THE EFFECT OF STAFFING VARIABLES ON NURSING HOME RESIDENT OUTCOMES

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ABSTRACT

The relationship between nursing home staffing variables and resident outcomes was investigated using a secondary data analysis. Data from the 2004 National Nursing Home Survey (NNHS) was linked with variables obtained from Nursing Home Compare in 2005. Minimum Data Set (MDS) quality indicators of facility-level depression and pain were used as outcome variables. This is a departure from previous studies which used primarily physiological outcome variables. Using a series of regression analyses, NNHS variables related to individual-level job factors, staff benefits, and staff richness were used to predict facility-level pain and depression. It was hypothesized that all three of these constructs would predict better resident outcomes in the form of reduced depression and pain. Staff stability and richness were also investigated as potential mediators.

The overall model was not supported, although several interesting relationships were found. As nursing home leadership experience increased, so did facility-level depression scores. The number of volunteers and volunteer hours had a similar relationship to depression. Greater wages, full-time staff turnover, and volunteer duties were associated with decreased depression rates. Staff HPPD, hourly wages, and several control variables were associated with decreased rates of pain. Implications for future studies are discussed, including the need for firsthand data collection and the reduction of measurement bias.

DEDICATION

This document is dedicated to everyone who helped me through the process of finalizing this document. In particular, I would like to acknowledge my parents (Kathy and Steve), my friends, and the members of my research lab for their continuous support.

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
β	Beta coefficient
F	Fisher's F ratio
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
r	Pearson product-moment correlation
R^2	Coefficient of determination
t	Computed value of t test
<	Less than
=	Equal to

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Chapter 1: Introduction

Life expectancy has increased substantially over the last few decades, and as a result the number of older adults has increased as well. By the middle of this century, as much as 22% of the world's population will be aged 60 or older (Tse, Leung, & Ho, 2011). Some of these older adults may require nursing home care; however, nursing homes and other care facilities may not be equipped to meet this increased demand (Tse, Wan, & Ho, 2011; Sandberg, Lundh, & Nolan, 2001). Staffing variables, such as turnover, have been linked to several types of resident outcomes. The most frequently studied outcomes are deficiency citations, physical restraint use, falls, and pressure ulcers (Castle, 2008). Whereas previous research has determined a link between staffing variables and resident outcomes, few studies have examined psychological outcomes such as depression. These conditions create major problems in the nursing home environment, and have been researched extensively in both this sample and the community (Herman, Johnson, Ritchie, & Parmelee, 2009; Hoover et al., 2010; Smallbrugge, Jongenelis, Beekman, & Eefsting, 2005). The goal of this project is to examine the effect of facility staffing variables on the psychological outcomes of nursing home residents. Individual level job factors, staff stability, and staff richness served as predictors; depression and pain served as outcome variables. Before reviewing the literature on organization, staffing, and resident outcomes, I will briefly introduce the outcome variables of interest for this project. Specifically, I will discuss the prevalence of pain and depression within nursing facilities.

Pain and Depression in Long-Term Care

Pain is relatively common in nursing home residents. Compared to a 10% to 40% prevalence in the general population (Gureje et al., 1998), the prevalence of pain in the nursing home population can range from 49% to 83% (Herman et al., 2009). This increased prevalence can be partially explained by conditions associated with aging, such as arthritis and other degenerative joint diseases, osteoporosis, and vascular disease (Gran, Festvag, & Landmark, 2009; Takai et al., 2010). Pain can lead to a decrease in quality of life, activities of daily living (ADLs), and social interaction (Herman et al., 2009; Weiner & Hanlon, 2001). Persistent pain may also influence the psychological well-being of nursing home residents. In a recent study by Tse, Leung, and Ho (2011), individuals suffering from pain demonstrated less happiness, lower life satisfaction, more loneliness, and more depression when compared to pain-free controls.

Depression is also associated with negative health outcomes, including functional decline, poor quality of life, and increased risk of death (Blazer, 2003; Hoover et al., 2010). Depressive symptoms can also negatively influence other comorbid conditions, such as congestive heart failure, diabetes, and dementia (Siegal et al., 2012). Depression is frequently diagnosed in nursing home populations, with some researchers suggesting a prevalence rate as high as 78% (Blazer, 2003; Hoover et al., 2010). These symptoms are often undertreated in nursing homes, despite previous research indicating that depression is both a risk factor for and a consequence of nursing home admission (Onder et al., 2007; Rodstein, Savitsky, & Starkman, 1976). If depression is detected successfully, the use of antidepressants and/or psychotherapy will typically alleviate depressive symptoms (Kallenbach & Rigler, 2006). Since the detection and treatment of depression is particularly relevant for nursing home residents, several studies have examined the link between the condition and facility quality. A study by Lapane and

Hughes (2004) demonstrated that antidepressant use is associated with various organizational characteristics of the nursing facility. Greater antidepressant use was associated with a greater percentage of residents from payer sources other than Medicaid/Medicare and more professional nursing staff. Lower antidepressant use was associated with larger nursing homes and the presence of full-time physicians (Lapane & Hughes, 2004).

Complexity Theory

In order to examine pain and depression in the context of nursing home organizational and staffing characteristics, it is important to have a basic understanding of complexity theory and its implications. Complexity science has been used in both the biological and the physical sciences (Anderson, Issel, & McDaniel, 2003), and has been applied to health care as well (McDaniel & Driebe, 2001). Complexity science can be defined as the study of how living things behave in complex systems, which can include nursing homes (Colon-Emeric et al., 2006). One of the most important aspects of the theory, self-organization, is when individuals within the system adjust their behavior to internal and external environmental demands (Cilliers, 1998; Anderson, Issel, & McDaniel, 2003).

Self-organization is achieved through several processes that are relevant to resident care in nursing home environments. First, the number of connections between the staff members within a facility determines how information flows through the system (Colon-Emeric et al., 2006; Anderson & McDaniel, 1999; Ashmos, Duchon, & McDaniel, 1998). As the number of connections increase within a given nursing facility, information may flow more freely and become available for problem-solving. Second, connections may be formed between staff members with different roles, training, and experiences, meaning that information can be

interpreted from a variety of perspectives (Colon-Emeric et al., 2006; Anderson & McDaniel, 1999). These two criteria lead to a form of cognitive diversity (Colon-Emeric et al., 2006), in which information flows between different staff types and actions are taken based on the blending of staff experiences.

Several studies have applied this theory and other management theories directly to nursing home environments. Colon-Emeric and colleagues (2006) used complexity theory to determine if connections among nursing home staff can influence the care planning process. The authors note that while good self-organization may lead to positive resident outcomes, ineffective self-organization can lead to negative resident outcomes. A situation in which ineffective communication leads to the limited availability of information, barriers against relationships, and the lack of cognitive diversity could result in a negative outcome (Colon-Emeric et al., 2006). Using a case study methodology, this study examined three different nursing homes and the effects of information flow, self-organization, and cognitive diversity on care planning. The results indicated that greater staff linkages lead to more innovation in care planning. In particular, connections between frontline staff and the care plan team were found to be important for resident outcomes and care process changes (Colon-Emeric et al., 2006). Furthermore, the study suggests that interventions should be created to strengthen staff connections and potentially lead to greater health outcomes (Colon-Emeric et al., 2006).

Similarly, Anderson, Issel, and McDaniel (2003) conducted a study to test the relationship between management practices and resident outcomes. Using primary data collected from directors of nursing and registered nurses in 164 Texas nursing homes, the authors used a cross-sectional design to examine the study hypotheses. The management practices under investigation included communication openness, participation in decision making, relationship-

oriented leadership, and formalization. The resident outcomes included in the study were the prevalence of aggressive behavior, restraint use, complications of mobility, and fractures (Anderson, Issel, & McDaniel, 2003).

The results indicated that each of the management practices had an effect on one or more of the resident outcomes used in the study; however, different practices led to different outcomes (Anderson, Issel, & McDaniel, 2003). Greater communication openness was associated with a lower use of restraints, while more RN participation in decision making was associated with less aggressive or disruptive behavior among residents (Anderson, Issel, & McDaniel, 2003). Greater use of relationship-oriented leadership was related to lower prevalence of complications of immobility and fractures. Meanwhile, greater level of formalization was associated with a higher prevalence of complications of immobility (Anderson, Issel, & McDaniel, 2003). This suggests that top-down management practices are less beneficial than more relationship-oriented practices. Additionally, the tenure of the director of nursing and years of experience may also influence resident outcomes (Anderson, Issel, & McDaniel, 2003).

In support of this finding, Gittell and colleagues (2008) found that relational coordination was positively associated with resident quality of life and CNA job satisfaction. In this study, relational coordination was defined as "shared understandings of the work and the context in which it is carried out" (Gittell et al, 2008, p. 154). This coordination was associated with nursing home outcomes both through enhancing the benefits associated with getting work done and by fostering positive connections with others. Connections between staff members and residents allowed for the creation of a web of social support and more client-centered care (Gittell et al., 2008). More freedom in work environments is also beneficial to nursing home staff members in other ways. Willemse, de Jonge, Smit, Depla, and Pot (2012) found that

decision authority buffered the adverse effects of job demands. Additionally, supervisor support was found to buffer job demands and emotional exhaustion in situations with low decision authority. Meanwhile, co-worker support had an adverse effect on personal accomplishments in high strain situations (Willemse et al., 2012).

Overall, these studies indicate the effectiveness of relationship-oriented management practices as opposed to more top-down styles of management. However, the success of such practices is limited by several factors inherent to the nursing home environment. Nursing homes are typically understaffed and high turnover rates are not uncommon (Donoghue & Castle, 2006). These problems, among others, can serve as significant barriers against staff communication and resident quality of life. For example, Hill and colleagues (2009) identified three major themes relating to falls by using a focus group methodology. The three themes discussed in the study were person, nursing home environment, and interactions leading to falls (Hill et al., 2009). One subcategory within the nursing home environment theme was staff and organization of care. This subcategory addressed the issue of low staffing levels and how this affected the staff's ability to deal with resident falls. The nursing home with a low fall rate had higher staff levels in which staff frequently worked as a team to prevent and react to falls (Hill et al., 2009). Using this advantage, the nursing home was capable of scheduling more frequent rounds and anticipating resident needs. Fall prevention was seen as a team effort that involved all levels of staff from housekeeping to nursing. Meanwhile, at a nursing home with a high fall rate, the primary complaint was the lack of qualified staff members to observe residents during busy time periods (Hill et al., 2009). In the following section I will elaborate on the research regarding staffing variables and how these variables relate to resident outcomes. Specifically, I will discuss turnover, retention, management style, and the use of agency staff. Then I will

describe my proposed project in further detail and what I plan to contribute to the existing literature.

