
Resident- and Facility-Level Predictors of Quality of Life in Long-Term Care

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Received May 23 2013; Accepted October 28 2013.

Decision Editor: Rachel Pruchno, PhD

Purpose of the Study: Although there is substantial research on quality of care in nursing homes (NH), less is known about what contributes to quality of life (QOL) for NH residents. This study assesses multiple domains of QOL and examines facility- and resident-level correlates for different domains.

Design and Methods: Data come from (a) self-reported resident interviews using a multidimensional measure of QOL; (b) resident clinical data from the Minimum Data Set; and (c) facility-level characteristics from Minnesota Department of Human Services. We used factor analysis to confirm domains of QOL, and then employed cross-sectional hierarchical linear modeling to identify significant resident- and facility-level predictors of each domain.

Results: We examined six unique domains of QOL: environment, personal attention, food, engagement, negative mood, and positive mood. In multilevel models, resident-level characteristics were more reliable correlates of QOL than facility characteristics. Among resident characteristics, gender, age, marital status, activities of daily living, mood disorders, cognitive limitations, and length of stay consistently predicted QOL domains. Among facility characteristics, size, staff hours, quality of care, and percent of residents on Medicaid predicted multiple QOL domains.

Implications: Examining separate domains rather than a single summary score makes associations with predictors more accurate. Resident characteristics account for the majority of variability in resident QOL. Helping residents maintain functional abilities, and providing an engaging social environment may be particularly important in improving QOL.

Key Words: Quality of life, Quality of care, Nursing homes

Quality of life (QOL) for nursing home (NH) residents is important for consumers, practitioners, and policy makers (Kane, 2001, 2003). The Centers for Medicare & Medicaid Services (CMS, 2011) call for facility environments that

promote maintenance or enhancement of each resident's QOL. Yet, studies of NH residents have predominantly assessed quality of care (QOC), emphasizing clinical indicators, which provide a limited reflection of residents'

lives beyond basic medical and physical needs (Arling, Kane, Lewis, & Mueller, 2005). Most studies of NH residents' QOL have been qualitative, using small, exploratory samples (Bergland & Narum, 2007; Guse & Masesar, 1999), limiting generalizability. No "gold standard" exists for measuring NH residents' QOL (Sloane et al., 2005); much work focuses on affect and satisfaction as primary measures of QOL (Lawton, 2001). One exception was CMS-commissioned work addressing the critical need for resident-centered, broadly applicable measures of QOL in NHs (Kane, 2003; Kane et al., 2003).

The present study builds on that work using a multidimensional, resident-reported measure of QOL for the entire population of Medicaid-certified NHs in Minnesota, which is one of the few states in the nation to collect such measures. The study used a new factor analysis of an expanded version of this QOL measure to confirm relevant QOL domains and assessed which facility- and resident-level characteristics were significantly associated with NH resident-reported QOL.

Background

QOL is a multidimensional construct that captures social, psychological, environmental, and functional aspects of residents' lives. Because the NH is a restricted environment and NH residents are frail, QOL takes on special significance. Compared with QOC, QOL is an underdeveloped area (Kane, 2001) and requires asking residents directly about their experiences, rather than relying on staff reports.

Just as existing measures of QOC use more than a single measure of quality, QOL should capture various aspects of NH residents' lives (Brod et al., 1999). Yet, few studies have examined "multiple domains of QOL" for NH residents. Most existing studies focus on a few select domains of the resident experience, including comfort (Bowers, Fibich, & Jacobson, 2001), relationships with staff (Mattiasson & Andersson, 1997), dignity (Franklin, Ternstedt, & Nordenfelt, 2006), and privacy and autonomy (Shippee, 2012). One exception is a CMS-commissioned QOL study that developed a multidomain assessment of resident-reported QOL (Kane, 2003). This instrument was adopted by Minnesota in 2005 for resident interviews in all Medicaid-certified NHs and serves as the basis for the present study.

Predictors of NH Residents' QOL

Resident-Level Predictors

Both individual resident and facility characteristics are associated with QOL in long-term care (LTC) (Kane et al.,

2004; Mitchell & Kemp, 2000). Most studies have focused on resident characteristics, finding that physical and mental health affect NH residents' QOL (González-Salvador et al., 2000; Mitchell & Kemp, 2000; Pekkarinen, Sinervo, Perälä, & Elovainio, 2004). Residents with physical disabilities (Degenholtz, Kane, Kane, Bershadsky, & Kling, 2006; Elliott et al., 2009) or problems with activities of daily living (ADL; Lucas et al., 2007) and mental functioning (Abrahamson, Clark, Perkins, & Arling, 2012; Elliott et al., 2009) report lower QOL. Meanwhile, the ability to adapt to change has been linked to better QOL among NH residents (Guse & Masesar, 1999). Other resident characteristics such as longer term stays (Ejaz et al., 2003), payment source (Grabowski, 2001), and age marginally predict QOL in LTC facilities (Degenholtz et al., 2006; González-Salvador et al., 2000; Kane et al., 2004).

