013	0.023	-0.576	0.565
Pain PRN to Admits	-0.021	0.021	-1.010	0.312
Falls to Admits	0.016	0.022	0.726	0.468
Charlson Score to Admits	0.079	0.021	3.763	0.000
Psychosis to Admits	0.266	0.027	9.866	0.000
Depression to Admits	-0.008	0.023	-0.326	0.744
Dementia to Admits	0.024	0.027	0.904	0.366
Bipolar to Admits	0.142	0.024	6.025	0.000
Covariances:				
Psychosis with Depression	-0.167	0.020	-8.188	0.000
Dementia with Depression	-0.154	0.021	-7.507	0.000
Bipolar with Depression	-0.118	0.021	-5.723	0.000
Psychosis with Dementia	-0.364	0.018	-19.968	0.000

Bipolar with Dementia	-0.210	0.020	-10.465	0.000
Psychosis with Bipolar	-0.240	0.020	-12.137	0.000

Results for Falls Model with Latency

This model (results in Table 6) tested the statistical relationships proposed in the falls model previously discussed with latency to readmission serving as the outcome variable. Like the LOS model discussed above, this model failed to reach convergence when first analyzed due to the large value of the latency variable for some patients. This variable was changed to months instead of days to account for this. After this change, the model demonstrated a poor fit (CFI= 0.522, RMSEA=0.154, SRMR=0.056). As mentioned in the model above, modification indices function suggested allowing the various diagnostic variables to covary outside of the path model.

Overall, the model demonstrated a good fit once these modifications were included (CFI=0.970, SRMR=0.020, RMSEA=0.045). This model is very similar to the previous one (related to falls and number of admissions), so only unique findings will be discussed here. Rate of pain PRNs was negatively associated with latency to readmission. Psychosis, dementia, and bipolar disorder were positively associated with increased latency to readmission. This is partially consistent with hypothesis 1.

Figure 5. Diagram of significant pathways for falls model with latency

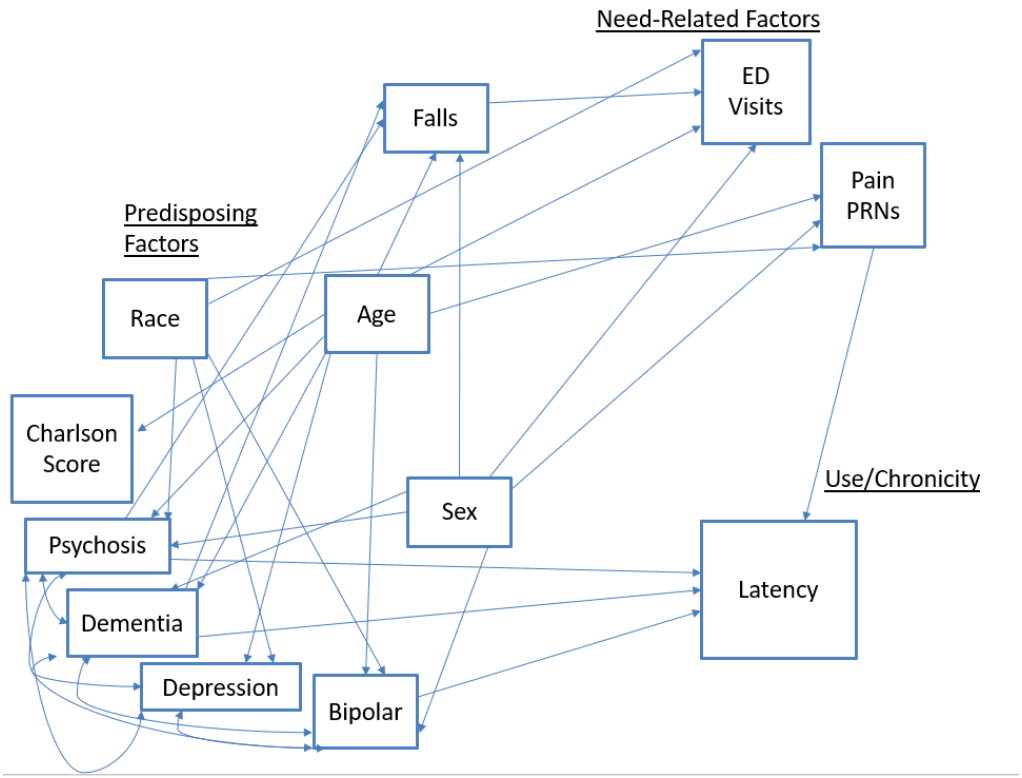


Table 6
Model results for falls and latency

Pathway	Estimate	SE	Est./SE	P-value (2-tailed)
The path from:				
Age to Psychosis	-0.266	0.019	-14.240	0.000
Race to Psychosis	-0.207	0.019	-10.894	0.000
Sex to Psychosis	-0.197	0.019	-10.398	0.000
Age to Depression	-0.071	0.021	-3.435	0.001
Race to Depression	0.143	0.021	6.921	0.000
Sex to Depression	-0.029	0.021	-1.414	0.157
Age to Dementia	0.308	0.019	16.422	0.000
Race to Dementia	-0.015	0.020	-0.759	0.448
Sex to Dementia	0.177	0.019	9.115	0.000

Age to Bipolar	-0.152	0.020	-7.406	0.000
Race to Bipolar	0.092	0.021	4.453	0.000
Sex to Bipolar	-0.061	0.021	-2.969	0.003
Age to Charlson Score	-0.066	0.021	-3.141	0.002
Race to Charlson Score	-0.035	0.021	-1.657	0.098
Sex to Charlson Score	0.008	0.021	0.393	0.694
Age to Falls	0.046	0.023	2.051	0.040
Race to Falls	0.044	0.021	2.068	0.039
Sex to Falls	-0.006	0.021	-0.263	0.793
Psychosis to Falls	-0.075	0.027	-2.777	0.005
Depression to Falls	-0.017	0.023	-0.731	0.465
Dementia to Falls	0.091	0.026	3.465	0.001
Bipolar to Falls	-0.025	0.024	-1.054	0.292
Charlson Score to Falls	0.010	0.021	0.484	0.628
Age to Pain PRN	-0.086	0.021	-4.138	0.000
Race to Pain PRN	0.086	0.021	4.153	0.000
Sex to Pain PRN	-0.067	0.021	-3.206	0.001
Falls to Pain PRN	0.021	0.021	1.001	0.317
Age to ED	0.080	0.020	4.023	0.000
Race to ED	0.054	0.020	2.730	0.006
Sex to ED	0.060	0.020	3.047	0.002
Falls to ED	0.295	0.019	15.465	0.000
Age to Latency	-0.007	0.023	-0.301	0.763
Race to Latency	-0.010	0.022	-0.452	0.651
Sex to Latency	-0.029	0.022	-1.364	0.173
ED to Latency	-0.035	0.022	-1.590	0.112
Pain PRN to Latency	-0.086	0.021	-4.059	0.000
Falls to Latency	0.032	0.022	1.468	0.142
Charlson Score to Latency	0.040	0.021	1.927	0.054
Psychosis to Latency	0.133	0.027	4.892	0.000
Depression to Latency	0.003	0.023	0.134	0.894
Dementia to Latency	0.068	0.027	2.549	0.011
Bipolar to Latency	0.067	0.024	2.806	0.005
Covariances:				
Psychosis with Depression	-0.167	0.020	-8.188	0.000
Dementia with Depression	-0.154	0.021	-7.507	0.000
Bipolar with Depression	-0.118	0.021	-5.723	0.000

Psychosis with Dementia	-0.364	0.018	-19.968	0.000
Bipolar with Dementia	-0.210	0.020	-10.465	0.000
Psychosis with Bipolar	-0.240	0.020	-12.137	0.000

Results for Assaults Model with LOS

This model (see Table 7 and Figure 2 below) tested the statistical relationships proposed in the assaults model with LOS as the outcome variable. As previously mentioned the LOS model for falls, LOS was recalculated into months after the model initially failed to reach convergence. After this change, the model demonstrated poor fit (CFI=0.542, SRMR=0.054, RMSEA=0.152). The modification indices also suggested that the diagnostic variables should covary, as in the previous fall models.