Staffing Variables Related to Quality of Care

Staff turnover is a persistent problem in nursing homes, and many studies have been conducted to examine the factors that lead to higher turnover rates. Kash, Castle, Naufal, and Hawes (2006) examined the effects of facility and market-level characteristics on staffing levels and turnover rates for direct care staff. In this study, staffing levels and turnover were largely associated with facility characteristics rather than market level factors. An exception was found for LPNs, who may be more influenced by market factors (Kash, Castle, Naufal, & Hawes, 2006). The authors also suggested that better management and higher wages may decrease CNA turnover, and that greater use of agency staff was associated with higher turnover for regular staff (Kash, Castle, Naufal, & Hawes, 2006). Rosen, Stiehl, Mittal, and Leana (2011) investigated attitudinal factors associated with turnover. In this case, actual turnover was predicted by turnover intentions and the absence of health insurance; pay was not a significant predictor of turnover intentions or actual turnover (Rosen, Stiehl, Mittal, & Leana, 2011). The authors also made a distinction between switchers (direct care employees who move from one facility to another) and leavers (who leave the profession all together). Switchers tended to leave for better opportunities, while leavers were more likely to have lower emotional well-being and job satisfaction (Rosen, Stiehl, Mittal, & Leana, 2011).

Castle and Engberg (2006) found that higher turnover, lower staffing levels, lower staff stability, and higher agency use were negatively associated with quality of nursing home care. A separate study also found that higher turnover among CNAs, LPNs, and RNs is associated with

low quality of care, and attempted to determine when turnover becomes a problem (Castle, Engberg, & Men, 2007). The results suggested that RN turnover of less than 30%, LPN turnover of less than 50%, and CNA turnover less than 40% would be the most advantageous in nursing home environments (Castle, Engberg, & Men, 2007). A longitudinal study confirmed this result and suggested that greater staffing levels (particularly for RNs and CNAs), lower turnover, less use of agency employees, and greater professional staff mix are associated with quality (Castle & Anderson, 2011). Turnover rates for one employee type may also affect turnover for other staff members. For example, a lower DON turnover rate is associated with lower turnover and more retention for other frontline staff members (Donoghue, 2010). Furthermore, nursing homes with more RN hours per patient day are less likely to have high LPN or CNA turnover. More CNA hours per patient day is associated with lower turnover in LPNs and CNAs (Donoghue, 2010).

The use of agency staff has been consistently linked to lower quality care (Castle & Anderson, 2011; Castle & Engberg, 2007; Kash et al., 2006), but the use of such staff has become a necessity in nursing homes with large turnover rates. Some research has indicated that the use of agency staff affects quality of care in a nonadditive fashion (Castle, Engberg, & Men, 2008). Low levels of agency workers may not affect resident outcomes in a negative fashion; however, higher levels of agency staff are generally associated with lower quality of care (Castle, Engberg, & Men, 2008). This may be partially explained by the lack of consistent assignment. In a study examining the organizational attributes of nursing homes with good, average, and poor resident outcomes, Rantz and colleagues (2004) found that consistent assignment was associated with higher quality. Consistent assignment refers to procedures that allow the same staff members to care for the same residents each time the staff member is on duty (Castle, 2013, Rantz et al., 2004; Castle, 2011). While the literature on consistent assignment in nursing homes

is somewhat mixed (Rahman, Straker, & Manning, 2009), some studies have indicated that the practice may have a beneficial effect on care quality. Castle (2011) found that consistent assignment resulted in fewer quality of care and quality of life deficiency citations. High RN staffing was also associated with fewer resident quality of life citations. However, high CNA turnover was associated with more staffing quality of life citations and high agency CNA staffing was linked to more severe citations (Castle, 2011). Castle (2013) linked consistent assignment in nursing homes to lower turnover and absenteeism. On the other hand, Temkin-Greener and colleagues (2012) found that whereas staff cohesion was associated with better pressure ulcer and incontinence outcomes, consistent assignment had no effect.

Other studies have attempted to examine the relationships among organizational characteristics, staff turnover, and resident outcomes. Donoghue and Castle (2009) examined the relationship between nursing home administrator leadership style and staff turnover using data obtained from the National Nursing Home Turnover Study (NNHTS). Leadership style was found to be associated with turnover. Specifically, administrators with a "consensus manager" style experienced lower levels of turnover at their facilities (Donoghue & Castle, 2009). The study defined a consensus manager as a leader who seeks out input from frontline staff and takes this information into consideration when making decisions. Another study by Castle and Decker (2011) investigated how the leadership style of the nursing home administrator and director of nursing related to quality of care for residents. Once again, the presence of the consensus manager leadership style among administrators and DONs was associated with greater quality of care (Castle & Decker, 2011). A leadership style match between the administrator and DON was also associated with quality of care (Castle & Decker, 2011). Barry, Brannon, and Mohr (2005) conducted a similar study which attempted to link this management style to staff empowerment

and resident outcomes. Situations in which CNAs had more opportunities, in the form of rewards or advancement, were associated with less pressure ulcer occurrence. Meanwhile, situations in which CNAs had more influence in resident care decisions were associated with higher social engagement scores for the facilities residents (Barry, Brannon, & Mohr, 2005).

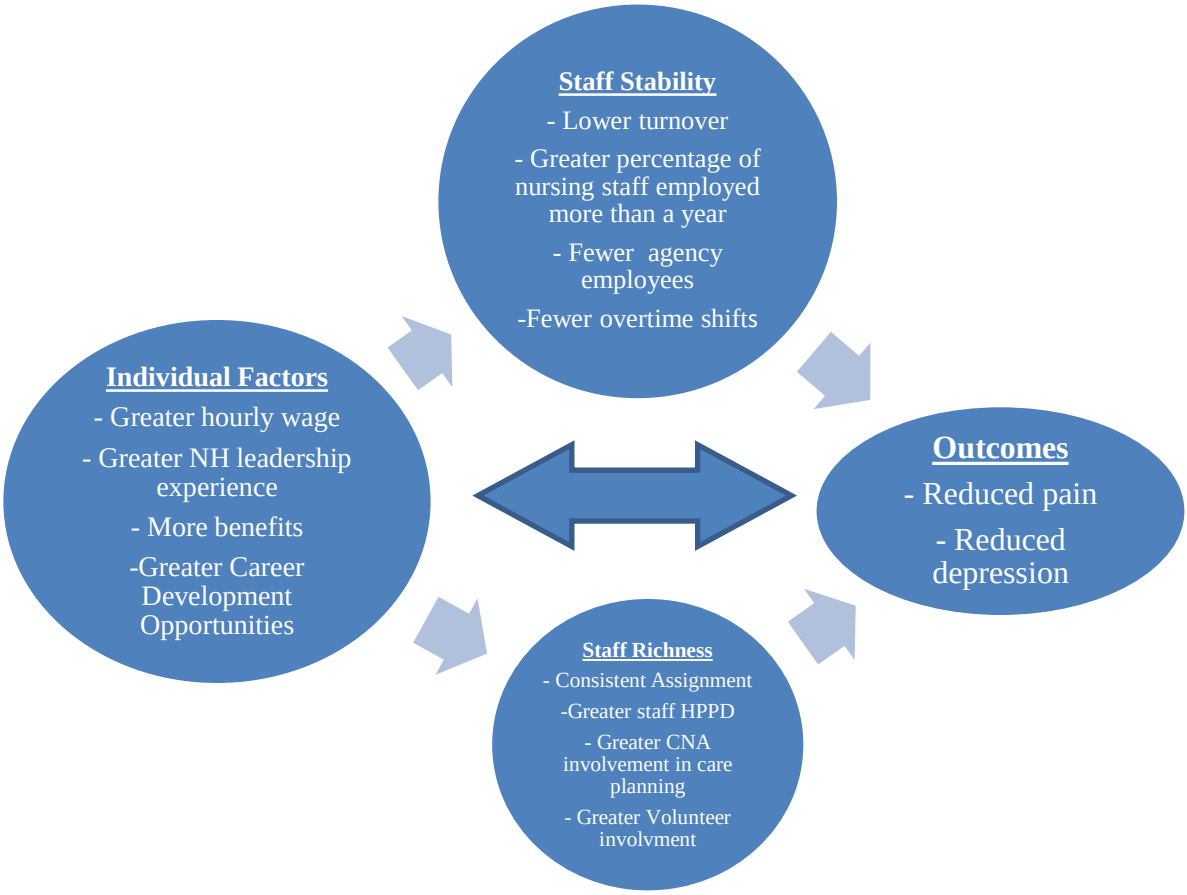
Whereas previous research has established a link between staff characteristics and resident outcomes (Castle, 2008), few studies have used psychological constructs as outcome variables. Since psychological conditions, such as depression, are common in nursing home residents, it is important to identify factors that predict these outcomes. As a result, this study examined the relationships among individual-level factors, staff stability, staff richness, and resident outcomes. Individual factors, potentially unique to each nursing home, include leadership experience, hourly wage, and staff benefits. Staff stability refers to variables the may reflect the overall experience level of the nursing home employees. Retention, overtime shifts, and agency employees are related to this construct. A fairly stable staff may have the knowledge and experience to give better care to residents. Staff richness refers to the cognitive complexity of the current staff and the degree that information flows from one staff level to another. Consistent assignment, staff HPPD, and volunteer involvement are measures related to this construct that were examined in the current research. Consistent assignment and high staff HPPD might allow nursing home employees to gain more detailed knowledge about resident health; this information may then be passed on to other personnel for their expertise. Some studies have indicated that volunteers may impact the efficiency of nursing homes and improve resident quality of life (Berta, Laporte, & Kachan, 2010; Cheung & Ma, 2010). However, no previous studies have evaluated the impact of volunteers on resident behavior. These volunteers may have more opportunities to socially engage residents compared to full-time staff members,

and could potentially impact a resident's mood based on these interactions. Therefore, volunteers were included in the conceptualization of staff richness.