Facility-Level Predictors

Most studies examining facility characteristics have mainly assessed resident experience and satisfaction rather than QOL. These studies show that facility size (Allen, 2003), ownership type (O'Neill, Harrington, Kitchener, & Saliba, 2003), location (Coburn, 2002), staff retention, and nursing home staffing rates (Harrington, Zimmerman, Karon, Robinson, & Beutel, 2000) affect resident experiences. One study found that although most of the variation in QOL could be attributed to resident characteristics, NH characteristics did contribute significantly (Degenholtz et al., 2006; Kane et al., 2004). Residents reported higher QOL in facilities with higher ratios of activity/recreation and household staff (Degenholtz et al., 2006; González-Salvador et al., 2000). Staff stressors have a negative effect on resident QOL (Pekkarinen et al., 2004). Residents in smaller and not-for-profit (compared with investor-owned) facilities report better overall QOL (Lucas et al., 2007; Pekkarinen et al., 2004).

Conceptual Framework

This study examines facility- and resident-level correlates of QOL. One relevant conceptualization was developed by Zubritsky and colleagues (2013) for health-related QOL (HRQOL) for persons in LTC settings. The heuristic model by Zubritsky and colleagues (2013) is useful in identifying correlates of QOL, a personal construct of well-being similar to, but not the same as, HRQOL, in LTC to inform our hypotheses. The model uses the basic components of Donabedian's (1992) model of QOC—specifically, structure, process, and outcome measures—and applies them to LTC settings. Thus, at least in part and indirectly, we also use the Donabedian model. Building on other theoretical work, it also views HRQOL as multidimensional and influenced

by both characteristics of individual and environment, which mutually affect each other (Brod et al., 1999; Wilson & Cleary, 1995). The model posits that accounting for unique characteristics of older adults receiving LTC care is key for understanding QOL. Individual-level characteristics include sociodemographic characteristics, functioning, psychological functioning, satisfaction, social support, cognitive ability, and behavioral disorders. Environmental characteristics include organizational factors of the service system (staff retention, hours of care) and the physical environment (size and structure). Drawing from Zubritsky and colleagues (2013), we employed a conceptual model to guide our choice of correlates of QOL, thus grouping them into resident and facility characteristics for conceptual clarity, and organizing our reasoning for hypotheses below.

Overall hypothesis

- H₁: Compared to facility characteristics, resident characteristics will explain more of the variance in QOL (Kane et al., 2003).

Resident-related hypotheses

- H₂: Demographic and status characteristics that are historically associated with lower societal status (e.g., non-White, not married, lower education) will be negatively associated with QOL.
- H₃: Physical and mental health problems will be negatively associated with QOL (Zubritsky et al., 2013).

Facility-related hypotheses

- H₄: Structural and financial characteristics affecting facilities' capacity to meet resident needs (e.g., for-profit, high aggregate acuity level, higher percent of residents on Medicaid) will be associated with lower resident QOL (Lucas et al., 2007).
- H₅: Staffing and administrative limitations will be associated with lower QOL (Rantz et al., 2004).

In testing these hypotheses, the current study updates and expands upon earlier work examining multidimensional QOL (Abrahamson et al., 2012; Degenholtz et al. 2006; Kane et al., 2004) in two ways. First, we build on that work by including additional domains of QOL. Second, we examine all domains separately within multilevel models to assess the resident- and facility-level predictors of resident QOL.

Data and Methods

Sample

This study uses data from three sources. They are (a) resident interviews using a multidimensional measure of QOL; (b) resident clinical data from the Minimum Data Set (MDS);

and (c) facility-level characteristics from facility reports to the Minnesota Department of Human Services (DHS).

Resident QOL was compiled from the 2010 Resident Quality of Life and Satisfaction with Care Survey. The tool is administered to a random sample of residents in all Medicaid-certified nursing homes in Minnesota. It is conducted via two-stage random sampling, in which facilities provided a list of long-stay and short-stay residents. Residents were eligible for either list if they were not in isolation due to communicable illness and if their guardian did not decline participation. Statewide, 96% of residents (27,724) were eligible to be participated and 58% (16,187) were sampled to be approached. Of the 16,187 residents sampled, 15% had unsuccessful interview attempts. The most common reasons were inability to respond (5%), refusal (4%), and severe cognitive impairment (2%), leaving a survey response rate of 85% ($n = 13,433$). The average number of completed interviews per facility was 35 (Vital Research, 2010). Additional information regarding survey methods can be found in the 2010 Vital Research final report to the Minnesota Department of Human Services.

Interviews were conducted face-to-face using a 52-item instrument covering various QOL domains (Kane, 2003; Kane et al., 2003). The survey uses a simplified yes/no binary response structure to include respondents with mild to moderate cognitive impairment (except for mood items that use a Likert scale from 1 to 4). Response rates for the QOL questions matched the original tool development work (Kane et al., 2003). The majority of respondents missed only 1–5 out of 52 items (58%), with 14% responding to all 52 items. Patterns of missingness differed by resident characteristics, with older, longer stay, and more cognitively impaired residents being less likely to have a complete survey. We used full-information maximum likelihood (FIML) in Mplus to address missing data on dependent variables. Our full models used 10,969 out of 13,433 survey respondents due to matching with MDS data (see below).