Fit indices indicate that this improved model has a good overall fit (CFI=0.986, SRMR=0.015, RMSEA=0.031). The significant predictors of the diagnostic variables and Charlson score are the same as in the falls models and will not be discussed again here. However, several unique and significant predictors were found for assaults, psych PRNs, seclusions, and LOS.

For assaults, the only significant predictor was a dementia-related diagnosis. This relationship was positive, which indicates that these diagnoses are associated with an increase in assault rates; this is consistent with hypothesis 2 from the proposed assaults model. It's important to note that none of the demographic variables or the other diagnostic categories were significantly associated with assaults. However, hypothesis 4 was confirmed since the rate of assaults served as a strong positive predictor of both psych PRNs and seclusions.

For LOS, age, race, assaults, a diagnosis of psychosis, and a diagnosis of bipolar disorder were significant predictors. These relationships confirmed hypothesis 3 (the association between

assaults and LOS) and partially confirmed hypothesis 1 (psychosis and bipolar disorder). As age increased, LOS decreased; NHW race and bipolar diagnoses were also negatively associated with LOS. As rate of assaults increased, LOS also increased; the presence of psychotic diagnoses was also positively associated with LOS. Since neither psych PRNs nor seclusions had a significant relationship with LOS, hypothesis 5 was disconfirmed for this model.

Figure 6. Diagram of significant pathways for assaults model with LOS

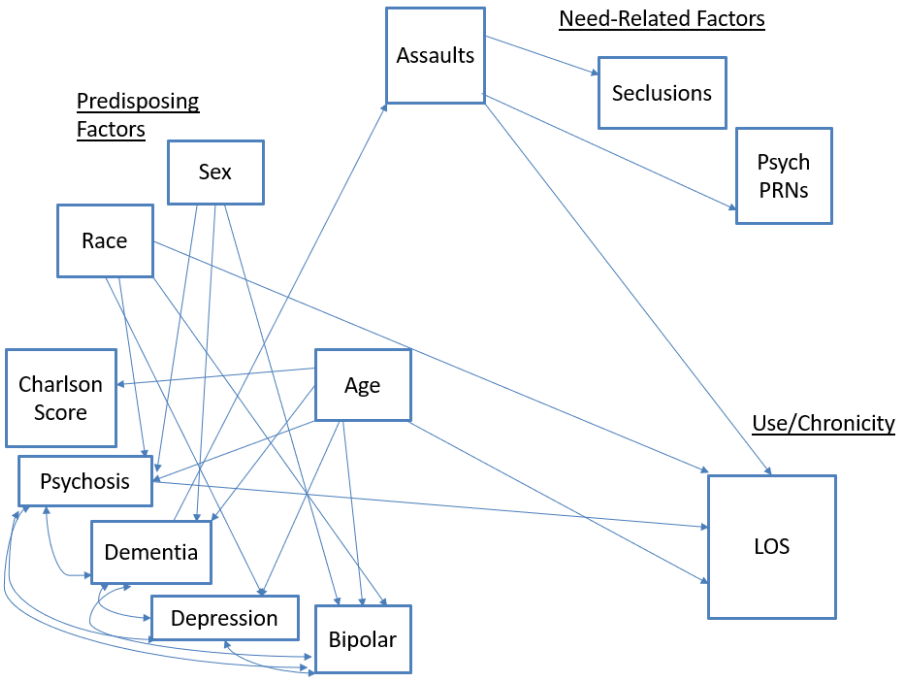


Table 7
Model results for assaults and LOS

Pathway	Estimate	SE	Est./SE	P-value (2-tailed)
The path from:				
Age to Psychosis	-0.266	0.019	-14.240	0.000
Race to Psychosis	-0.207	0.019	-10.894	0.000
Sex to Psychosis	-0.197	0.019	-10.398	0.000

Age to Depression	-0.071	0.021	-3.435	0.001
Race to Depression	0.143	0.021	6.921	0.000
Sex to Depression	-0.029	0.021	-1.414	0.157
Age to Dementia	0.308	0.019	16.422	0.000
Race to Dementia	-0.015	0.020	-0.759	0.448
Sex to Dementia	0.177	0.019	9.115	0.000
Age to Bipolar	-0.152	0.020	-7.406	0.000
Race to Bipolar	0.092	0.021	4.453	0.000
Sex to Bipolar	-0.061	0.021	-2.969	0.003
Age to Charlson Score	-0.066	0.021	-3.141	0.002
Race to Charlson Score	-0.035	0.021	-1.657	0.098
Sex to Charlson Score	0.008	0.021	0.393	0.694
Age to Assaults	-0.041	0.023	-1.800	0.072
Race to Assaults	-0.018	0.022	-0.830	0.406
Sex to Assaults	0.018	0.022	0.811	0.418
Psychosis to Assaults	0.008	0.028	0.282	0.778
Depression to Assaults	-0.040	0.023	-1.755	0.079
Dementia to Assaults	0.073	0.027	2.726	0.006
Bipolar to Assaults	-0.026	0.024	-1.078	0.281
Charlson Score to Assaults	0.002	0.021	0.087	0.931
Age to Psych PRN	0.003	0.019	0.176	0.861
Race to Psych PRN	0.005	0.019	0.282	0.778
Sex to Psych PRN	0.021	0.019	1.074	0.283
Assaults to Psych PRN	0.379	0.018	21.088	0.000
Age to Seclusions	-0.031	0.021	-1.509	0.131
Race to Seclusions	-0.030	0.021	-1.454	0.146
Sex to Seclusions	0.040	0.021	1.909	0.056
Assaults to Seclusions	0.142	0.021	6.931	0.000
Age to LOS	-0.058	0.023	-2.516	0.012
Race to LOS	-0.056	0.022	-2.522	0.012
Sex to LOS	0.016	0.022	0.740	0.460
Psych PRN to LOS	0.004	0.023	0.179	0.858
Seclusions to LOS	-0.022	0.021	-1.058	0.290
Assaults to LOS	0.082	0.023	3.621	0.000
Charlson Score to LOS	-0.022	0.021	-1.012	0.311

Psychosis to LOS	0.069	0.028	2.415	0.016
Depression to LOS	-0.043	0.023	-1.851	0.064
Dementia to LOS	0.017	0.028	0.605	0.545
Bipolar to LOS	-0.048	0.025	-1.958	0.050
Covariances:				
Psychosis with Depression	-0.167	0.020	-8.188	0.000
Dementia with Depression	-0.154	0.021	-7.507	0.000
Bipolar with Depression	-0.118	0.021	-5.723	0.000
Psychosis with Dementia	-0.364	0.018	-19.968	0.000
Bipolar with Dementia	-0.210	0.020	-10.465	0.000
Psychosis with Bipolar	-0.240	0.020	-12.137	0.000

Results for Assaults Model with Admits

This model (see Table 8 below) tested the statistical relationships proposed in the assaults model with number of admissions as the outcome variable. The original model demonstrated poor fit (CFI= 0.564, SRMR=0.056, RMSEA=0.152). As in the previous models, the modification indices suggested that the diagnostic variables should be allowed to covary. A similar statement was suggested for seclusions and psych PRNs, as seen in the model below.

The statistical output for this model also indicated that it achieved a good level of fit (CFI=0.990, SRMR=0.014, RMSEA=0.028). The results contained in the table below are like those for previous models, except for the significant predictors related to number of admissions. An increase in age or Charlson score was positively associated with number of admissions. The same is true for having a psychotic and bipolar diagnosis; both were associated with an increase in the number of admissions to the facility. As previously mentioned, this partially confirms hypothesis 1 from the originally proposed assaults model. Sex had the opposite relationship with the outcome variable; male sex was negatively associated with the number of inpatient admissions.