I will test several hypotheses related to these constructs. Individual-level variables will serve as independent variables (IVs) for facility-level depression and pain (dependent variables, DVs). The variables included as individual-level factors will also serve as predictors for variables included as staff stability and richness. Staff stability and staff richness will both be independently associated with better resident outcomes in the form of reduced prevalence of depression and pain. A full diagram of the proposed model is shown in Figure 1. These analyses will allow for the investigation of potential mediators based on the criteria established by Baron and Kenny (1986). If mediation exists, one or more of the IVs should be significantly associated with either of the DVs. These IVs should also have a significant relationship with the potential mediator(s). Finally, the potential mediator should have a unique relationship with the same DV. The first objective of the current study is to determine if a relationship exists between individual level job factors and nursing home outcomes. If a relationship does exist, then the mediating role of staff stability and staff richness will be examined.

Figure 1

Model Overview



Chapter 2: Method

Data from the National Nursing Home Survey (NNHS) and Nursing Home Compare were used to complete study objectives.

NNHS

The NNHS is a nationally representative survey of nursing homes in the United States, including their services, staff, and residents. The survey was first conducted in 1973-1974 and then repeated in 1977, 1985, 1995, 1997, 1999, and 2004. The data contained within the 2004 NHHS was collected from August 2004 to December 2004, and was used to test the hypotheses of this study. All nursing homes responding to the survey had at least three beds and were either certified (Medicaid or Medicare) or maintained state licensure. Data for the NNHS were obtained from facility administrators and staff who used administrative records to answer questions regarding facilities, staff, services and programs. A computer-assisted personal interviewing system was used to administer the survey to respondents. A sample of 1,500 nursing homes was selected for the NNHS, with 1,174 homes agreeing to participate.

This study used the staffing questionnaire of the 2004 NNHS, and variables relevant to the current study are described below. Analyses were conducted using SAS version 9.4 and SPSS 22. Prior to running the regression analyses, composite variables were created using the variables from the NNHS. The composite variables consisted of nursing home leadership experience, hourly wages, staff hours per patient day (HPPD), and percent of employees staying

more than one year, full time staff leaving in the past 3 months, part time staff leaving in the past 3 months, contract employee hours, staff overtime shifts, volunteer intensity, volunteer duties, staff vacation days, staff personal days, career development, and other staff benefits.

Control Variables. Facility size, type of facility ownership, occupancy rate, and the percent of residents with Medicare as the primary payment source were used as control variables. Facility size, or the number of beds, was included as a control variable to take into account the difference between small and large facilities on resident outcomes. Facility ownership was included in an attempt to control for the difference between profit and nonprofit facilities. Occupancy rate was included to account for the number of beds filled at the time the survey was completed. Staff at highly occupied facilities may have more residents to care for than staff at less occupied facilities, which may affect resident outcomes. The percent of residents currently on Medicare was included to control for any facility-level differences in the number of post-acute versus long-stay residents. All of these variables are well-established controls in the nursing home literature (Castle & Engberg, 2006; Castle, Engberg, & Men, 2007; Kash, Castle, Naufal, & Hawes, 2006; Rosen, Stiehl, Mittal, & Leana, 2011).

Nursing Home Leadership. This composite was calculated by obtaining the mean of the total length of time the administrator, medical director, and director of nursing had worked at the facility in months ($\alpha = 0.48$). Although the turnover amongst leadership positions is not necessary correlated, the composite created for this study is conceptually coherent and indicative of overall stability. Additionally, scales containing less than 10 items commonly have low alpha scores even though the items are conceptually similar (Pallant, 2010). Since many of the scales in this study were created using less than 10 items, low alpha levels will be seen throughout.

Staff Stability. This category consists of several composite variables. Although it would have been ideal to examine stability indices for each type of staff (RNs, LPNs, CNAs) separately, this would unnecessarily complicate the analyses at this early level of inquiry. (1) Staff overtime shifts is an average of the number of overtime shifts in the past week for RNs, LPNs, and CNAs (α=0.58). (2) The number of contract employee hours is a mean of the total number of hours worked by contract (agency) RNs, LPNs, and CNAs in the past week (α= 0.67). Staff turnover was calculated by averaging the number of RNs, LPNs, and CNAs who left the facility in the previous 3 months. This variable was calculated separately for (3) full time (α= 0.40) and (4) part time (α= 0.38) employees. The composite for (5) the percent of employees staying more than one year is a mean of the percent of RNs, LPNs, and CNAs employed for more than one year (α= 0.77).

Staff Benefits. This category also consists of several different composites. The construct of staff benefits is conceptually important as it takes into account several factors that might influence the quality of care provided by the staff as a function of increased motivation and reduced stress. (1) Hourly wages was calculated as the mean of three variables related to RN, LPN, and CNA hourly wage (α=0.81). (2) Staff personal days is a mean of number of RN/LPN personal days and number of CNA personal days (α= 0.98); (3) the vacation days composite is a mean of 4 variables related to paid vacation and sick days for both RNs/LPNs and CNAs (α= 0.78). Both personal and vacation days serve as indicators of benefits by determining the availability of paid time off. (4) Career development is a sum of several variables, including tuition for nursing staff, workshop/conference reimbursement, the availability of nurse and CNA career ladder positions. This variable was summed to serve as an indicator of the breadth of career development benefits at the facility. (5) LPN/RN health insurance and (6) CNA health

insurance were entered as individual variables. Finally, (7) other benefits is a sum based on several variables, specifically, the existence of employee recognition programs, sign-on bonuses, recruitment bonuses, perfect attendance awards, flexible schedules, paid time off, payback for unused sick time, daycare facilities, and retirement/pensions.

Volunteers. Two measures were created as indicators of volunteer involvement. The composite variable for (1) volunteer intensity is mean of the number of volunteers and the number of days worked by those volunteers ($\alpha = 0.20$). (2) The number of volunteer duties is a sum of different tasks completed by volunteers at the facility. These activities included assisting with letter writing, snacks, personal care needs, recreational activities, transport, and socializing with residents.

Quality of Care. (1) Staff HPPD is a mean of RN HPPD, LPN HPPD, and CNA HPPD ($\alpha = 0.66$). (2) Consistent assignment and (3) CNA involvement in care plan meetings were entered as individual variables.

Nursing Home Compare

Nursing Home Compare is a freely available source that is intended to provide information to consumers about nursing homes; it allows consumers to compare nursing home information. It contains information about every Medicare and Medicaid-certified nursing home in the United States. Nursing home ratings are based on health inspections, quality measures, and hours of care per resident provided by nursing staff. The database also contains information regarding different types of staff (RNs, LPNs, physical therapists, CNAs) and penalties imposed due to identified inadequacies during surveys. Most importantly, Nursing Home Compare contains the quality measures for each nursing home. For the current study I used two of these

quality indicators as outcome variables: the percentage of long-stay residents who have depressive symptoms, and the percentage of long-stay residents who self-report moderate to severe pain.

Data for the quality indicators come from the Minimum Data Set (MDS) assessment conducted for each resident. This assessment is conducted by nursing home staff at regular intervals and is intended to assess the needs of residents. This information may be used to guide care planning as well as for reimbursement and quality monitoring. The quality indicator scores for each nursing home are summary measures based on all long-stay residents, and do not represent each individual resident. Specifically, these questions represent the proportion of long-stay residents who are experiencing the condition in question (depression or pain) at the time of survey completion. Data on quality indicators, contained within Nursing Home Compare, is available on the Medicare website. Since data from NNHS were collected in late 2004, data from the 2005 Nursing Home Compare was used for outcome variables. For the purpose of this study, the quality indicator scores for pain and depression were obtained for the third and fourth quarters of the year. An average was created to obtain a total score for both pain and depression. Nursing Home Compare data was linked to the NNHS data based on the Medicare provider numbers of the individual facilities.

Data Preparation and Analysis

The NNHS is publicly available; however the ID numbers given to each facility are not the same as the facility's Medicare ID number. Therefore, it is difficult to link the responses to health information, including the data contained within Nursing Home Compare (which was the source of outcomes for this research). However, Research Data Centers (RDCs) maintained by

the National Center of Health Statistics (NCHS) within the CDC allow access to restricted data through several modes. The RDCs are responsible for protecting the identities of the respondents and their institutions. To be granted access to this restricted information, a research proposal must be submitted detailing the need for data access. A proposal was submitted and reviewed for the current study, a process which took approximately 6-8 weeks. Two of modes of access to the data were practical within the constraints of the current project. The first mode was remote access, which involves communication with an automated system via email to analyze data. The second mode involved accessing the data on site at the Census RDC. The Census Bureau maintains several RDCs across the country, with the closest location to Tuscaloosa in Atlanta, Georgia. This process required additional steps to obtain access to the data, including completion of security requirements and confidentiality training. Outputs produced from data analysis must be reviewed for disclosure risk; this review can take up to three weeks. Given the goals of the project and the limitations of each mode of access, the second option was the most practical. After several suggest edits from the review board, the project was accepted. I completed both the security and confidentiality requirements before scheduling the data analysis at the RDC in Atlanta.

Data from NNHS was linked to the Medicare provider number of each facility. Since the NNHS does not contain provider numbers, I was required to submit a proposal to the CDC asking for a link to Nursing Home Compare. After the proposal was accepted, a CDC analyst linked the NNHS with the Medicare provider number. The analyst then used this provider number to link the NNHS to the Nursing Home Compare data. Afterwards, a non-identifiable subject number was created to each variable and the provider number was deleted.