Resident clinical data were drawn from MDS 2.0 data, for all NH residents with a QOL report in 2010 ($N = 78,000$ residents with at least one assessment during 2010). MDS includes data on residents' functional status, physical health, and other outcomes. We used MDS data to construct independent variables at the resident level, including demographics, physical and mental health, payment source, and length of stay (LOS). Most independent variables had little missing (<6%). We used a maximum likelihood approach to multiple imputation in Stata v12 statistical software via the "mi estimate" family of commands to generate our final estimates in full models (StataCorp LP, 2011).

Facility-level characteristics come from facility reports to the DHS, including ownership type, size, resident acuity, metropolitan status, payer mix, nursing administrator turnover, staff hours per resident day, and other predictors. We had no missing data on facility characteristics.

Measurement of QOL

The original instrument that was the basis for our measure (Kane, 2003; Kane et al., 2003; Kane et al., 2004) included 35 items. However, when Minnesota adopted the items for a statewide survey, modifications were made, and some items were eliminated and other items were added. The final tool included 52 items. Our measure consists of six QOL domains: environment, personal attention, food, personal engagement, negative mood, and positive mood. Mood items were adapted from Brod et al. (1999). Mood was included separately in the QOL assessment tool; Kane and colleagues (2003) found it to be strongly associated with QOL and suggested it as a component of QOL for future studies but ultimately did not include it as a QOL domain. Conceptually, mood is an intraindividual concept, which allows capturing both positive and negative emotions that affect QOL (Brod et al., 1999). Recent studies of QOL using the same tool have found it to be strongly associated with QOL when treated as a separate domain (Abrahamson et al., 2012; Xu & Kane, 2013). We also identified a separate domain for physical function, corresponding to ADL, but for the purposes of this study, we did not model “ADLs” as a dependent variable because it was substantively different from other QOL domains (i.e., not self-reported and closely resembled existing ADL scales).

Resident-Level Variables

Our selection of resident-level characteristics was guided by characteristics identified by Zubritsky and colleagues (2013), with the exception of social support, which was not available in our data. Sociodemographic factors included age, gender, race (White vs. non-White), educational attainment (high school education or more vs. less than a high school education), marital status (married vs. widowed/divorced/never married), living arrangement prior to entering the facility (lived alone, lived with others, transferred from another facility), and LOS in the facility (measured in years).

“Health characteristics” included difficulties with ADLs (scored from 0 to 28; high score indicates more impairment; Doble & Fisher, 1998); count of chronic conditions (scored from 0 to 4, where 0 = no chronic conditions; 1 = 1 condition; 2 = 2 conditions; 3 = 3 conditions, and 4 = 4+ chronic conditions, including cancer, Parkinson’s disease,

multiple sclerosis, stroke, arthritis, diabetes mellitus, and hip fracture); Alzheimer’s disease; presence of an anxiety or mood disorder; and higher cognitive status (1 = better cognitive performance, corresponding to score of 0–3 on the original measure vs. 0 = score of 4–6 corresponding to higher cognitive impairment; Morris et al., 1994).

Facility-Level Variables

Facility-level characteristics were based on work by Zubritsky and colleagues (2013) and Lucas and colleagues (2007). “Structural characteristics” included whether the facility was attached to a hospital, ownership (for-profit, nonprofit, and government), location (rural, metropolitan, and micropolitan), size (number of beds), chain status (chain-affiliated vs. not), whether or not facility staff were unionized, percent private rooms, and aggregate resident acuity level (a measure of case mix and severity, which has been shown to predict satisfaction among NH residents).

Financial resources are often captured via percent of residents on Medicaid and occupancy ratios (Lucas et al., 2007). Here, we controlled for sources of payment upon admission on the facility level (percentage of residents on Medicare, Medicaid, or self-pay/private insurance). We control for occupancy ratios, which have been shown to impact resident care.

Staffing and administrative resources include direct care staff hours per day, staff retention (percent of staff not leaving each year), and whether residents were unionized. Based on the work of Degenholtz and colleagues (2006), we included hours per resident day of different staff specialties (e.g., activity staff, licensed social workers, certified nursing assistants [CNAs], registered nurses, and licensed practical nurses [LPNs]). We also controlled for administrative turnover in the past year, which has been associated with resident satisfaction.

We explored the effect of clinical performance measures that have not been previously studied, including (a) quality of care (score from the Minnesota Nursing Home Report Card website, which uses established quality measures such as use of physical restraints, incidence of worsening bowel continence, incidence of cured pressure sores, etc.) and (b) star rating (a measure of performance by the CMS based on health inspections, quality of care rating, staffing combined into an overall rating ranging from 1 to 5 stars).