Figure 7. Diagram of significant pathways for assaults model with admits

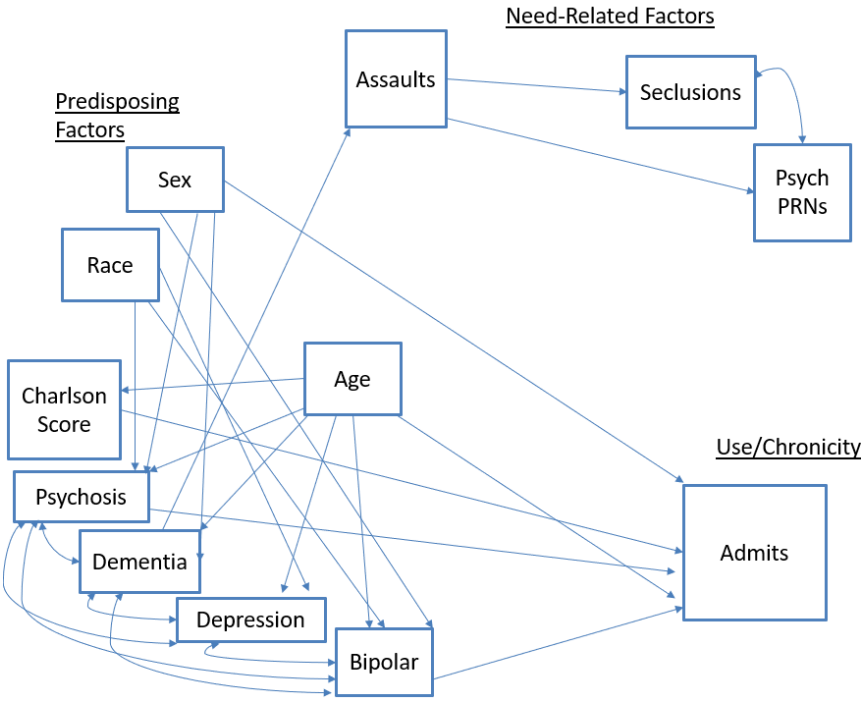


Table 8
Model results for assaults and admits

Pathway	Estimate	SE	Est./SE	P-value (2-tailed)
The path from:				
Age to Psychosis	-0.266	0.019	-14.240	0.000
Race to Psychosis	-0.207	0.019	-10.894	0.000
Sex to Psychosis	-0.197	0.019	-10.398	0.000
Age to Depression	-0.071	0.021	-3.435	0.001
Race to Depression	0.143	0.021	6.921	0.000
Sex to Depression	-0.029	0.021	-1.414	0.157
Age to Dementia	0.308	0.019	16.422	0.000
Race to Dementia	-0.015	0.020	-0.759	0.448

Sex to Dementia	0.177	0.019	9.115	0.000
Age to Bipolar	-0.152	0.020	-7.406	0.000
Race to Bipolar	0.092	0.021	4.453	0.000
Sex to Bipolar	-0.061	0.021	-2.969	0.003
Age to Charlson Score	-0.066	0.021	-3.141	0.002
Race to Charlson Score	-0.035	0.021	-1.657	0.098
Sex to Charlson Score	0.008	0.021	0.393	0.694
Age to Assaults	-0.041	0.023	-1.800	0.072
Race to Assaults	-0.018	0.022	-0.830	0.406
Sex to Assaults	0.018	0.022	0.811	0.418
Psychosis to Assaults	0.008	0.028	0.282	0.778
Depression to Assaults	-0.040	0.023	-1.755	0.079
Dementia to Assaults	0.073	0.027	2.726	0.006
Bipolar to Assaults	-0.026	0.024	-1.078	0.281
Charlson Score to Assaults	0.002	0.021	0.087	0.931
Age to Psych PRN	0.003	0.019	0.176	0.861
Race to Psych PRN	0.005	0.019	0.282	0.778
Sex to Psych PRN	0.021	0.019	1.074	0.283
Assaults to Psych PRN	0.379	0.018	21.088	0.000
Age to Seclusions	-0.031	0.021	-1.509	0.131
Race to Seclusions	-0.030	0.021	-1.454	0.146
Sex to Seclusions	0.040	0.021	1.909	0.056
Assaults to Seclusions	0.142	0.021	6.931	0.000
Age to Admits	0.112	0.023	4.920	0.000
Race to Admits	-0.024	0.022	-1.125	0.261
Sex to Admits	-0.060	0.022	-2.759	0.006
Psych PRN to Admits	0.013	0.022	0.574	0.566
Seclusions to Admits	-0.018	0.021	-0.893	0.372
Assaults to Admits	0.032	0.023	1.397	0.162
Charlson Score to Admits	0.079	0.021	3.752	0.000
Psychosis to Admits	0.266	0.027	9.891	0.000
Depression to Admits	-0.008	0.023	-0.343	0.731
Dementia to Admits	0.023	0.027	0.872	0.383
Bipolar to Admits	0.143	0.024	6.039	0.000
Covariances:				
Psychosis with Depression	-0.167	0.020	-8.188	0.000
Dementia with Depression	-0.154	0.021	-7.507	0.000

Bipolar with Depression	-0.118	0.021	-5.723	0.000
Psychosis with Dementia	-0.364	0.018	-19.968	0.000
Bipolar with Dementia	-0.210	0.020	-10.465	0.000
Psychosis with Bipolar	-0.240	0.020	-12.137	0.000
Psych PRN with Seclusions	0.065	0.021	3.106	0.002

Results for Assaults Model with Latency

This model (see Table 9) tested the statistical relationships proposed in the assaults model with latency to readmission as the outcome variable. Like the latency model for falls, this model failed to reach convergence until the latency variable was recalculated into months. After this, the model's initial fit was poor (CFI=0.544, SRMR=0.054, RMSEA=0.152). The modification indices suggested that the fit would be improved if the diagnostic variables to covary.

Like previous models, a good statistical fit was achieved after the modifications were added (CFI=0.988, SRMR=0.015, RMSEA=0.029). The most unique findings in this model are the predictors of latency. Psych PRNs had a negative relationship with latency, indicating that the time between admissions was decreased as the number of medications increased. This was predicted by hypothesis 5 from the proposed assaults model. Assaults, psychosis, and bipolar disorder had the opposite relationship with latency; an increase (or the presence of a diagnosis) was associated with an increase in the time between admissions. Relationships between these variables were predicted by hypothesis 1 (psychosis and bipolar diagnoses) and 3 (assaults), although not in the observed direction.