Next, descriptive statistics were obtained for the sample. This was completed in order to describe the characteristics of the sample and check for any assumption violations. Normality was assessed using the Kolmogorov-Smirnov statistic and measures of skewness and kurtosis. A nonsignificant result on the Kolmogorov-Smirnov statistic would indicate that the sample meets the assumption of normality. Multicollinearity, outliers, and sample size were taken into consideration. Simple Pearson product-moment coefficients were also conducted for all variables within each composite.

Mediation analyses using a series of ordinary least square (OLS) regressions were conducted as described in Baron and Kenny (1986). A mediation analysis involves three separate regression analyses. First, the relationship between the independent variable (individual job level factors, for example) and the outcome variables (depression, pain) is assessed. The relationships between the independent variable and a potential mediator (such as staff stability) is assessed, followed by an examination of the relationship between the mediator and the outcome variables. If staff stability is a mediator in the model, than the relationship between individual-level factors and outcome will be weakened once the other two regression analyses are controlled.

The composite variables for each category (nursing home leadership, staff stability, staff benefits, volunteers, and quality of care) were used to run a series of regression models to examine the effect of staffing variables on resident depression and pain. The analyses were run separately for each set of predictors. For each series of analyses, control variables were introduced on block 1. Block 2 for each analysis added the variables thought to be predictive of resident depression or pain. Block 3 contained all hypothesized mediators, in addition to the variables from the previous blocks. In cases where block 3 produces significant results, a Sobel

test was conducted to determine the significance of the mediation. This test is used to determine the significance of the mediation and the reduction in the effect of the IV.

Chapter 3: Results

Results of the descriptive analyses will be presented first, followed by the regression results. The regression results for both depression and pain will be presented together for the five sets of predictor variables (nursing home leadership, staff stability, staff benefits, volunteers, and quality of care).

Descriptive statistics

Basic statistics, including mean, standard deviation, skewness, kurtosis, and Kolmogorov-Smirnov, were computed for each predictor variable. For full details, see Table 1. All of the 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; a negative skew indicates that the values are clustered toward the high end. Additionally, all of the variables 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. The Kolmogorov-Smirnov statistic was significant for all of the predictor variables, further indicating that the assumption of normality was violated. Due to the relatively large sample, the skewness and kurtosis of the sample may not heavily impact the final results (Tabachnick & Fidell, 2007). Violations of normality, based on the Kolmogorov-Smirnov statistic, are also not uncommon in relatively large samples (Pallant, 2010). Correlations (see Tables 2-6) were computed for each set of predictors (nursing home leadership,

staff stability, staff benefits, volunteers, and quality of care) to help identify any possible sources of multicollinearity among predictors.

Table 1
Descriptive Characteristics (n=1174)

Predictor	% or M (SD)	Skewness	Kurtosis	Kolmogrov-Smimov Value	Sig
		Controls			
100-199 beds	41.3%	-0.122	-0.608	0.249	<.001
95% or more occupancy	32.8%	-0.408	-1.08	0.195	<.001
For-profit ownership	60.2%	0.418	-1.82	0.394	<.001
0 to 9% Medicare patients	54%	0.791	-0.671	0.34	<.001
		Leadership			
NH Leadership	60.23 (46.7)	1.37	2.42	0.104	<.001
		Stability			
1-year stability	66.67 (22.37)	-1	0.484	0.11	<.001
Full-time staff left	2.14 (2.42)	2.52	10.9	0.189	<.001
Part-time staff left	.817 (1.25)	2.62	10.08	0.256	<.001
Contract employees	12.94 (51.22)	11.97	205.83	0.4	<.001
Overtime shifts	5.11 (9.05)	6.06	59.69	0.286	<.001
		Volunteers			
Volunteer intensity	7.69 (7.62)	2.38	7.16	0.208	<.001
Volunteer duties	4.17 (1.71)	0.486	0.134	0.149	<.001
		Quality of Care			
Staff HPPD	3.21 (.82)	1.24	1.99	0.195	<.001
Consistent Assignment	1.31 (.463)	0.823	-1.323	0.439	<.001
CNAs in care plan meetings	2.92 (1.25)	-0.066	-1.02	0.164	<.001
		Benefits			
Wages	14.53 (2.30)	0.541	-0.044	0.088	<.001
RN/LPN insurance	1.85 (.355)	-1.99	1.97	0.514	<.001
CNA insurance	1.88 (.323)	-2.37	3.61	0.525	<.001
Personal days	1.36 (.472)	0.585	-1.63	0.402	<.001
Vacation days	1.12 (.245)	1.96	3.09	0.467	<.001
Other benefits	5.57 (2.78)	0.31	-0.288	0.092	<.001
Career Development	3.36 (1.78)	-0.388	-0.725	0.187	<.001

Table 2
Correlations among Control and Predictors for NH Leadership

Measure	1	2	3	4	5
1. Facility size	1				
2. Occupancy	-0.13*	1			
3. Ownership Type	0.11*	0.14*	1		
4. Medicare %	0.03	-0.14*	-0.02	1	
5. NH Leadership	-0.02	0.12*	0.13*	-0.15*	1

Note. Asterisks indicate significance (p<.05).

Table 3
Correlations among Control and Predictors for Staff Stability

Measure	1	2	3	4	5	6	7	8	9
1. Facility size	1								
2. Occupancy	-0.13*	1							
3. Ownership Type	0.11*	0.14*	1						
4. Medicare %	0.03	-0.14*	-0.02	1					
5. 1-year stability	-0.04	0.22*	0.15*	-0.08*	1				
6. Full time staff left	0.41*	-0.19*	-0.004	0.10*	-0.26*	1			
7. Part-time staff left	0.22*	0.05	0.15*	0.001	-0.02	0.04	1		
8. Contract employees	0.14*	0.09*	0.05	-0.03	0.009	0.06	0.06	1	
9. Overtime shifts	0.31*	0.08*	0.10*	0.02	-0.03	0.17*	0.10*	0.13*	1

Note. Asterisks indicate significance (p<.05).

Table 4

Correlations among Control and Predictors for Staff Benefits

Measure	1	2	3	4	5	6	7	8	9	10	11
1. Facility size	1										
2. Occupancy	-0.13*	1									
3. Ownership Type	0.11*	0.14*	1								
4. Medicare %	0.03	-0.14*	-0.02	1							
5. Wages	0.22*	-0.07*	0.13*	0.08*	1						
6. LPN/RN insurance	0.008	-0.14*	-0.07*	0.12*	-0.03	1					
7. CNA insurance	0.02	-0.19*	-0.12*	0.07*	-0.06	0.8*	1				
8. Personal days	-0.03	-0.17*	-0.22*	-0.03	-0.05	0.03	0.06	1			
9. Vacation days	-0.01	-0.14*	-0.1*	-0.06	-0.13*	0.001	0.05	0.08*	1		
10. Other benefits	0.1*	0.27*	0.23*	0.13*	0.05	-0.002	-0.03	-0.3*	-0.21*	1	
11. Career development	0.15*	0.11*	0.18*	0.1*	0.01	-0.007	-0.03	-0.22*	-0.19*	0.47*	1

Note. Asterisks indicate significance ($p<.05$).

Table 5
Correlations among Control and Predictors for Volunteers

Measure	1	2	3	4	5	6
1. Facility size	1					
2. Occupancy	-0.13*	1				
3. Ownership Type	0.11*	0.14*	1			
4. Medicare %	0.03	-0.14*	-0.02	1		
5. Volunteer intensity	0.26*	0.23*	0.15*	-0.12*	1	
6. Volunteer duties	0.23*	0.22*	0.20*	-0.07*	0.41*	1

Note. Asterisks indicates significance (p<.05).

Table 6
Correlations among Control and Predictors for Quality of Care

Measure	1	2	3	4	5	6	7
1. Facility size	1						
2. Occupancy	-0.13*	1					
3. Ownership Type	0.11*	0.14*	1				
4. Medicare %	0.03	-0.14*	-0.02	1			
5. Staff HPPD	-0.09*	0.15*	0.001	0.14*	1		
6. Consistent assignment	-0.30*	0.07*	-0.04	-0.09*	-0.003	1	
7. CNA involvement in care plans	0.004	-0.03	0.003	0.10*	-0.02	0.03	1

Note. Asterisks indicate significance (p<.05).

Volunteers

For this regression, the volunteer variables were entered on block 2 as main IVs rather than potential mediators. For the regression for volunteers on facility-level prevalence of depression (see Table 7), nonprofit ownership was the only significant control variable in block 1; this step remains the same throughout all of the analyses, as the control variables are the same for all predictors. However, ownership type was no longer significant in block 2. Volunteer intensity was significant in block 2, but volunteer duties were not significant. Volunteer

intensity was a positive predictor, indicating that facility-level depression increased with the intensity of volunteer involvement.

Table 7
Regression results for volunteers on facility-level prevalence of depression

Predictor	R	Overall R2	Adjusted R2	β	F or t	df	ΔF	p
Block 1- Control variables	0.109	0.012	0.008	-	3.18	4	-	0.013
Facility size				-0.035	-1.13	1		0.26
Ownership type				0.081	2.48	1		0.013
Occupancy rate				0.038	1.2	1		0.232
% of residents with Medicare				0.047	1.41	1		0.159
Block 2	0.142	0.02	0.013	-	2.97	6	4.76	0.007
Facility size				-0.069	-1.88	1		0.061
Ownership type				0.041	1.08	1		0.279
Occupancy rate				0.026	0.73	1		0.463
% of residents with Medicare				0.028	0.76	1		0.449
Volunteer intensity				0.075	2.13	1		0.034
Volunteer duties				-0.065	-1.69	1		0.091

Note. F values were computed for each block and t values for each variable.

For the pain regression analysis (see Table 8), nonprofit ownership and higher occupancy rate were significant in block 1; both variables were negative predictors and consistently significant across pain analyses. This indicates that nonprofit ownership and a higher occupancy rate are associated with less resident pain. Both ownership type and occupancy rate remained significant in block 2. Neither volunteer intensity nor volunteer duties were significant.