Analytic Plan

QOL Factor Analysis

Our first aim was to confirm a factor structure for the modified QOL measures. Our analyses were based on the original QOL work, which produced 10 QOL domains (Kane et al.,

2003). Since the original factor analysis, a number of items were revised prior to being administered in Minnesota in 2005. Also, new domains were added (e.g., affect), and the original domains were developed on a different sample of NH residents. Therefore, we undertook a new factor analysis to examine whether the items resulted in fewer and/or different domains. The final tool administered in Minnesota consisted of 52 items (see [Supplementary Appendix B](#) for Minnesota tool). [Lewis et al. \(2013\)](#) performed exploratory factor analyses of these measures. Based on this work, we carried out a series of confirmatory factor analyses to validate the factor structure and test for consistency. The analyses were conducted using promax rotation for confirmatory factor analyses on the revised 52-item tool. We used MPLUS v7 software for factor analyses as it uniquely offers the ability to conduct factor analyses with dichotomous outcomes, as well as FIML estimation for missing data ([Larsen, 2011](#); [Muthen & Muthen, 2011](#)). In sensitivity analyses, results were similar with unimputed data.

HLM Model for QOL

We used hierarchical linear models (HLM) to assess resident- and facility-level correlates of QOL. Because residents are grouped within NHs, outcomes of those residents will be correlated, which violates one of the assumptions of standard regression methods. If this correlation is ignored, incorrect inferences can result with respect to the effect of both resident and facility factors. HLM accounts for this “within-group” correlation to produce better inferences ([Raudenbush and Bryk 2002](#)). All multivariate analyses were conducted using Stata v12 statistical software using the “xt” family of commands.

Results

Six unique domains were identified, all with $\alpha > .60$, pointing to the multidimensional nature of QOL for NH residents. Overall, the factor structure remained similar to the original factor analysis ([Kane et al., 2003](#)), with few exceptions. Specifically, we retained environment and food domains and created four factors: personal attention, engagement, negative mood, and positive mood. We performed tests of absolute model fit (chi-square and standardized root mean square residual), relative fit (Tucker–Lewis Index), and noncentrality tests that compare the model to the alternative rather than null (root mean square error of approximation [RMSEA] and comparative fit index [CFI]). All measures of fit demonstrated support for our new factor structure (e.g., RMSEA = 0.41; CFI = 0.985).

The items for each scale are described in [Table 1](#). “Environment” (four-item scale) captures residents’ ease of getting around and ability to take ownership of one’s

own things. “Personal attention” (six-item scale) reflects how residents are treated by staff and others in the facility and residents’ overall satisfaction with the facility. “Food/meal enjoyment” is a three-item scale. “Engagement” (9 items) includes enjoyment of things to do and whether the respondent feels that staff and other residents know him/her as a person and whether he/she considers others as friends. “Negative mood” is a six-item scale consisting of questions about being bored, angry, worried, sad, afraid, and lonely. “Positive mood” is a three-item scale including questions about being peaceful, interested in things, and happy. In both exploratory and confirmatory factor analyses, positive and negative moods loaded separately, showing that the three items tapping positive affect were distinct from the other six items tapping negative affect.

Domain scores were calculated as a sum of residents’ scores for each set of questions. Higher values on each domain indicate better QOL (including negative mood, which is rescaled and reverse coded, so higher values indicate better mood). The QOL summary scale was calculated as the summary of items that were answered yes and ranged from 0 to 31. In sensitivity analyses, we created and compared both unweighted and weighted scores. The findings were essentially unchanged. Our final tables display the unweighted overall summary score. [Table 1](#) lists the individual items that comprise each QOL domain and alphas for each QOL scale.

[Table 2](#) presents sample characteristics of the residents ($n = 10,969$) and facilities ($n = 396$). Residents tended to be in their 80s, female, White, not married, with at least a high school education. About 37% of residents lived alone before moving into the facility and a third moved from another facility (28%). Residents had an average LOS of just over 3 years, but the range was wide (0–46 years). A majority of residents were not cognitively impaired and had an average score of 14 on ADL impairment (with a range 0–28). The majority of residents (64%) were classified as having some kind of anxiety/mood disorder and residents had, on average, one chronic condition.

Facilities varied widely in their characteristics: about 14% were attached to a hospital; 1/3 had unionized staff; with an average of 94% occupancy rate and 74% staff retention rate. About 16% of facility administrators had left within the past year and, on average, staff direct care hours per resident day varied by facility and specialty. CNAs had the highest average hours per day (2.36) and licensed social workers had the lowest (0.11). The acuity level, a measure of case mix and severity, had a mean of 1.1 (with a range of 0.6–1.4). Greater than 70% of all residents had some self-pay or private insurance on admission, 69% had Medicare on admission, and 14% had Medicaid on admission. The average CMS overall star rating was