Figure 8. Diagram of significant pathways for assaults model with latency

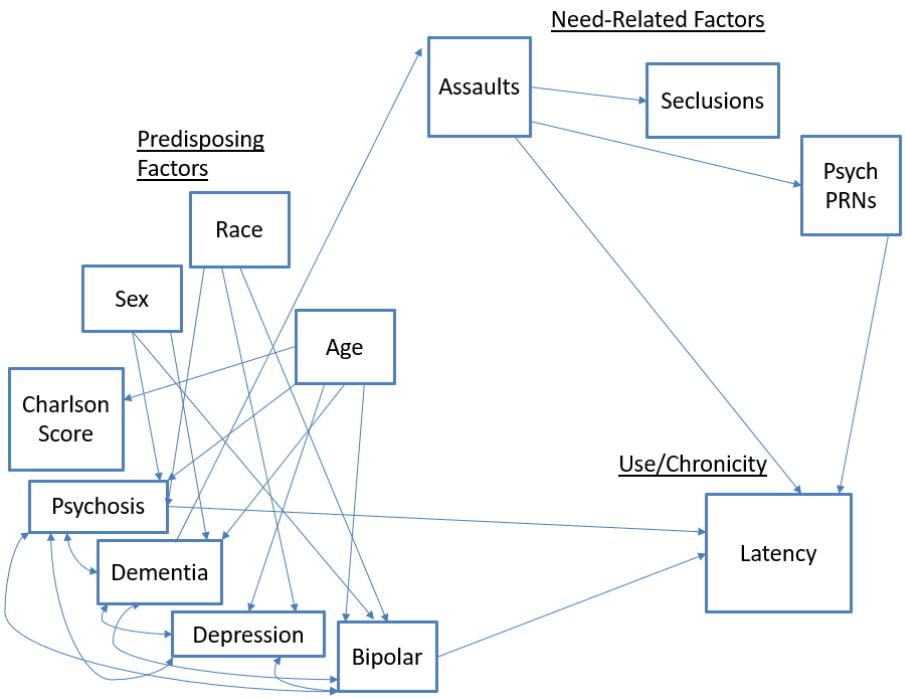


Table 9
Model results for assaults and latency

Pathway	Estimate	SE	Est./SE	P-value (2-tailed)
The path from:				
Age to Psychosis	-0.268	0.019	-13.987	0.000
Race to Psychosis	-0.208	0.019	-10.698	0.000
Sex to Psychosis	-0.187	0.019	-9.651	0.000
Age to Depression	-0.072	0.021	-3.368	0.001
Race to Depression	0.138	0.021	6.561	0.000
Sex to Depression	-0.028	0.021	-1.337	0.181
Age to Dementia	0.310	0.019	16.111	0.000
Race to Dementia	-0.011	0.020	-0.521	0.602

Sex to Dementia	0.172	0.020	8.670	0.000
Age to Bipolar	-0.148	0.021	-7.079	0.000
Race to Bipolar	0.099	0.021	4.677	0.000
Sex to Bipolar	-0.064	0.021	-3.042	0.002
Age to Charlson Score	-0.064	0.021	-2.986	0.003
Race to Charlson Score	-0.032	0.021	-1.509	0.131
Sex to Charlson Score	0.000	0.021	-0.011	0.991
Age to Assaults	-0.046	0.023	-1.963	0.050
Race to Assaults	-0.023	0.022	-1.037	0.300
Sex to Assaults	0.020	0.022	0.920	0.358
Psychosis to Assaults	0.011	0.028	0.386	0.700
Depression to Assaults	-0.039	0.023	-1.673	0.094
Dementia to Assaults	0.079	0.027	2.891	0.004
Bipolar to Assaults	-0.022	0.025	-0.896	0.370
Charlson Score to Assaults	0.006	0.021	0.273	0.785
Age to Psych PRN	0.002	0.020	0.094	0.925
Race to Psych PRN	0.006	0.020	0.315	0.753
Sex to Psych PRN	0.023	0.020	1.143	0.253
Assaults to Psych PRN	0.384	0.018	20.960	0.000
Age to Seclusions	-0.024	0.021	-1.122	0.262
Race to Seclusions	-0.036	0.021	-1.704	0.088
Sex to Seclusions	0.033	0.021	1.575	0.115
Assaults to Seclusions	0.151	0.021	7.203	0.000
Age to Latency	0.026	0.023	1.130	0.258
Race to Latency	-0.011	0.022	-0.519	0.603
Sex to Latency	-0.035	0.022	-1.620	0.105
Psych PRN to Latency	-0.087	0.023	-3.783	0.000
Seclusions to Latency	-0.008	0.022	-0.358	0.721
Assaults to Latency	0.111	0.023	4.799	0.000
Charlson Score to Latency	0.028	0.021	1.307	0.191
Psychosis to Latency	0.145	0.028	5.226	0.000
Depression to Latency	-0.007	0.023	-0.287	0.774
Dementia to Latency	0.033	0.027	1.215	0.224
Bipolar to Latency	0.052	0.024	2.135	0.033
Covariances:				
Psychosis with Depression	-0.169	0.021	-8.103	0.000
Dementia with Depression	-0.154	0.021	-7.328	0.000

Bipolar with Depression	-0.118	0.021	-5.591	0.000
Psychosis with Dementia	-0.364	0.019	-19.522	0.000
Bipolar with Dementia	-0.208	0.021	-10.123	0.000
Psychosis with Bipolar	-0.241	0.020	-11.909	0.000

Integrated Models

After analyzing the models discussed above, two integrated models (one for falls and another for assaults) were constructed. Table 10 summarizes results for the integrated assaults model and Table 11 (also below) contains the results for the integrated falls model. Figures 9 and 10 visually represent the assaults and falls models, respectively.

In terms of fit, the assaults model met the criteria for good fit according to all statistical indices (CFI=0.985, SRMR=0.020, and RMSEA=0.022). All pathways significant in the previous models retained significance when all the chronicity variables were integrated. As hypothesized, assaults were significantly associated with LOS and latency to readmission; however, assaults were not related to the number of admissions. Seclusions was unrelated to any of the outcomes, although a significant covariation was observed with psych PRNs. The demographic (age, sex, race) and diagnostic variables maintained a variety of significant relationships across the model. Psych PRNs were not associated with LOS or admissions but demonstrated a significant association with latency. A mediation analysis was conducted to determine if psych PRNs served a significant moderator of the assaults-latency relationship. Based on a Sobel test (value=-5.59), psych PRNs significantly mediated the relationship between assaults and latency (p=0.00).

The falls model also demonstrated good fit according to statistical indices (CFI=0.977, SRMR=0.021, RMSEA=0.028). Age was no longer a significant predictor of LOS, but all other

pathways retained significance. Falls was not a significant predictor of any chronicity variable. However, psych PRNs demonstrated significant relationships with LOS and latency; ED visits also demonstrated a significant relationship with LOS. Similar to the integrated model for assaults, the demographic and diagnostic variables demonstrated significant relationships throughout the model.

Table 10
Integrated assaults model results

Pathway	Estimate	SE	Est./SE	P-value (2-tailed)
The path from:				
Age to Psychosis	-0.265	0.019	-14.228	0.000
Race to Psychosis	-0.212	0.018	-11.978	0.000
Sex to Psychosis	-0.201	0.019	-10.792	0.000
Age to Depression	-0.071	0.021	-3.417	0.001
Race to Depression	0.140	0.020	6.873	0.000
Age to Dementia	0.307	0.019	16.408	0.000
Sex to Dementia	0.173	0.019	9.001	0.000
Age to Bipolar	-0.151	0.020	-7.395	0.000
Race to Bipolar	0.089	0.020	4.384	0.000
Sex to Bipolar	-0.065	0.020	-3.158	0.002
Age to Charlson Score	-0.069	0.021	-3.281	0.001
Dementia to Assaults	0.073	0.021	3.493	0.000
Assaults to Psych PRNs	0.380	0.018	21.139	0.000
Assaults to Assaults	0.146	0.021	7.078	0.000
Sex to Admits	-0.050	0.019	-2.595	0.009
Charlson Score to Admits	0.064	0.019	3.416	0.001
Age to Admits	0.115	0.020	5.759	0.000
Psychosis to Admits	0.264	0.022	12.027	0.000
Bipolar to Admits	0.137	0.021	6.433	0.000
Assaults to LOS	0.083	0.021	4.027	0.000

Race to LOS	-0.063	0.022	-2.885	0.004
Psychosis to LOS	0.078	0.023	3.431	0.001
Age to LOS	-0.039	0.022	-1.767	0.077
Psych PRNs to Latency	-0.117	0.020	-5.863	0.000
Assaults to Latency	0.088	0.020	4.358	0.000
Psychosis to Latency	0.109	0.021	5.180	0.000
Bipolar to Latency	0.049	0.021	2.320	0.020
Covariances:				
Psychosis with Depression	-0.167	0.020	-8.183	0.000
Dementia with Depression	-0.153	0.021	-7.428	0.000
Bipolar with Depression	-0.120	0.021	-5.752	0.000
Psychosis with Dementia	-0.364	0.018	-19.996	0.000
Bipolar with Dementia	-0.210	0.020	-10.464	0.000
Psychosis with Bipolar	-0.240	0.020	-12.134	0.000
Psych PRN with Seclusions	0.066	0.021	3.136	0.002

Figure 9. Integrated assaults model.