Table 8
Regression results for volunteers on facility-level prevalence of pain

Predictor	R	Overall R2	Adjusted R2	β	F or t	df	ΔF	p
Block 1- Control variables	0.147	0.022	0.018	-	6.03	4	-	<0.000
Facility size				-0.03	-0.97	1		0.332
Ownership type				-0.094	-2.97	1		0.003
Occupancy rate				-0.085	-2.51	1		0.012
% of residents with Medicare				-0.063	-1.95	1		0.051

Block 2	0.151	0.023	0.016	-	3.37	6	5.97	0.003
Facility size				-0.008	-0.23	1		0.818
Ownership type				-0.112	-2.97	1		0.003
Occupancy rate				-0.093	-2.4	1		0.017
% of residents with Medicare				-0.036	-0.92	1		0.356
Volunteer intensity				0.017	0.47	1		0.638
Volunteer duties				-0.005	-0.14	1		0.891

Note. F values were computed for each block and t values for each variable.

Quality of Care

This regression evaluated the effect of the quality of care variables as main IVs. As mentioned in previous analyses, ownership type was a positive predictor indicating higher levels of depression in nonprofit facilities (See Table 9). While ownership type remained significant in block 2, the overall model was not significant. Neither consistent assignment nor CNA involvement in care plan meetings were significant predictors.

Table 9
Regression results for quality of care on facility-level prevalence of depression

Predictor	R	Overall R2	Adjusted R2	β	F or t	df	ΔF	p
Block 1- Control variables	0.109	0.012	0.008	-	3.28	4	-	0.011
Facility size				-0.033	-1.05	1		0.293
Ownership type				0.084	2.54	1		0.011
Occupancy rate				0.037	1.19	1		0.234
% of residents with Medicare				0.048	1.47	1		0.143
Block 2	0.107	0.012	0.004	-	1.63	7	0	0.124
Facility size				-0.021	-0.64	1		0.522
Ownership type				0.075	2.18	1		0.029
Occupancy rate				0.034	1.02	1		0.307
% of residents with Medicare				0.033	0.97	1		0.332
Staff HPPD				-0.014	-0.43	1		0.668
Consistent assignment				0.025	0.73	1		0.464
CNA involvement in care plan meetings				0.049	1.61	1		0.106

Note. F values were computed for each block and t values for each variable.

For the pain regression analysis (see Table 10), nonprofit ownership, greater occupancy rate, and percent of residents with Medicare were again significant control variables in block 1; occupancy rate remained significant in block 2 with the addition of the main IVs. Percent of residents with Medicare also remained significant in block 2; it was a negative predictor, indicating that as the percentage increased, facility-level pain decreased. Finally, staff HPPD was also a significant negative predictor in block. As staff HPPD increased, the prevalence of resident pain decreased.

Table 10
Regression results for quality of care on facility-level prevalence of pain

Predictor	R	Overall R2	Adjusted R2	β	F or t	df	ΔF	p
Block 1- Control variables	0.148	0.022	0.018	-	6.1	4	-	<0.000
Facility size				-0.029	-0.93	1		0.351
Ownership type				-0.095	-2.97	1		0.003
Occupancy rate				-0.086	-2.52	1		0.012
% of residents with Medicare				-0.064	-1.98	1		0.048
Block 2	0.184	0.034	0.027	-	4.89	7	4.82	<0.000
Facility size				-0.023	-0.7	1		0.485
Ownership type				-0.063	-1.9	1		0.058
Occupancy rate				-0.106	-3.08	1		0.002
% of residents with Medicare				-0.074	-2.32	1		0.02
Staff HPPD				-0.071	-2.48	1		0.013
Consistent assignment				0.052	1.51	1		0.132
CNA involvement in care plan meetings				0.003	0.09	1		0.929

Note. F values were computed for each block and t values for each variable.

Nursing Home Leadership

Table 11 outlines the regression for nursing home leadership experience on depression. In this set of analyses, mediation effects were evaluated by the criteria established by Baron and Kenny (1986). As mentioned previously, meditation requires (1) an IV that significantly affects

a mediator, (2) the IV directly affects the DV (without the mediator), and (3) the mediator significantly and uniquely affects the DV. After the introduction of a successful mediator, the relationship between the IV and the DV should be attenuated. Block 1 of this analysis contains the control variables, such as facility size, occupancy rate, ownership type, and percent of patients using Medicare. Nonprofit ownership was a significant predictor of depression in this block. Block 2 contains the main independent variable (leadership) in addition to the control variables previously entered. In this block, nursing home leadership experience was a significant predictor of depression; ownership type was reduced to marginal significance. This significant relationship establishes the second criterion of mediation. However, only a very small amount of additional variance was explained (Overall R^2= .015, p= .009). Block 3 contains all of the previous variables with potential mediators added. In this block, volunteer intensity and volunteer duties were significant predictors; a small amount of additional variance was explained (Overall R^2= .068, p= .002). Volunteer intensity, a composite representing the number of volunteers and the number of hours, was a positive predictor of depression; however, the number of volunteer duties was a negative predictor of depression. The presence of these variables made leadership experience nonsignificant, indicating the possibility of mediation; this satisfies the third criterion of mediation. Regression analyses indicated that nursing home leadership significantly predicted volunteer intensity (p=.013) and duties (p=.000). These regression analyses establish the first criterion of mediation established by Baron and Kenny (1986). To fully evaluate this mediation, a Sobel test was conducted for each potential mediator. Neither volunteer intensity (Sobel=1.79, p=.074) nor volunteer duties (Sobel=1.93, p=.053) were statistically significant, although both showed nonsignificant trends.

Table 11

Regression results for nursing home leadership on facility-level prevalence of depression

Predictor	R	Overall R2	Adjusted R2	β	F or t	df	ΔF	p
Block 1- Control variables	0.109	0.012	0.008	-	3.28	4	-	0.011
Facility size				-0.033	-1.05	1		0.293
Ownership type				0.084	2.54	1		0.011
Occupancy rate				0.037	1.19	1		0.234
% of residents with Medicare				0.048	1.47	1		0.142
Block 2	0.121	0.015	0.009	-	3.11	5	3.56	0.009
Facility size				-0.035	-1.1	1		0.273
Ownership type				0.066	1.97	1		0.049
Occupancy rate				0.021	0.64	1		0.522
% of residents with Medicare				0.038	1.18	1		0.239
NH leadership experience				0.079	2.54	1		0.011
Block 3-Mediators	0.259	0.068	0.04	-	2.47	15	7.21	0.002
Facility size				-0.058	-107	1		0.285
Ownership type				-0.008	-0.16	1		0.874
Occupancy rate				0.074	1.79	1		0.074
% of residents with Medicare				0.051	1.21	1		0.226
NH leadership experience				0.038	0.84	1		0.398
% of employees staying more than one year				-0.02	-0.45	1		0.656
Full time staff left in past 3 months				-0.042	-1.07	1		0.284
Part time staff left in past 3 months				0.041	0.91	1		0.363
Contract employee hours				-0.014	-0.29	1		0.772
Staff overtime shifts in past week				0.064	1.26	1		0.209
Volunteer intensity				0.121	2.59	1		0.01
Volunteer duties				-0.115	-2.28	1		0.023
Staff HPPD				-0.044	-1.04	1		0.3
Consistent assignment				0.08	1.76	1		0.079
CNA involvement in care planning				-0.022	-0.55	1		0.581

Note. F values were computed for each block and t values for each variable.

Nonprofit ownership, the percent of Medicare patients, and a higher occupancy rate were significant negative predictors of facility-level pain prevalence in block 1 of the nursing home leadership regression analysis (see Table 12). All of these variables remained significant in block 2 with the addition of the main independent variables. However, nursing home leadership

was not significant. None of these variables remained significant in block 3 of the model, and none of the potential mediators were significant.

Table 12
Regression results for nursing home leadership on facility-level prevalence of pain

Predictor	R	Overall R2	Adjusted R2	β	F or t	df	ΔF	p
Block 1- Control variables	0.148	0.022	0.018	-	6.1	4	-	<0.000
Facility size				-0.028	-0.93	1		0.351
Ownership type				-0.095	-2.97	1		0.003
Occupancy rate				-0.086	-2.52	1		0.012
% of residents with Medicare				-0.064	-1.98	1		0.048
Block 2	0.162	0.026	0.021	-	5.62	5	4.79	<0.000
Facility size				-0.026	-0.8	1		0.421
Ownership type				-0.094	-2.91	1		0.004
Occupancy rate				-0.082	-2.35	1		0.019
% of residents with Medicare				-0.074	-2.21	1		0.028
NH leadership experience				-0.053	-1.57	1		0.116
Block 3-Mediators	0.204	0.042	0.014	-	1.48	15	1.93	0.107
Facility size				0.024	0.45	1		0.653
Ownership type				-0.091	-1.76	1		0.079
Occupancy rate				-0.047	-0.93	1		0.35
% of residents with Medicare				-0.052	-1.09	1		0.275
NH leadership experience				-0.05	-1.09	1		0.276
% of employees staying more than one year				0.003	0.07	1		0.947
Full time staff left in past 3 months				0.048	1.02	1		0.306
Part time staff left in past 3 months				-0.021	-0.48	1		0.635
Contract employee hours				-0.038	-1.25	1		0.211
Staff overtime shifts in past week				-0.025	-0.74	1		0.461
Volunteer intensity				0.06	1.35	1		0.179
Volunteer duties				0.018	0.43	1		0.667
Staff HPPD				-0.077	-1.85	1		0.064
Consistent assignment				0.079	1.61	1		0.108
CNA involvement in care planning				-0.005	-0.11	1		0.912

Table 13
Regression results for staff stability on facility-level prevalence of depression

Predictor	R	Overall R2	Adjusted R2	β	F or t	df	ΔF	p
Block 1- Control variables	0.109	0.012	0.008	-	3.28	4	-	0.011
Facility size				-0.033	-1.05	1		0.293
Ownership type				0.084	2.54	1		0.011
Occupancy rate				0.037	1.19	1		0.234
% of residents with Medicare				0.048	1.47	1		0.142
Block 2	0.134	0.018	0.004	-	1.31	9	1.42	0.231
Facility size				-0.03	-0.63	1		0.53
Ownership type				0.051	1.18	1		0.238
Occupancy rate				0.041	1.09	1		0.276
% of residents with Medicare				0.043	1.07	1		0.284
% of employees staying more than 1 year				0.04	0.98	1		0.326
Full-time staff who left in past 3 months				0.004	0.1	1		0.921
Part-time staff who left in past 3 months				0.069	1.7	1		0.089
Contract employee hours				-0.007	-0.18	1		0.856
Staff overtime shifts in past week				0.051	1.11	1		0.268

Note. F values were computed for each block and t values for each variable.