Table 1. Quality of Life Domain Measures and Factor Loading Alpha Scores

Domain	Survey questions	Loading score	Alpha score
Environment	Is it easy for you to get around in your room by yourself?	0.84	0.7351
	Are your personal items arranged so you can get to them?	0.91	
	Can you get to the personal items you want to use in your bathroom?	0.91	
	Can you take care of your own things here as much as you want to?	0.82	
Personal attention	Do the people who work here treat you politely?	0.86	0.7131
	Are you treated with respect here?	0.90	
	Do the people who work here handle you gently?	0.79	
	Can you get help when you need it?	0.78	
	Do the people who work here listen to what you say?	0.84	
	Would you recommend this nursing home to someone who needs care?	0.82	
Food	Do you like the food here?	0.89	0.7042
	Do you enjoy mealtimes here?	0.92	
	Do they serve your favorite foods here?	0.84	
Engagement	Are there things to do here that you enjoy?	0.74	0.7356
	Are there things to do on the weekend that you enjoy?	0.67	
	Do the people who work here know what you like and don't like?	0.71	
	Are people working here interested in the things you've done in your life?	0.68	
	Do the people who work here know you as a person?	0.81	
	Do the people who live here know you as a person?	0.74	
	Do the people who work here ever stop by just to talk?	0.59	
	Do you consider anybody who works here to be your friend?	0.69	
	Do you consider any of the other people who live here a friend?	0.67	
Negative mood	In the past two weeks, how often have you been bored?	0.68	0.7706
	In the past two weeks, how often have you been angry?	0.72	
	In the past two weeks, how often have you been worried?	0.65	
	In the past two weeks, how often have you been sad?	0.77	
	In the past two weeks, how often have you been afraid?	0.64	
Positive mood	In the past two weeks, how often have you been lonely?	0.69	0.6078
	In the past two weeks, how often have you been peaceful?	0.68	
	In the past two weeks, how often have you been interested in things?	0.55	
	In the past two weeks, how often have you been happy?	0.82	

Note: The factor analyses were conducted in Mplus using promax rotation with full-information maximum likelihood estimation.

4.5 (out of 5, a measure of performance), with the quality of care score averaging at 3.03 (out of 5), also a measure of performance. About half of the facilities were a part of a chain, 27% were located in rural areas, and 63% were nonprofit. On average, facilities had 94 beds and 39% private rooms.

Table 3 presents results from the hierarchical linear models. We found that the majority of the variance (about 95%) was attributed to resident predictors, with only about 3% of the variance due to facility indicators (supporting H₁).

Among resident-level predictors, both demographic and health characteristics affected QOL domains; however, the direction of the effect was not consistent across factors, providing partial support for H₂ and H₃. Age was significantly associated with lower scores on environment, engagement, mood, and the overall summary score, but it was positively associated with better scores on food. Individuals with higher education reported

receiving more personal attention but were also less engaged. A longer LOS was associated with better scores on environment, food, and engagement but lower scores on mood and the overall summary score. Problems with ADLs had a negative association with all QOL domains. Individuals with more serious conditions reported lower environment-related QOL but higher engagement. Regarding mental health problems, Alzheimer's disease was positively correlated with environment and food but negatively associated with engagement and mood. Having better cognitive performance was associated with higher personal attention, mood, and the overall score but lower food-related QOL.

Several facility-level variables also contributed to variation in QOL scores across factors, providing partial support for H₄ and H₅. Residents in larger facilities reported lower QOL in personal attention, food, engagement, and the overall summary score. Being attached to a hospital, nonprofit ownership, administrative turnover, star rating,

Table 2. Descriptive Statistics for Dependent and Independent Variables, 2010

	Range	Mean	SD
Dependent variables			
Quality of life domain scores			
Environment	0–4	3.14	0.01
Personal attention	0–6	5.26	0.01
Food	0–3	2.32	0.01
Engagement	0–9	6.36	0.02
Positive mood	0–3	2.30	0.01
Negative mood	0–6	4.27	0.01
Summary score	0–31	23.64	0.05
<i>n</i> = 10,969			
Independent variables			
Resident characteristics			
Age	21–111	83.89	11.35
Married	0/1	0.21	0.40
Female	0/1	0.69	0.46
White (vs. non-White)	0/1	0.96	0.18
High school education	0/1	0.66	0.47
Prior living arrangement			
Lived alone prior to entering facility	0/1	0.37	0.48
Transferred from another facility	0/1	0.28	0.45
Length of stay (years)	0–46	3.09	3.37
Activities of daily living	0–28	14.01	7.43
Alzheimer's disease	0/1	0.12	0.32
Anxiety/mood disorder	0/1	0.64	0.48
Count of conditions	0–4	1.10	0.86
Good cognitive performance (vs. impaired)	0/1	0.88	0.33
<i>n</i> = 10,969			
Facility characteristics			
Attached to a hospital	0/1	0.14	0.34
Ownership			
For profit	0/1	0.27	0.44
Nonprofit	0/1	0.63	0.48
Government	0/1	0.10	0.30
Metropolitan status			
Rural	0/1	0.27	0.45
Metro	0/1	0.53	0.50
Micro	0/1	0.19	0.39
Number of beds	15–397	94.23	54.90
Part of a chain	0/1	0.52	0.50
Acuity level	0.63–1.41	1.05	0.10
Percent private rooms	0/1	0.39	0.29
Star rating	1–7	4.52	1.14
Quality improvement score	1–5	3.03	0.97
Payment source/insurance coverage			
Percentage of residents with Medicaid	0/1	0.14	0.00
Percentage of residents with Medicare	0/1	0.69	0.00
Percentage of residents with self-pay	0/1	0.78	0.00
Percentage of residents with private insurance	0/1	0.71	0.00
Occupancy ratio	0.33–1.11	0.94	0.07
Staff direct care hours per resident day			
Activities staff	0–0.62	0.24	0.00
CNAs	0–4.23	2.36	0.00
Licensed mental health/social workers	0–1.22	0.11	0.00
LPNs	0.13–1.63	0.72	0.00