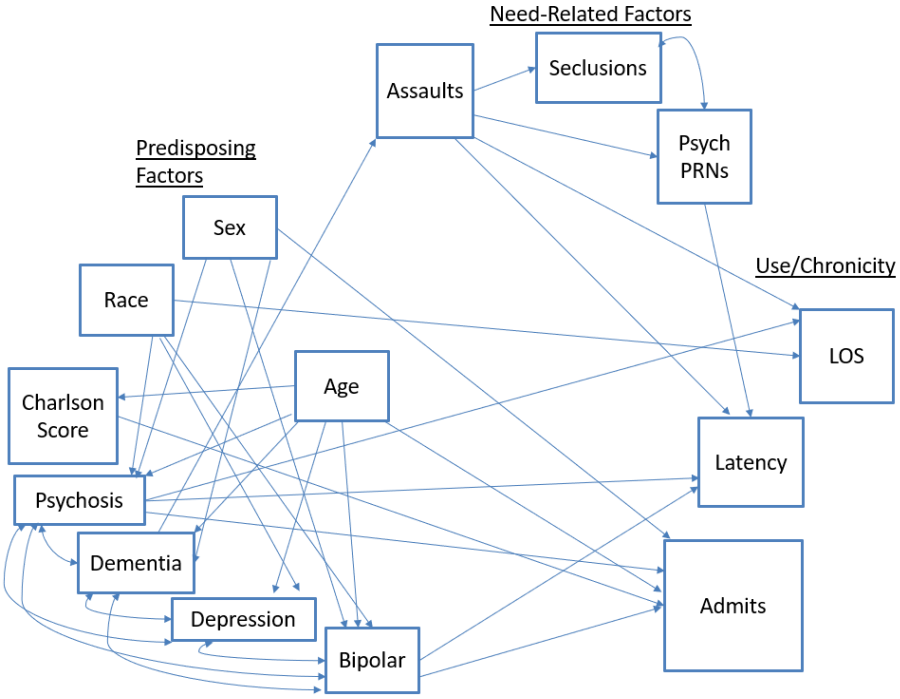
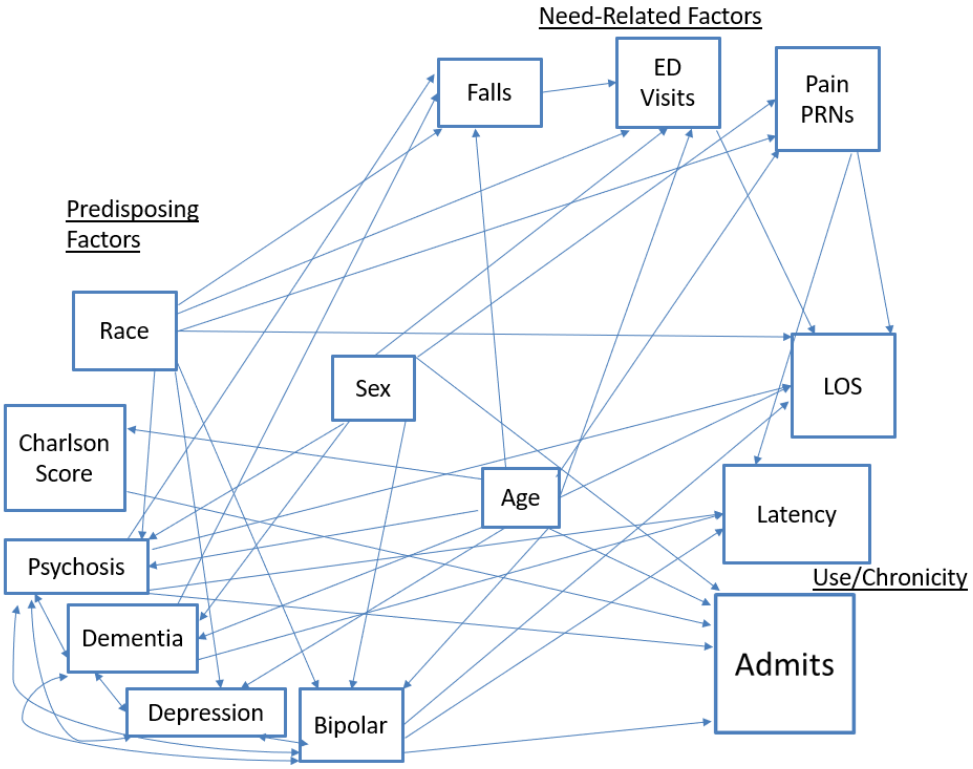


Table 11
Integrated falls model results

Pathway	Estimate	SE	Est./SE	P-value (2-tailed)
The path from:				
Age to Psychosis	-0.265	0.019	-14.228	0.000
Race to Psychosis	-0.212	0.018	-11.978	0.000
Sex to Psychosis	-0.201	0.019	-10.794	0.000
Age to Depression	-0.071	0.021	-3.415	0.001
Race to Depression	0.140	0.020	6.889	0.000
Age to Dementia	0.307	0.019	16.408	0.000
Sex to Dementia	0.173	0.019	8.999	0.000
Age to Bipolar	-0.151	0.020	-7.395	0.000
Race to Bipolar	0.089	0.020	4.384	0.000
Sex to Bipolar	-0.065	0.020	-3.157	0.002
Age to Charlson Score	-0.069	0.021	-3.281	0.001
Age to Falls	0.050	0.022	2.291	0.022
Race to Falls	0.043	0.021	2.000	0.046
Psychosis to Falls	-0.061	0.024	-2.535	0.011
Dementia to Falls	0.104	0.023	4.448	0.000
Age to Pain PRNs	-0.084	0.021	-4.057	0.000
Race to Pain PRNs	0.088	0.021	4.212	0.000
Sex to Pain PRNs	-0.066	0.021	-3.179	0.001
Age to ED	0.080	0.020	4.023	0.000
Race to ED	0.054	0.020	2.730	0.006
Sex to ED	0.060	0.020	3.047	0.002
Falls to ED	0.295	0.019	15.466	0.000
Age to Admits	0.122	0.020	6.071	0.000
Sex to Admits	-0.047	0.019	-2.435	0.015
Charlson Score to Admits	0.064	0.019	3.404	0.001
Psychosis to Admits	0.266	0.022	12.093	0.000
Bipolar to Admits	0.132	0.021	6.222	0.000
Pain PRN to LOS	-0.072	0.021	-3.391	0.001
ED to LOS	-0.045	0.021	-2.117	0.034

Race to LOS	-0.054	0.022	-2.470	0.013
Age to LOS	-0.052	0.023	-2.283	0.022
Psychosis to LOS	0.061	0.023	2.618	0.009
Bipolar to LOS	-0.050	0.022	-2.254	0.024
Pain PRNs to Latency	-0.077	0.019	-4.069	0.000
Psychosis to Latency	0.138	0.024	5.828	0.000
Dementia to Latency	0.055	0.022	2.436	0.015
Bipolar to Latency	0.067	0.022	2.968	0.003
Covariances:				
Psychosis with Depression	-0.167	0.020	-8.183	0.000
Dementia with Depression	-0.153	0.021	-7.473	0.000
Bipolar with Depression	-0.118	0.021	-5.721	0.000
Psychosis with Dementia	-0.364	0.018	-19.966	0.000
Bipolar with Dementia	-0.210	0.020	-10.464	0.000
Psychosis with Bipolar	-0.240	0.020	-12.134	0.000

Figure 10. Integrated falls model.