Staff Stability

Once again, nonprofit ownership was a positive predictor of depression. Overall, block 2 contained no significant variables, and overall the step was not significant (see Table 13). For pain (see Table 14), block 1 remained the same as previous analyses. In block 2, only ownership type remained significant and overall the block was nonsignificant. Thus, there appears to be no association of staff stability with pain and depression quality indicators, net of control variables.

Table 14

Regression results for staff stability on facility-level prevalence of pain

Predictor	R	Overall R2	Adjusted R2	β	F or t	df	ΔF	p
Block 1- Control variables	0.148	0.022	0.018	-	6.1	4	-	<0.000
Facility size				-0.029	-0.93	1		0.351
Ownership type				-0.095	-2.97	1		0.003
Occupancy rate				-0.086	-2.52	1		0.012
% of residents with Medicare				-0.064	-1.98	1		0.048
Block 2	0.16	0.026	0.012	-	1.88	9	9.56	0.052
Facility size				-0.008	-0.16	1		0.875
Ownership type				-0.092	-2.08	1		0.038
Occupancy rate				-0.06	-1.38	1		0.169
% of residents with Medicare				-0.075	-1.8	1		0.073
% of employees staying more than 1 year				0.007	0.17	1		0.862
Full-time staff who left in past 3 months				0.062	1.36	1		0.175
Part-time staff who left in past 3 months				-0.018	-0.48	1		0.629
Contract employee hours				-0.028	-1.04	1		0.299
Staff overtime shifts in past week				-0.018	-0.57	1		0.568

Table 15

Regression results for staff benefits on facility-level prevalence of depression

Predictor	R	Overall R2	Adjusted R2	β	F or t	df	ΔF	p
Block 1- Control variables	0.109	0.012	0.008	-	3.28	4	-	0.011
Facility size				-0.033	-1.05	1		0.293
Ownership type				0.084	2.54	1		0.011
Occupancy rate				0.037	1.19	1		0.234
% of residents with Medicare				0.048	1.47	1		0.142
Block 2	0.212	0.045	0.035	-	4.44	11	5.74	<0.000
Facility size				-0.013	-0.42	1		0.673
Ownership type				0.04	1.14	1		0.255
Occupancy rate				0.027	0.84	1		0.401
% of residents with Medicare				0.033	0.98	1		0.328
Hourly wages				-0.17	-5.24	1		<0.000
Health insurance (LPNs, RNs)				-0.054	-1.18	1		0.239
Health insurance (CNAs)				0.065	1.39	1		0.166
Staff personal days				-0.026	-0.77	1		0.441
Staff vacation days				-0.031	-0.9	1		0.367
Other staff benefits				-0.048	-1.28	1		0.199
Career development				-0.041	-1.09	1		0.274
Block 3-Mediators	0.321	0.103	0.066	-	2.75	21	7.45	<0.000
Facility size				-0.035	-0.63	1		0.528
Ownership type				-0.019	-0.37	1		0.71
Occupancy rate				0.074	1.69	1		0.092
% of residents with Medicare				0.059	1.31	1		0.191
Hourly wages				-0.163	-3.75	1		0
Health insurance (LPNs, RNs)				-0.033	-0.57	1		0.57
Health insurance (CNAs)				0.077	1.23	1		0.22
Staff personal days				-0.015	-0.34	1		0.734
Staff vacation days				-0.005	-0.1	1		0.917
Other staff benefits				0.007	0.13	1		0.897
Career development				-0.079	-1.53	1		0.126
% of employees staying more than one year				-0.002	-0.05	1		0.961
Full time staff left in past 3 months				-0.08	-2.17	1		0.031
Part time staff left in past 3 months				0.031	0.74	1		0.46
Contract employee hours				-0.023	-0.5	1		0.618
Staff overtime shifts in past week				0.083	1.65	1		0.099
Volunteer intensity				0.096	2.04	1		0.042
Volunteer duties				-0.115	-2.41	1		0.016

Staff HPPD	-0.043	-0.97	1	0.331
Consistent assignment	0.068	1.51	1	0.133
CNA involvement in care planning	-0.037	-0.94	1	0.345

Note. F values were computed for each block and t values for each variable.

Staff Benefits

In addition to the effects of the control variable ownership described earlier (see Table 15), at block 2, staff's hourly wages was a significant predictor of facility-level depression. This effect remained significant after the addition of potential mediators in block 3; higher staff wages was associated with lower rates of resident depression. The number of full time staff who left in the previous 3 months, number of volunteers, and volunteer duties were also significant in block 3. Full-time staff turnover was a negative predictor, indicating that rates of depression decreased as the turnover increased. The number of volunteer duties was also a negative predictor, indicating that rates of depression decreased as the number of duties increased; volunteer intensity was a positive predictor, indicating that this variable may be associated with increased prevalence of depression at the facility level. The addition of these potential mediators did not attenuate the effect of hourly wages, which indicates that mediation is not present. Regression analyses indicated that wages did not significantly predict volunteer intensity or full-time staff turnover; since the IV did not significantly affect the mediator, mediation cannot be established based on the rules of Baron and Kenny. Hourly wages did significantly predict volunteer duties ($p=.001$); a Sobel test indicated that the mediation was significant (Sobel=1.97, $p=.048$). This mediation also meets the criteria established by Baron and Kenny (1986), (1) hourly wage (IV) significantly predicts volunteer duties (mediator), (2) hourly wages significantly predicted depression (DV), and (3) volunteer duties was significantly related to depression.

For pain (see Table 16), nonprofit ownership and a higher occupancy rate were significant negative predictors in block 1. After the addition of the main IVs in block 2, hourly wages was a significant negative predictor and ownership type remained significant from block 1. Hourly wages remained significant in block 3, but the model was marginally significant. In this analysis, facility-level pain appeared to decrease as hourly wages increased. None of the potential mediators were significant.

Table 16
Regression results for staff benefits on facility-level prevalence of pain

Predictor	R	Overall R2	Adjusted R2	β	F or t	df	ΔF	p
Block 1- Control variables	0.148	0.022	0.018	-	6.1	4	-	<0.000
Facility size				-0.029	-0.93	1		0.351
Ownership type				-0.095	-2.97	1		0.003
Occupancy rate				-0.086	-2.52	1		0.012
% of residents with Medicare				-0.064	-1.98	1		0.048
Block 2	0.203	0.041	0.031	-	4.03	11	3.28	<0.000
Facility size				0.001	0.02	1		0.986
Ownership type				-0.081	-2.44	1		0.015
Occupancy rate				-0.056	-1.53	1		0.126
% of residents with Medicare				-0.053	-1.59	1		0.111
Hourly wages				-0.101	-3.09	1		0.002
Health insurance (LPNs, RNs)				0.014	0.22	1		0.829
Health insurance (CNAs)				0.031	0.47	1		0.637
Staff personal days				0.002	0.07	1		0.943
Staff vacation days				0.008	0.26	1		0.795
Other staff benefits				0.044	1.23	1		0.217
Career development				0.051	1.38	1		0.168
Block 3-Mediators	0.249	0.062	0.023	-	1.58	21	2.58	0.05
Facility size				0.05	0.92	1		0.358
Ownership type				-0.078	-1.48	1		0.14
Occupancy rate				-0.013	-0.25	1		0.8
% of residents with Medicare				-0.009	-0.18	1		0.854
Hourly wages				-0.108	-2.41	1		0.017
Health insurance (LPNs, RNs)				0.041	0.67	1		0.505
Health insurance (CNAs)				-0.014	-0.22	1		0.827
Staff personal days				0.04	0.82	1		0.412

Staff vacation days	0.034	0.63	1	0.532
Other staff benefits	0.078	1.41	1	0.158
Career development	0.028	0.52	1	0.607
% of employees staying more than one year	0.009	0.2	1	0.841
Full time staff left in past 3 months	0.032	0.71	1	0.48
Part time staff left in past 3 months	-0.023	-0.49	1	0.621
Contract employee hours	-0.036	-1.35	1	0.177
Staff overtime shifts in past week	-0.009	-0.27	1	0.787
Volunteer intensity	0.046	1.04	1	0.299
Volunteer duties	-0.001	-0.03	1	0.98
Staff HPPD	-0.069	-1.63	1	0.103
Consistent assignment	0.072	1.48	1	0.14
CNA involvement in care planning	0.001	0.02	1	0.983

Note. F values were computed for each block and t values for each variable.

Chapter 4: Discussion

The goal of the present study was to examine the relationship between facility staffing variables and resident outcomes such as depression and pain. This is particularly important given the number of individuals who currently require specialized nursing care-- a number that will likely increase in the future (Tse, Wan, & Ho, 2011). The present study was unique in that it examined psychological, instead of administrative or physical, outcomes. In one research study, Castle (2008) stated that the most frequently used outcome variables are the number of deficiency citations, falls, pressure ulcers, and the use of physical restraints. Despite the uniqueness of the outcome variables, few of the analyses in the current study proved significant and the overall model was not supported. In this chapter, I will first review and discuss the results for the depression analyses, followed by the pain analyses, and then the similarities between the two sets.

One control variable, ownership type, was significantly related to facility-level depression throughout all of the analyses. This result indicates that private and government owned not-for-profit nursing homes have higher levels of facility-level depression than do for-profit facilities. However, the ownership variable was dichotomous and may not reflect the true diversity of nursing home environments. Specifically, each nursing home was either "profit" (coded with a 1) or "all others (private and government not-for-profit)" (coded as a 2). Since nursing homes have become increasingly specialized (Banazak-Holl, Zinn, Brannon, Castle, & Mor, 1997), a simple breakdown between profit and nonprofit facilities may not be particularly

useful. For example, some nursing homes may choose to specialize in rehabilitation or psychiatric conditions. Furthermore, other variables (such as turnover, wage, and consistent assignment) may have more impact on resident outcomes.