Table 2. Continued

	Range	Mean	SD
RNs	0–1.53	0.44	0.00
Staff retention	0.28–0.97	0.74	0.10
Unionized staff	0/1	0.32	0.47
Administrative turnover in last year	0/1	0.16	0.36

Notes: $n = 396$. For QOL Domain Scores, higher scores indicate better QOL for all domains. For negative mood, higher scores also indicate better mood. CNA = certified nursing assistant; LPN = licensed practical nurse; RN = registered nurse.

quality improvement score, and percent private rooms predicted QOL for at least one factor.

Residents in facilities with higher percentage of Medicaid reported lower QOL for personal attention, engagement, and the summary score. And staff hours per resident day were significantly associated with QOL across factors. In particular, more activity staff hours per day was associated with better QOL in all domains, and greater licensed social-work hours was associated with better QOL in the personal attention, food, and engagement domains. In contrast, higher LPN hours per resident day was associated with worse QOL for mood and the summary score.

We conducted several goodness-of-fit tests for our models and present F -statistics, degrees of freedom, largest fraction of missing information, and log-likelihood for each model (see Table 3). Log-likelihood was obtained using nonimputed data, but we conducted sensitivity analyses using imputation = 1 to insure that the conclusions were comparable.

Discussion

This study had two aims. First, it sought to clarify the dimensions of NH resident QOL by analyzing the domains in a revised measure of resident-reported QOL. Second, it sought to identify significant predictors of QOL at the resident and facility levels and to understand how those varied by domain.

Under our first aim, we expected to confirm a preexisting factor analysis that identified separate domains of QOL, each with unique set of predictors. Indeed, we identified six unique domains of QOL: environment, personal attention, food/mealtime enjoyment, engagement, positive mood, and negative mood. Our study supported previous work on multiple domains of QOL (Kane et al., 2003, 2004) but found items loading on fewer domains, resulting in a more concise measure that fits the revised tool.

We also computed an overall summary score, but we found that the domain scores were more useful in addressing the effects of resident and facility variables. For example, among resident characteristics, race, high school education, and Alzheimer's disease, and having more chronic conditions are predictive of QOL for a number of domains but not for the overall summary score. Similarly, among facility

characteristics, being attached to the hospital, occupancy rate, percent private rooms, and star rating are predictive of QOL for at least one domain, but none is significant for the overall summary score. Thus, examining only the summary score would result in a less-nuanced understanding of the unique contributors to residents' experiences and may lead to inappropriate dismissal of important factors. In order to design responsive policies and programs to improve QOL, we must look at predictors of each domain separately to understand the complex mechanisms at play in each.

For our second aim, we used a conceptual framework based on Zubritsky and colleagues (2013) and other literature to identify correlates of QOL on the resident and facility level. As hypothesized (H_1), we found that resident characteristics account for the majority of the variability in resident QOL, with facility characteristics explaining at most 3% of the variance. This is similar to the finding by Degenholtz and colleagues (2006) who found that resident-level characteristics explained about 91% of the total variance in the summary QOL measure.

Regarding resident characteristics, H_2 was partially supported in that older age was negatively associated with QOL for all domains except food and marital status was positively associated with engagement, mood, and summary score. Longer LOS was positively associated with QOL in the environment, food/mealtime enjoyment, and engagement domains (presumably due to acclimation, although longer staying residents may simply lower their expectations) but was negatively associated with QOL for moods and summary score. Findings supported H_3 in regard to physical health, which had a negative effect across multiple QOL domains. Mental health problems also had an overall negative relationship with QOL, but the effects of dementia and cognitive impairment varied by domain (counterintuitive findings for environment and food may have been due to lowered expectations for facilities, but any explanation here is speculative; further research is warranted).

Of facility-level characteristics, H_4 received modest support; being attached to a hospital, for-profit status, larger size, lower percent private rooms, and lower QI scores were associated with lower QOL but only in one or two domains (most often environment and personal attention).