DISCUSSION

The goal of the present study was to integrate previous research into two comprehensive models of chronicity within the context of a geropsychiatric hospital. Chronicity was based on three distinct outcome variables: length of stay (LOS), number of admissions, and latency to readmission. Several variables were hypothesized to have relationships with these outcomes, including demographic information, diagnoses (psychological and medical), use of PRN medications (psychiatric and pain), ED visits, seclusions, falls, and assaults. Anderson's model of health care utilization was used to help explain chronicity in this geriatric population. This model contained three important components: predisposing, enabling, and need factors (Anderson, 1995). The predisposing components in this study were diagnoses (psychological and medical), age, race, and sex. The enabling component was represented only by treatment attendance; falls, assaults, PRN medications, and seclusions were included as indicators of need.

Unfortunately, the proposed latent construct (chronicity) did not hold together according to statistical analyses. The treatment attendance variable (contained in hypothesis 6 for assaults) was also removed due to limited data. Therefore, models were created using each individual indicator of chronicity in the context of either falls or assaults. These models demonstrated a good degree of fit, so they were combined into separate integrated models for falls and assaults, seen in figures 9 and 10 above. In this section, the results will be discussed in detail, limitations will be addressed, and ideas for future projects will be presented. Demographic predictors will be discussed first, followed by the hypotheses related to falls, and then finally the hypotheses related to assaults.

Several significant outcomes were observed for the demographic predictors which demonstrate their importance as predisposing factors. Older men are less likely to be diagnosed with psychosis or bipolar disorder, but more likely to have a diagnosis of dementia. Depression was more prevalent among the NHW patients, but African Americans were more likely to receive a psychotic diagnosis. These outcomes are consistent with other studies that have demonstrated different diagnostic and health patterns based on demographic variables (Seitz et al., 2012; Azad, Bugami, & Loy-English, 2007; Cabassa et al., 2013; Nguyen, Huang, Arganza, & Liao, 2007; Perlman et al., 2015). As mentioned previously, Husaini and colleagues (2002) found that African Americans have higher rates of dementia and schizophrenia diagnoses compared to Caucasians. However, Caucasians were more likely to be diagnosed with depression or anxiety (Husaini et al., 2002). This was not completely replicated in this population, but the results of this study clearly demonstrated that psychological diagnoses vary based on demographic variables.

Furthermore, the demographic variables also demonstrated significant relationships with other variables. Within the integrated model, all three demographic variables significantly predicted the use of pain PRN medications. Specifically, older African American males demonstrated the lowest rate of PRN medications for pain. This is consistent with previous research, which demonstrated that African Americans often receive less treatment for pain compared to NHW (Tait & Chibnall, 2014). However, older NHWs demonstrated a higher rate of falls which could partially account for the discrepancy in pain PRNs. This may be particularly true among males, since older men demonstrated a higher rate of ED visits which could indicate additional need regarding pain relief. Race and sex were also associated with two of the chronicity variables. Patients of NHW race demonstrated shorter stays in the facility compared

to African Americans; meanwhile, men demonstrated fewer readmissions to the facility. Anderson's utilization model is useful here, particularly related to the relationship between the proposed predisposing factors and indicators of need. Such information could be useful when planning treatment or discharge into the community for older adults with severe psychiatric needs. It also demonstrates the need to address racial disparities within inpatient care facilities, as well as other areas of health care. Implicit biases, ineffective patient-provider communication, and reduced access to care have been implicated as potential contributors to health disparities (Tait & Chibnall, 2014). Additional research should be conducted to develop methods to reduce such disparities, including ways to reduce diagnostic inequality, enhance pain management, and reduce LOS in minority older adults.

In addition to the hypotheses related to demographics, several hypotheses were presented for falls and assaults. Hypotheses related to falls (refer to Figure 1) will be discussed first followed by those related to assaults. Hypothesis 1 stated that psychotic diagnoses, bipolar diagnoses, and a low Charlson score would be related to increased chronicity. This hypothesis was partially confirmed, although the relationship of these variables to chronicity varied based on the outcome variable used. Charlson score did not demonstrate significant relationships with any of the chronicity variables (LOS, admissions, latency). This may be due to a limited number of patients with severe chronic illness, since these individuals would have likely been moved to a facility for more intensive medical care. However, psychotic and bipolar diagnoses showed several significant relationships. These diagnostic categories displayed key differences in their associations with outcomes, which indicates that each is a unique predisposing factor. Psychosis was associated with increased LOS, more admissions, and greater latency between admissions. The first two relationships (with LOS and admissions) fits within expectations and have been

demonstrated in previous studies (Hendrie et al., 2013; Cully et al., 2005; Liu, Li, Liu, & Tu, 2012; Gluvas et al., 2011). The relationship with latency is less expected but could represent the successful treatment of these conditions using medications and/or social support. With such treatments, patients may stay out in the community longer than originally anticipated; particularly when these patients are transitioned to group homes or nursing facilities.

Bipolar diagnoses were also associated with an increased number of admissions, although the relationship with LOS was not significant. This diagnostic category demonstrated a similar relationship to latency in that it was positive and associated with greater latency. This could also speak to successful treatment and adherence to medication regimens, at least for a period. Additionally, a dementia-related diagnosis was also positively associated with latency. It was not associated with LOS or admissions, which potentially speaks to successful management of the symptoms associated with this category. However, it is impossible to make conclusions regarding how treatment could have impacted latency without additional information. Unexpectedly, dementia was not associated with increased LOS, which has been demonstrated in several previous studies (Connolly & O'Shea, 2014; Snowden, 1993; Chung et al., 2010; Blais et al., 2003). Depression was not associated with any of the chronicity indicators, although previous studies have linked depression with increased use of psychiatric services (Djernes, Gulmann, Foldager, Oleson, & Munk-Jorgenson, 2011; Hendrie et al., 2013). However, these studies were not conducted in geropsychiatric units, nor were they focused on older adults. As mentioned by Blazer (2003), late life depression may have a different clinical presentation compared to manifestations of the disorder in earlier life phases. Not only are older adults more likely to have more psychiatric and medical comorbidities associated with their depression diagnoses, but minor (or subthreshold) depression may be more common within the population

(Blazer, 2003). Within this specific context, depression may not serve as a major predictor of chronicity although additional research must be conducted to confirm this result and to determine the specific variables that impact depression severity.

Hypothesis 2 for falls stated that psychosis, bipolar disorder, dementia, and Charlson score would be associated with an increased rate of falls. This hypothesis was partially confirmed, although bipolar diagnoses and Charlson score were not significant predictors. Depression was not a hypothesized predictor of falls in this study, although previous literature has demonstrated a significant relationship (Nanda et al., 2011; Grenier et al., 2014; Guzman, 2013; Kao et al., 2012; Kvelde et al., 2013; Kwan, Lin, Close, & Lord, 2012). Once again, these studies were not specifically conducted within a geropsychiatric unit which may have more experience treating depression. Furthermore, although it has been hypothesized that depression may be associated with falls due to decreased mobility (Nanda et al., 2011), depression might also be associated with reduced activity in general. A patient with reduced activity may have less opportunity to fall.

Dementia-related diagnoses demonstrated a positive relationship with fall rate, which confirms the hypothesis and supports previous literature (Blair & Gruman, 2005; Nanda et al., 2011). The behavioral disturbances (agitation, wandering, etc.) may contribute to this relationship (Blair & Gruman, 2005), since individuals with severe dementia may become active despite physical frailty and confusion. This clearly demonstrates a significant relationship between a predisposing factor (dementia) and an indicator of need (fall rate). Behavioral disturbances may also be considered a need-related factor, although such behaviors were not examined directly in the current study.