Volunteer intensity, as part of staff richness, was directly related to facility-level depression; as number of volunteers and volunteer hours increased so did the rate of depression. Nursing home leadership experience was also a significant indicator of depression; as administrator, medical director and director of nursing experience increased, so did facility-level depression scores. Greater wages appeared to have a negative impact on depression; facility-level depression decreased as staff wages increased. Additionally, the relationship between hourly wages and depression was mediated by volunteer duties. Full-time staff turnover and volunteer duties were also significant predictors of depression, although neither mediated the relationship between wages and depression. As full-time staff turnover and volunteer duties increased, facility-level depression decreased.

Some of these relationships appear counterintuitive, since it is easy to assume that having more help (in the case of volunteers), or more experience working in the nursing home environment, should lead to improved resident outcomes. In fact, one of the primary suggestions put forward by complexity theory is that a more connected and experienced staff leads to more information in the system and greater cognitive diversity (Colon-Emeric et al., 2006).

However, it is impossible to tell (at least with the variables used in this study) if any administrative changes had recently occurred within the environment of the nursing homes surveyed. For example, if a more experienced nursing home director had recently implemented consistent assignment or other person-centered changes to the resident care procedure it is

unlikely that such changes would have enough time to significantly impact resident outcomes. These changes, and others, would have to be implemented in the appropriate fashion to be truly effective. Furthermore, it is impossible to determine the true level of connection or cognitive diversity at each nursing home based on the variables used for the present analyses. However, other studies have demonstrated that greater connections between staff members can improve resident outcomes. Gittell and colleagues (2008) found that greater coordination between staff members led to increased resident quality of life. Other researchers have shown that taking a team approach, involving all staff members, can help the facility prevent and react to resident falls (Hill et al., 2009). Once again, techniques designed to increase staff complexity would have to be implemented appropriately for any significant changes to occur. Based on the relationship between hourly wages and depression (mediated by volunteer duties) demonstrated in the current paper, implementing changes at multiple levels of organization could potentially lead to positive resident outcomes. However, the question remains as to how such changes can be conducted in real-world environments.

These questions also exist for the results of the pain analyses, although the outcomes were somewhat different. Of the control variables used in the analysis, greater occupancy rate, higher percentage of Medicare patients and nonprofit ownership type were consistently associated with decreased facility-level pain. Similar to the depression analyses discussed above, these results may seem contradictory. A greater occupancy rate could potentially lead to more stress or pressure on nursing home staff and indirectly cause increased facility-level pain rates by impairing the staff's ability to properly treat it. However, a higher percentage of Medicare patients mean that patients may be staying in the nursing home for a shorter period of time. Given that the present study used only quality indicators for long-stay residents, most Medicare

patients would not show up in the analyses. It is possible that treating Medicare patients, who may require extensive treatment after surgeries or falls, may help staff develop the skills necessary to detect and reduce resident pain. Alternatively, the more intensive care required by Medicare patients may distract from pain assessment in long term residents. The present analyses support the former interpretation, but this is purely speculation and future studies should be conducted to clarify the relationship. The pain analyses also indicated that staff HPPD was a significant predictor of facility level pain; as staff HPPD increased, the level of facility-level pain decreased. This may be expected as more patient hours may help the staff learn to detect pain and take appropriate action to relieve it.

Similar to the depression analyses, hourly wages remained a significant predictor with greater staff pay being associated with decreased pain rates. This indicates that increased pay may serve as an additional incentive to detect and alleviate resident pain, although the exact mechanism is unknown. However, as mentioned by Kash and colleagues (2006), higher wages may decrease CNA turnover by offering an additional incentive to stay at the nursing facility. Since CNAs conduct most of the day-to-day care of the patients in the nursing home environment, these employees may improve their ability to detect adverse conditions (such as pain) over time. This additional experience in pain detection could then lead to an appropriate intervention.

However, this study has several limitations. As mentioned previously, this study is a secondary data analysis with no direct interaction with nursing home staff. Therefore, it is difficult to make specific conclusions regarding the application of complexity theory to nursing homes. An intervention designed to increase communication between different types of nursing home staff members may clarify the effects of the study variables on resident outcomes. Such an

intervention would benefit from observational studies to determine potential contributors (both good and bad) to resident well-being. Once these contributors are identified, the intervention can target them directly in an effort to promote long lasting change. In a previous study, Colon-Emeric and colleagues (2006) found that increased information flow, self-organization, and cognitive diversity led to innovations in care planning. However, this study was based mostly on case studies conducted in three nursing homes. A more extensive study utilizing person-centered techniques (such as consistent assignment), psycho-education regarding communication, and "treatment as usual" nursing homes may lead to results that are more conclusive and generalizable. Management practices could also be investigated based on previous evidence that communication style has an effect on resident aggression, fractures, restraint use, and mobility (Anderson, Issel, & McDaniel, 2003; Gittell et al, 2008; Willemse et al., 2012). Different management practices were found to be associated with different outcomes. For example, greater communication has been associated with decreased restraint use (Anderson, Issel, & McDaniel, 2003). Future studies should utilize a longitudinal design in order to determine if changes related to complexity theory and management practices have long-term effects on resident outcomes.

Additionally, the present study had several limitations related to construct measurement. The alpha levels for several of the composite variables were low and may have impacted the results. On the other hand, many of the composites created for this study had fewer than three variables and it is not uncommon for small-item scales to suffer from low alpha levels (Pallant, 2010). While the items in each composite are conceptually similar, scales with higher reliability may have demonstrated a stronger relationship with resident outcomes. Additionally, it might have been more informative to further investigate the differences in different types of staff

members particularly related to turnover rates. However, such methods would have further complicated the interpretation of the results and are outside the scope of the present study. Furthermore, only a handful of analyses were approved by the CDC which limits the researcher's ability to go back and run these more detailed procedures.

The measures of resident pain and depression may also have impacted the results. Future studies may wish to measure pain and depression by incorporating the perspectives of the residents and the frontline staff members. MDS 3.0, implemented in 2010, contains this information; therefore, the use of more recent data could yield a different pattern of results. This data might also limit the influence of ascertainment bias, which might affect the quality improvement measures used in the present study. Ascertainment bias refers to assessment differences between facilities in terms of the staff's ability to identify symptoms (Roy & Mor, 2005; Mor et al., 2003), and "has the perverse effect of penalizing those who seek to identify and document the problem" (Mor et al., 2003, p. 43). For example, each nursing home might have a different assessment process or evaluators with different levels of experience. Some facilities might specialize in certain conditions that affect quality indicators (such as pressure ulcers, depression, or pain); therefore, these facilities would be more successful in documenting these conditions. Pain and depression may be particularly difficult to assess, as not all nursing home assessors have experience detecting these conditions (Roy & Mor, 2005). One study demonstrated that the prevalence of pain in nursing home residents differs based on state, even when the patients from each facility are similar in other characteristics (Mor et al., 2003; Roy & Mor, 2005; Teno, Weitzen, Wetle, & Mor, 2001). Mor and colleagues hypothesized that such large differences in prevalence are most likely due to differences in the methods used to train assessors rather than differences in biology (Mor et al., 2003). Consequently, variation in

assessment techniques from one nursing home to another might limit the interpretation and generalizability of the present study. In the case of depression and pain, ascertainment bias might be the result of high turnover rates, which limit the ability of the staff to know the residents well enough to detect these conditions. This could potentially explain the relationship between full-time staff turnover and depression demonstrated in the present study.

The quality improvement measures may be biased in other ways. For example, given the increased specialization of nursing homes (Banazak-Holl et al., 1997), facilities may be penalized for treating a more severe population even when risk adjustment methods are used (Roy & Mor, 2005). Furthermore, the traditional interpretation of these measures may not be accurate. Cadogan and colleagues (2004) found that a high prevalence of pain according to the MDS measures was associated with better pain assessments and treatment procedures, rather than poor quality. Similarly, Schnelle and colleagues (2001) found that the depression indicator was also associated with measurement processes. Specifically, the researchers concluded that facilities with higher rates of depression may have employees who are more adept at detecting symptoms of depression (Schnelle, Wood, Schnelle, & Simmons, 2001). In another study, researchers challenged the idea that a low prevalence of pressure ulcers was associated with better care (Bates-Jensen et al., 2003). The researchers indicated that facilities that had lower rates of pressure ulcers, according to the MDS quality indicator, provided no better care than facilities with higher rates (Bates-Jensen et al., 2003). Therefore, some of the quality indicators can be misleading when seen out of context.

In summary, the present study attempted to investigate the effects of facility staffing variables on resident outcomes. Although the overall model was not supported, the data indicated that several interesting relationships existed. For example, hourly wage was a

consistent predictor of both facility-level depression and pain. As in previous studies, turnover of full-time staff was an important contributor to resident outcomes. This indicates that staff members do not stay long enough in nursing homes to detect or alleviate resident symptoms of depression. Alternatively, it is possible that frontline staff receive inadequate training to detect depressive symptoms regardless of turnover rates. Future studies should attempt to further clarify the relationship between staffing variables and resident outcomes through primary data collection and interventions. Such studies should consider using assessors trained in administering self-report measures of resident pain and depression to avoid ascertainment bias and low reliability. Despite these limitations, this study is one of the few to examine how staffing variables affect psychological, rather than physical, outcomes for nursing home residents.

Chapter 5: References

Anderson, R.A., Issel, L.A., & McDaniel, R.R. (2003). Nursing homes as complex adaptive systems: Relationship between management practice and resident outcomes. *Nursing Research, 52* (1), 12-21.

Anderson, R.A., & McDaniel, R.R. (1999). RN participation in organizational decision making and improvements in resident outcomes in nursing homes. *Health Care Management Review, 24* (1), 7-16.