Table 3. Regression Coefficients From Hierarchical Linear Models Predicting Quality of Life Domains

	Environment		Personal attention		Food		Engagement		Negative mood		Positive mood		Summary score	
	<i>b</i>	SE	<i>b</i>	SE	<i>b</i>	SE	<i>b</i>	SE	<i>b</i>	SE	<i>b</i>	SE	<i>b</i>	SE
Resident level														
Age	-0.003**	0.00	0.00	0.00	0.004***	0.00	-0.01***	0.00	-0.02***	0.00	-0.01***	0.00	-0.04***	0.01
Married	-0.02	0.03	0.07	0.03	0.00	0.02	0.18**	0.06	0.12*	0.05	0.08**	0.03	0.43**	0.15
Female	-0.05	0.03	0.07**	0.03	0.02	0.02	0.18***	0.05	-0.01	0.04	0.02	0.02	0.24	0.13
White	-0.03	0.06	0.05	0.07	0.12*	0.05	0.19	0.13	-0.11	0.11	0.00	0.06	0.16	0.33
High school education ^a	0.01	0.02	0.06*	0.03	-0.03	0.02	-0.10*	0.05	0.05	0.04	0.04	0.02	0.06	0.12
Lived alone (reference no.)														
Yes	0.02	0.03	0.06*	0.03	0.00	0.02	0.10	0.06	0.11*	0.05	0.07*	0.03	0.36*	0.15
Other facility	0.02	0.03	0.00	0.03	-0.03	0.02	-0.03	0.06	0.14**	0.05	0.09**	0.03	0.19	0.15
Length of stay (years)	0.01***	0.00	0.00	0.00	0.01**	0.00	0.03***	0.01	-0.07***	0.01	-0.04***	0.00	-0.05**	0.02
Activities of daily living ^b	-0.06***	0.00	-0.01***	0.00	-0.003*	0.00	-0.01**	0.00	-0.01***	0.00	-0.01***	0.00	-0.10***	0.01
Alzheimer's disease	0.26***	0.03	-0.01	0.04	0.11***	0.03	-0.28***	0.07	-0.22***	0.06	-0.13***	0.03	-0.28	0.18
Anxiety/mood disorder	-0.06***	0.01	-0.07***	0.02	-0.06***	0.01	-0.15***	0.03	-0.05	0.03	-0.02	0.01	-0.42***	0.08
Count of conditions ^c	-0.05***	0.01	-0.01	0.01	-0.01	0.01	0.06*	0.03	0.02	0.02	0.02	0.01	0.02	0.07
Less cognitively impaired ^d	-0.05	0.04	0.21***	0.04	-0.15***	0.03	0.13	0.07	0.23***	0.06	0.16***	0.03	0.52**	0.18
Facility level														
Attached to a hospital	-0.12**	0.04	0.06	0.05	-0.01	0.04	0.10	0.09	0.05	0.08	0.02	0.04	0.11	0.24
Ownership (reference: for-profit)														
Nonprofit	0.11**	0.04	0.03	0.04	-0.02	0.03	0.05	0.07	0.09	0.07	0.04	0.04	0.30	0.21
Government	0.09	0.05	0.05	0.06	0.03	0.05	0.15	0.11	0.17	0.10	0.08	0.06	0.57	0.31
Metropolitan status (reference: rural)														
Metro	0.01	0.03	-0.01	0.04	-0.03	0.03	-0.13	0.07	-0.09	0.06	-0.04	0.04	-0.30	0.20
Micro	-0.06	0.04	0.01	0.04	-0.04	0.04	0.06	0.08	-0.07	0.07	-0.03	0.04	-0.12	0.23
Number of beds	0.00	0.00	-0.001**	0.00	-0.001**	0.00	-0.003***	0.00	0.00	0.00	0.00	0.00	-0.01**	0.00
Part of a chain	0.00	0.03	-0.02	0.03	0.03	0.03	0.02	0.06	0.02	0.05	0.02	0.03	0.07	0.16
Acuity level ^e	0.08	0.20	0.21	0.23	-0.25	0.18	-0.11	0.42	0.35	0.38	0.12	0.21	0.38	1.16
Percent private rooms	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.002*	0.00	0.00	0.00	0.01	0.00
Star rating	0.00	0.01	0.02	0.01	0.00	0.01	0.01	0.02	0.05*	0.02	0.02	0.01	0.11	0.07
Quality improvement score	0.02	0.01	0.04**	0.02	0.02	0.01	0.04	0.03	0.05	0.03	0.02	0.01	0.20*	0.08
Percent with each payer source														
Medicaid	-0.15	0.18	-0.76***	0.21	0.07	0.16	-1.07**	0.38	-0.30	0.34	-0.16	0.19	-2.38*	1.06
Medicare	0.10	0.14	-0.19	0.17	0.22	0.13	-0.36	0.30	0.08	0.27	0.06	0.15	-0.09	0.85
Self-pay	-0.20	0.20	0.20	0.23	0.03	0.18	0.52	0.42	0.42	0.38	0.26	0.21	1.24	1.17
Private insurance	0.03	0.18	-0.26	0.21	0.00	0.17	-0.46	0.38	-0.18	0.34	-0.09	0.19	-1.00	1.07
Occupancy rate	0.08	0.20	0.47*	0.23	0.24	0.18	0.08	0.42	0.62	0.38	0.37	0.21	1.85	1.18