Surprisingly, psychotic disorders were not associated with increased fall rate. In fact, the opposite relationship was demonstrated. This is inconsistent with previous research that found an association between delusions and falls (Nanda et al., 2011). However, Nanda and colleagues (2011) did not examine psychotic disorders which typically involve more than delusions. Furthermore, the presentation of psychosis changes with aging and this may alter the significance of certain variables within Anderson's model. Specifically, negative symptoms and cognitive impairment become more prominent as positive symptoms (hallucinations, delusions) decrease (Davidson et al., 1995; Soni & Mallick, 1993). The presence of more negative symptoms, such as flat affect, reduced social interaction, anhedonia, and reduced motivation, may explain the lack of association between psychosis and falls. These symptoms could be associated with less physical activity and therefore reduced opportunities to experience a significant fall. Specific research should be conducted regarding the unique contributions of each symptom category to patient fall rates. It is possible that positive symptoms may be less relevant as predisposing factor among older adults. Negative symptoms may be a more significant factor in general, and more indicative of need in Anderson's model, but not for fall rate specifically. Although psychosis did not predict falls, the use of psychological PRNs demonstrated a positive relationship with fall rate. The relationship between medications and falls has been repeatedly shown in the literature. Specifically, antipsychotics, hypnotics, benzodiazepines, and antidepressants have all been associated with falls in various studies (Rigler et al., 2013; Joo et al., 2002; Monane & Avorn, 1996).

Hypothesis 3 for falls was broken down into two competing predictions. Hypothesis 3A predicted that falls would be associated with increased chronicity; hypothesis 3B predicted that falls would be associated with decreased chronicity due to the patient's transfer to a different

facility. However, neither of these hypotheses were confirmed; falls were not associated with any of the chronicity outcome measures. This is inconsistent with a study conducted by Greene and colleagues (2001). This study, conducted within a geropsychiatric unit, found that falls (particularly recurrent falls) were significantly associated with LOS. The authors advocated for fall risk assessments to identify and develop treatment plans for patients who might be at risk for such adverse incident (Greene et al., 2001). The Harper Center has a specific unit which is designed to give special attention to patients who at risk for falls; a unit for those with severe dementia also exists. The use of these units, as well as other practices, could have impacted the relationship between falls and chronicity. The use of fall risk assessments, staff specialized in the treatment of frail older adults, and environmental modifications could have attenuated the relationship between fall rate and the outcome variables. The use of risk assessments may be particularly useful, as these plans could be used to document predisposing, enabling, and need variables so that staff can plan treatment accordingly. It may be useful for future studies to examine the association between falls and chronicity before and after the implementation of fall-related interventions. Such a study could potentially demonstrate the effectiveness of fall-related interventions within geropsychiatric care facilities.

Hypothesis 4 for falls predicted that fall rate would be associated with ED visits and pain PRN usage. This hypothesis was only partially supported. Specifically, the relationship between fall rate and ED visits was significant; however, fall rate was not a significant predictor of pain PRN use. The lack of significance for pain PRNs is somewhat surprising, although patients with particularly severe falls might have received a prescription medication instead of a PRN. It's important to note that several diagnostic categories were associated with usage of pain PRNs. Depression and bipolar diagnoses were associated with increased usage, although dementia

diagnoses were associated with decrease use. Pain is a common complaint in geriatric psychiatry units (Meeks et al., 2008), but the reduced rate for dementia patients may indicate difficulty associated with communication or pain detection regarding these individuals. Therefore, additional research should focus on the role of chronic pain as a need-related factor. Nonetheless, diagnosis serves as an important predisposing factor within the context of pain PRN utilization.

Hypothesis 5 for falls was split similarly to hypothesis 3, predicting opposite linkages of ED visits with chronicity. Pain PRNs were also hypothesized to have a significant relationship to measures of chronicity. Neither of these hypotheses were completely confirmed since ED visits were not significantly associated with any of the chronicity outcome measures. This indicates that ED visits are not an important predictor of chronicity, potentially due to the nature of the patients seen at the Harper Center. Few facilities are equipped to handle patients with severe psychopathology on a long-term basis, particularly within a geriatric context. It likely that some patients were sent to nursing facilities after an ED visit (in the case of a severe fall for example), but others were likely returned to the facility after medical stabilization for treatment of their psychiatric concerns. However, pain PRNs demonstrated a significant association with two measures of chronicity: LOS and latency. Both relationships were negative, indicating that pain PRNs were associated with a decreased LOS but a reduced period before readmission (latency). This could indicate that pain PRNs could help to stabilize patients prior to their discharge from the facility; however, the relationship between pain PRNs and latency is less clear. It is possible that patients with greater pain PRN use were discharged to another facility for treatment and then returned after medical stabilization. If so, this could potentially explain the differing relationship

that pain PRNs demonstrated with LOS and latency. Further research would be needed to clarify this issue.

Several hypotheses were also suggested for assaults (refer to Figure 2). Hypothesis 1 is the same as the first hypothesis for falls and will not be discussed again. Furthermore, the demographic variables remain significant predictors as discussed above. However, hypothesis 2 stated that psychosis, bipolar disorder, dementia, and Charlson score would be associated with assaults. This hypothesis was only partially confirmed since dementia-related diagnoses were the sole predictor of assaults. Behavioral disturbances may occur within the context of dementia and have been hypothesized to increase LOS (White et al., 1997). The significant association between dementia and assaults is likely due to the presence of behavioral disturbances, although this cannot be stated definitively within the current study.

Hypothesis 3 for assaults predicted an association with the chronicity outcome variables. This hypothesis was partially confirmed. No relationship was demonstrated between assaults and number of admissions, but number of assaults was associated with a longer LOS and increased latency to readmission. The association between assaults and LOS has been demonstrated in previous studies, particularly within the context of dementia-related behavioral disturbances (Hwang, Yang, Tsai, & Liu, 1997). Patients who have a history of assaults may also be difficult to place in nursing or group homes until their behaviors have been resolved. Behavioral disturbances, such as assaults or general aggression, can be identified and targeted for successful interventions (Hwang, Yang, Tsai, & Liu, 1997). Such intervention could potentially explain the increased latency demonstrated in this study such that reductions in behavioral disturbances could contribute to increased time between admissions.

Hypothesis 4 stated that assaults would be associated with use of psychological PRNs and seclusions. This hypothesis was confirmed. Since PRNs and seclusions are often used to calm patients after adverse incidents such as assaults, it is intuitive that a patient's rate of assaults would predict both variables. Assaults, psych PRNs, and seclusions are all indicators of need within Anderson's model, as they may be associated with severe psychopathology. Hypothesis 5 took this relationship a step further and proposed that psychological PRNs and seclusions were related to chronicity. This hypothesis was not confirmed, and seclusions were not significantly associated with any of the chronicity variables. However, psychological PRNs were significantly associated with latency in the predicted direction. Specifically, higher rate of psychological PRN usage was associated with a decrease in latency and mediated the assaults-latency relationship. In this case, psychological PRNs could serve as an indicator of severity such that patients with higher usage rates may have more severe diagnoses or histories of disruptive behaviors. This may translate into difficulty in adjusting to new environments or increased caregiver stress, which could potentially lead to readmission to the facility.

This research has some clear limitations. Unfortunately, the current study only includes data from one geropsychiatric facility. This limits the generalizability of the results, but this could serve as a model for additional research. Specifically, data collected from several different facilities over the course of several years could help plan patient care by giving providers a way to anticipate potential roadblocks in treatment provision. It would also allow for the collection and analyses of additional information.

For example, information regarding the patient's family and community resources could be collected to understand environmental factors that could prevent or facilitate recovery from mental illness. Social support, which was not addressed in this study, has been shown to have an

important influence on an individual's ability to recover and to reduce likelihood of relapse or hospitalization (Ellis, Bernichon, Yu, Roberts, & Herrell, 2004; Zhang, Harvey, & Andrew, 2011). Ellis and colleagues (2004) conducted a study with women leaving a residential treatment setting for substance use. Positive activities (such as family members helping each other) were associated with a decrease in the rate of relapse, while negative activities (such as family fights) were associated with an increased rate of relapse (Ellis et al., 2004). Their study was not conducted with older adults, but it does emphasize the importance of family and environmental dynamics to an individual's recovery. These factors are just as important for older adults leaving psychiatric facilities, particularly those who are returning home or to family caregivers. This data would also fit into the enabling factor proposed by Anderson's theory (Anderson, 1995).