Ashmos, D.P., Huonker, J.W., & McDaniel, R.R. (1998). Participation as a complicating mechanism: The effect of clinical professional and middle manager participation on hospital performance. *Health Care Management Review, 23* (4), 7-20.

Banaszak-Holl, J., Zinn, J.S., Brannon, D., Castle, N.G., & Mor, V. (1997). Specialization and diversification in the nursing home industry. *Health Care Managing Review, 3,* 91-99.

Baron, R.M., & Kenny, D.A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51* (6), 1173-1182.

Barry, T., Brannon, D., & Mor, V. (2005). Nurse aide empowerment strategies and staff stability: Effects on nursing home resident outcomes. *The Gerontologist, 45* (3), 309-317.

Bates-Jensen, B.M., Cadogan, M., Osterweil, D., Levy-Storms, L., Jorge, J., Al-Samarrai, N., Grbic, V., & Schnelle, J.F. (2003). The minimum data set pressure ulcer indicator: does it reflect differences in care processes related to pressure ulcer prevention and treatment in nursing home?. *Journal of the American Geriatric Society, 51*,1203-1212.

Berta, W., Laporte, A., & Kachan, N. (2010). Unpacking the relationship between operational efficiency and quality of care in Ontario long-term care homes. *Canadian Journal on Aging, 29*(4), 543-556.

Blazer, D.G. (2003). Depression in late life: review and commentary. *Journal of Gerontology:*

Medical Sciences, 58, 249-265.

Cadogan, M.P., Schnelle, J.F., Yamamoto-Mitani, N., Cabrera, G., & Simmons, S.F. (2004). A minimum data set prevalence of pain quality indicator: is it accurate and does it reflect differences in care processes?. *Journal of Gerontology: Medical Sciences, 59A, 281-285.*

Castle, N.G. (2008). Nursing home caregiver staffing levels and quality of care: A literature review. *Journal of Applied Gerontology, 27* (4), 375-405.

Castle, N.G. (2011). The influence of consistent assignment on nursing home deficiency citations. *The Gerontologist, 51* (6), 750-760.

Castle, N.G. (2013). Consistent assignment of nurse aides: Association with turnover and absenteeism. *Journal of Aging & Social Policy, 25* (1), 48-64.

Castle, N.G., & Anderson, R.A. (2011). Caregiver staffing in nursing homes and their influence on quality of care. *Medical Care, 49* (6), 545-552.

Castle, N.G., & Decker, F.H. (2011). Top management leadership style and quality of care in nursing homes. *The Gerontologist, 51* (5), 630-642.

Castle, N.G., & Engberg, J. (2007). The influence of staffing characteristics on quality of care in nursing homes. *Health Services Research, 42* (5), 1822-1847.

Castle, N.G., Engberg, J., & Men, A. (2007). Nursing home staff turnover: Impact on nursing home compare quality measures. *The Gerontologist, 47* (5), 650-661.

Castle, N.G., Engberg, J., & Men, A. (2008). Nurse aide agency staffing and quality of care in nursing homes. *Medical Care Research and Review, 65,* 232-252.

Cilliers, P. (1998). Complexity and post-modernism: Understanding complex systems. New York: Routledge.

Colon-Emeric, C.S., Lekan-Rutledge, D., Utley-Smith, Q., Ammarell, N., Bailey, D., et al. (2006). Connection, regulation, and care plan innovaton: A case study of four nursing homes. *Health Care Management Review, 31* (4), 337-346.

Cheung, C.K., & Ma, S.K. (2010). How older residents benefit from the management of volunteer services. *Administration in Social Work, 34* (3), 241-258.

Donoghue, C. (2010). Nursing home staff turnover and retention: An analysis of national level

data. *Journal of Applied Gerontology, 29* (1), 89-106.

Donoghue, C., & Castle, N.G. (2009). Leadership styles of nursing home administrators and their association with staff turnover. *The Gerontologist, 49* (2), 166-174.

Gittell, J.H., Weinburg, D., Pfefferle, S., & Bishop, C. (2008). Impact of relational coordination on job satisfaction and quality outcomes: A study of nursing homes. *Human Resource Management Journal, 18* (2), 154-170.

Gran, S.V., Festvag, L.S., & Landmark, B.T. (2009). 'Alone with my pain- it can't be explained, it has to be experienced' a Norwegian in-depth interview study of pain in nursing home residents. *International Journal of Older People Nursing, 5,* 25-33.

Gureje, O., Van Korff, M., Simon, G.E., & Gater, R. (1998). Persistent pain and well being: A World Health Organization study in primary care. *Journal of the American Medical Association, 280*(2), 147-151.

Herman, A.D., Johnson, T.M., Ritchie, C.S., & Parmelee, P.A. (2009). Pain management interventions in the nursing home: a structured review of the literature. *Journal of the American Geriatrics Society, 57,* 1258-1267.

Hill, E.E., Nguyen, T.M., Shaha, M., Wenzel, J.A., DeForge, B.R., & Spellbring, A.M. (2009) Person-environment interactions contributing to nursing home falls. *Gerontological Nursing, 2* (4), 287-296.

Hoover, D.R., Siegel, M., Lucas, J., Kalay, E., Gaboda, D., Devanand, D.P., & Crystal, S. (2010) Depression in the first year of stay for elderly long-term nursing home residents in the U.S.A. *International Psychogeriatrics, 22,* 1161-1171.

Kallenbach, L.E., & Rigler, S.K. (2006). Identification and management of depression in nursing facility residents. *Journal of the American Medical Directors' Association, 7,* 448-455.

Kash, B.A., Castle, N.G., Naufal, G.S., & Hawes, C. (2006). Effect of staff turnover on staffing: A closer look at registered nurses, licensed vocational nurses, and certified nursing assistants. *The Gerontologist, 46* (5), 609-619.

Lapane, K.L., & Hughes, C.M. (2004). Which organizational characteristics are associated with increased management of depression using antidepressants in US nursing homes? *Medical Care, 42* (10), 992-1000.

McDaniel, R.R., & Driebe, D.J. (2001). Complexity science and health care management. In

G.T. Savage (Ed.), Advances in Health Care Management (Vol. 2, pp. 11-36). Stamford, CT: JAI Press.

Mor, V., Berg, K., Angelelli, J., Gifford, D., Morris, J., & Moore, T. (2003). The quality of quality measurement in US nursing homes. *The Gerontologist, 43*, 37-46.

Onder, G., Liperoti, R., Soldato, M., Cipriani, M.C., Bernabei, R., & Landi, F. (2007). Depression and risk of nursing home admission among older adults in home care in Europe: results from the Aged in Home Care (AdHOC) study. *Journal of Clinical Psychiatry, 68,* 1392-1398.

Pallant, J. (2010). *SPSS survival manual*. New York: McGraw-Hill.

Rahman, A., Straker, J.K., & Manning, L. (2009). Staff assignment practices in nursing homes: Review of the literature. *Journal of the American Medical Directors Association, 10,* 4-10.

Rantz, M.J., Hicks, L., Grando, V., Petroski, G.F., Madsen, R.W., Mehr, D.R., et al. (2004) Nursing home quality, cost, staffing, and staff mix. *The Gerontologist, 44* (1), 24-38.

Rodstein, M., Savitsky, E., & Starkman, R. (1976). Initial adjustment to a long-term care institution: medical and behavioral aspects. *Journal of the American Geriatrics Society, 24*, 65-71.

Rosen, J., Stiehl, E.M., Mittal, V., & Leana, C.R. (2011). Stayers, leavers, and switchers among certified nursing assistants in nursing homes: A longitudinal investigation of turnover intent, staff retention, and turnover. *The Gerontologist, 51* (5), 597-609.

Roy, J., & Mor, V. (2005). The effect of provider-level ascertainment bias on profiling nursing homes. *Statistics in Medicine, 24*, 3609-3626.

Sandberg, J., Lundh, U., & Nolan, M.R. (2001). Placing a spouse in a care home: the importance of keeping. *Journal of Clinical Nursing, 10,* 406-416.

Schnelle, J.F., Wood, S., Schnelle, E.R., & Simmons, S.F. (2001). Measurement sensitivity and the minimum data set depression quality indicator. *The Gerontologist, 41,* 401-405.

Siegel, J.M., Lucas, J.A., Akincigil, A., Gaboda, D., Hoover, D.R., Kalay, E., & Crystal, R. (2012). Race, education, and the treatment of depression in nursing homes. *Journal of Aging Health, 24,* 752-778.

Smalbrugge, M., Pot, A.M., Jongenelis, K., Beekman, A.T.F., & Eefsting, J.A. (2005). Prevalence and correlates of anxiety among nursing home residents. *Journal of Affective Disorders, 88,* 145-153.

Tabachnick, B.G. & Fidell, L.S. (2007). *Using multivariate statistics.* Boston: Pearson Education.

Takai, Y., Yamamoto-Mitani, N., Okamoto, Y., Koyama, K., & Honda, A. (2010). Literature review of pain prevalence among older residents of nursing homes. *Pain Management Nursing, 11,* 209-223.

Temkin-Greener, H., Cai, S., Zheng, N.T., Zhao, H., & Mukamel, D.B. (2012). Nursing home work environment and the risk of pressure ulcers and incontinence. *Health Services Research, 43* (1), 1179-1200.

Teno, J.M., Weitzen, S., Wetle, T., & Mor, V. (2001). Persistent pain in nursing home residents. *The Journal of the American Medical Association, 285* (16), 2081.

Tse, M., Leung, R., & Ho, S. (2011). Pain and psychological well-being of older persons living in nursing homes: an exploratory study in planning patient-centered intervention. *Journal of Advanced Nursing, 68*(2), 312-321.

Weiner, D.K., & Hanlon, J.T. (2001). Pain in nursing home residents: management strategies. *Drugs and Aging, 18*(1), 13-29.

Willemse, B.M., de Jonge, J., Smit, D., Depla, M.F.I.A., & Pot, M.A. (2012). The moderating role of decision authority and coworker- and supervisor support on the impact of job demands in nursing homes: a cross-sectional study. *International Journal of Nursing Studies, 49* (7), 822-833.