Data collection from multiple facilities would also allow for the inclusion of additional diagnostic categories. Posttraumatic stress disorder (PTSD; Szafranzi, Gros, Menefree, Wanner, & Norton, 2014; Brown, Stout, & Mueller, 1999), substance use (Brown, Stout, & Mueller, 1999; Gluvas et al., 2011; Cully et al., 2005), and borderline personality disorder (Bohus, Haaf, Stiglmayr, Pohl, Bohme, & Linehan, 2000) have all been associated with chronic psychiatric hospitalizations. PTSD is often associated with high rates of treatment discontinuation despite the use of evidence-based treatments (Szafranski et al., 2014). Older adults also struggle with PTSD, which can lead to decreased cognitive performance (Schuitevoerder et al., 2013). Substance use, while associated with decreased LOS and admissions in some studies (Gluvas et al., 2011; Cully et al., 2005), is often comorbid with PTSD (Brown, Stout, & Mueller, 1999). The rates of dual diagnoses are lower for older adults, but the presence of multiple diagnoses also increases the use of inpatient and outpatient services (Prigerson, Desai, & Rosenheck,

2001). A larger sample from several facilities would allow for the investigation of how dual diagnoses impact older adults in psychiatric care.

While this study was conducted using secondary data analysis, a prospective study may be a more comprehensive way to collect additional information. Intake procedures could be established to administer validated, reliable scales of psychopathology to new patients. These scales could be administered over time to document change in symptoms related to treatment. This would also allow for the testing of hypotheses related to the effectiveness of group therapy and other modalities over the course of treatment. Relationships with adverse incidents (falls, assaults, and other behavioral disturbances) could also be tracked across time and related to overall outcomes.

Furthermore, consistent structured interviews could be given to patients to establish reliable diagnoses. One limitation of the current study is that diagnoses were provided by a small number of psychiatrists over the course of the facility's existence. This allows the diagnoses to be internally consistent to the facility but may not allow to accurate comparison to the larger population of psychiatric inpatients. The inclusion of structured interviews would provide a platform to give patients reliable diagnoses across providers and facilities. Such a study, while expensive and time consuming, would allow for establishment of patterns for healthcare utilization for a variety of different older adults. These patterns would help clinicians plan for adverse incidents and other need-based factors as well as clarify the selection or modification of enabling factors within the treatment environment.

Based on the results of the current study, an in-depth intake procedure is recommended for PGUs to document variables that could impact chronicity during inpatient stays. Staff members should especially look out for information related to the predisposing, enabling, and

need factors proposed in Anderson's model. Demographics (sex, age, and race/ethnicity) are important predictors because these predisposing variables have demonstrated relationships with both diagnosis and chronicity indicators. Appropriate diagnosis is also important since different diagnoses are associated with different need-related variables and chronicity indicators. Within Anderson's model, such predisposing variables indicate likelihood that an individual would require care. By collecting and maintaining data related to these variables, facilities may be able to predict the needs of patients as they arise. Furthermore, as mentioned above, social support and family structure have a large impact on the mental health of an individual. Facilities should aspire to collect information regarding family functioning to assess the degree to which social connections could enable an individual to seek and benefit from care. Needs-related information, such as previous falls, disruptive behaviors (such as assaults), and medical concerns (comorbidities, ED visits) should also be collected so that staff members can create treatment plans designed to maximize patient improvement and reduce chronicity.

Finally, factors from the expanded model should be collected across time (Aday & Anderson, 1974). Specifically, this model includes variables related to healthcare policy, characteristics of the system, and consumer satisfaction (Aday & Anderson, 1974). Use of this expanded theory could help characterize healthcare utilization among older adults diagnosed with psychiatric disorders and assist in the development of interventions to reduce their chronicity. A study of this variety would be best conducted longitudinally so that impact of the variable included in the expanded model can be determined across an extended period. The current study demonstrated several relationships among predisposing factors, need, and outcome variables. However, the development of successful interventions requires more than this individual-level information. Enabling resources, such a therapy attendance and

family/environmental dynamics, can be utilized to assist individuals in obtaining the treatment that they require within the appropriate environment. Knowledge of how policy, system characteristics, and consumer satisfaction influence care will further enhance the ability of clinicians in geropsychiatric environments to meet the needs of the aging population.

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APPENDIX: IRB APPROVAL

THE UNIVERSITY OF ALABAMA | Office of the Vice President for Research & Economic Development
Office for Research Compliance

April 3, 2017

Patricia A. Parmelee, Ph.D.
Director, Alabama Research Institute on Aging
Professor, Department of Psychology
College of Arts & Sciences
The University of Alabama
Box 870315

Re: IRB # 15-OR-130-ME-R2 "Outcomes of Care for Geriatric Psychiatric Inpatients"

Dear Dr. Parmelee,

The University of Alabama Institutional Review Board has granted approval for your renewal application. Your renewal application has been given expedited approval according to 45 CFR part 46. You have also been granted a waiver of informed consent and waiver of HIPAA authorization. Approval has been given under expedited review category 5 and 7 as outlined below:

(5) Research involving materials (data, documents, records, or specimens) that have been collected, or will be collected, solely for non-research purposes (such as medical treatment or diagnosis).

(7) Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.

Your approval will expire on April 2, 2018. If the study continues beyond that date, you must complete the IRB Renewal Application. If you modify the application, please complete the Modification of an Approved Protocol form. Changes in this study cannot be initiated without IRB approval, except when necessary to eliminate apparent immediate hazards to participants. When the study closes, please complete the Request for Study Closure (Investigator) form.

Should you need to submit any further correspondence regarding this application, please include the assigned IRB approval number.

Good luck with your research.

Sincerely,

Stuart Usdan, PhD.
Chair, Non- Medical Institutional Review Board
The University of Alabama

358 Rose Administration Building | Box 870127 | Tuscaloosa, AL 35487-0127
205-348-8461 | Fax 205-348-7189 | Toll Free 1-877-820-3066

IRB Project #: 15-OR-130-ME -R2

UNIVERSITY OF ALABAMA
INSTITUTIONAL REVIEW BOARD FOR THE PROTECTION OF HUMAN SUBJECTS
REQUEST FOR APPROVAL OF RESEARCH INVOLVING HUMAN SUBJECTS

I. Identifying information

	Principal Investigator	Second Investigator	Third Investigator
Names:	Patricia A. Parmelee		
Department:	ARIA/ Psychology		
College:	A&S		
University:			
Address:	Box 870315		
Telephone:	ext 1499		
FAX:			
E-mail:	pparmelee@ua.edu		

Title of Research Project: Outcomes of Care for Geriatric Psychiatric Inpatients

Date Submitted:
Funding Source: n/a

Type of Proposal	☐ New	☐ Revision	☒ Renewal Please attach a renewal application	☐ Completed	☐ Exempt
			Please attach a continuing review of studies form		
		Please en[illegible] original IRB [illegible] of the page			

UA faculty or staff member signature: _____

II. NOTIFICATION OF IRB ACTION (to be completed by IRB):
Type of Review: _____ Full board ✓ Expedited

IRB Action:
___ Rejected Date: _____
___ Tabled Pending Revisions Date: _____
___ Approved Pending Revisions Date: _____
✓ Approved-this proposal complies with University and federal regulations for the protection of human subjects.
Approval is effective until the following date: 4-2-18
Items approved: ___ Research protocol (dated_____)
___ Informed consent (dated_____)
___ Recruitment materials (dated_____)
___ Other (dated_____)

Approval signature _____ Date 4-3-17