Table 3. Continued

	Environment		Personal attention		Food		Engagement		Negative mood		Positive mood		Summary score	
	<i>b</i>	SE	<i>b</i>	SE	<i>b</i>	SE	<i>b</i>	SE	<i>b</i>	SE	<i>b</i>	SE	<i>b</i>	SE
Staff direct care hours per resident day														
Activities staff	0.42*	0.16	0.68***	0.19	0.62***	0.15	1.61***	0.35	1.29***	0.31	0.70***	0.18	5.30***	0.98
CNAs	-0.04	0.04	0.04	0.04	0.00	0.03	0.00	0.08	-0.11	0.07	-0.06	0.04	-0.15	0.22
Licensed social workers	-0.10	0.16	0.63***	0.19	0.38*	0.15	1.07**	0.35	-0.23	0.32	-0.07	0.18	1.64	1.01
LPNs	-0.14	0.07	-0.01	0.08	-0.11	0.06	-0.27	0.14	-0.36**	0.13	-0.19**	0.07	-1.06**	0.39
RNs	0.03	0.08	-0.01	0.09	-0.07	0.07	-0.27	0.17	-0.06	0.15	-0.01	0.08	-0.38	0.47
Staff retention	-0.05	0.13	-0.11	0.15	-0.03	0.12	-0.38	0.28	-0.28	0.25	-0.17	0.14	-1.01	0.79
Unionized staff	0.04	0.03	-0.02	0.03	-0.01	0.03	-0.03	0.06	0.00	0.05	-0.01	0.03	-0.03	0.17
Administrative turnover in last year	0.02	0.04	0.00	0.04	-0.03	0.03	-0.07	0.07	-0.15*	0.07	-0.08*	0.04	-0.30	0.21
<i>F</i> -statistic	43.50***		7.81***		6.27***		8.62***		10.54***		11.09***		12.53***	
Degrees of freedom	384.43		972.00		1362.37		341.66		3645.97		3683.02		1091.82	
Largest FMI	0.16		0.10		0.08		0.17		0.05		0.05		0.09	
Log-likelihood	-14803***		-15283***		-12980***		-21502***		-14800***		-9557***		-28642***	
Intercept	4.22***	0.35	4.34***	0.40	1.94***	0.32	7.76***	0.73	1.67*	0.66	0.81*	0.37	20.85***	
ICC (empty model) ^f	0.01***		0.02***		0.02***		0.02***		0.02***		0.02***		0.03***	

Notes: Higher scores indicate better QOL for all domains. For negative mood, higher scores also indicate better mood. CNA = certified nursing assistant; LPN = licensed practical nurse; RN = registered nurse.

*Compared with less than a high school education.

^bMeasured on a scale of 0–28; higher indicates greater impairment.

^cMeasured on a scale of 0–4; higher indicates more chronic conditions.

^d1 = better cognitive performance, corresponding to score of 0–3 on the original measure versus 0 = score of 4–6 corresponding to higher cognitive impairment.

^eHigher scores indicate more severe case mix.

^fGenerated with nonimputed data.

*** $p < .001$, ** $p < .01$, * $p < .05$.

Also, higher proportion of Medicaid-only residents and occupancy rate were associated with lower personal attention QOL; Medicaid proportion was also negatively associated with engagement. Finally, we found mixed support for H_5 ; staff hours per resident day did not have consistent associations with QOL across type of staff. Greater activity staff and licensed social-worker staff hours were consistently associated with better QOL. In particular, activity staff hours were positively associated with all QOL domains, indicating the importance of going beyond physical needs and care to involve residents in social or goal-directed activities. In contrast, LPN hours were negatively associated with mood-related and summary QOL, possibly because higher LPN hours indicate higher need or more medicalized facilities. It is also possible that the lack of a (consistent) finding related to administrative turnover or staff hours could be due in part to measurement error. It is useful to note that QOC scores correlated with better QOL across multiple factors, confirming our assertion that QOC is related to, yet distinct from, QOL.

Although individual characteristics of residents are heterogeneous and beyond the control of states or facilities, our findings indicate that no “one-sized-fits-all” policy will address QOL for all residents. Instead, we find a number of individual characteristics that put some residents at higher risk of lower QOL, including older age, greater functional and cognitive limitations, and mental health disorders. NHs should pay particular attention to the needs of these residents in order to ensure that their QOL is being adequately addressed. Similarly, facility-related findings should serve as a call for increased support and attention to large, high-need facilities. It is possible that in those facilities, staff attention and resources are diverted to QOC and health outcomes, with less time spent on activities related to QOL. Notably, larger facilities, those with higher percent of Medicaid-only residents, and fewer activity staff or social worker hours per resident day were all associated with lower QOL in both engagement and personal attention domains. This suggests that these are different but related constructs, and moreover, that capacity (as termed by Lucas et al., 2007) may be vital not only in meeting physical needs and care but also in providing a nurturing social environment in an otherwise potentially distressing time of life.

Despite the small percent of the variance explained by facility characteristics, the facility effect may be found in less tangible aspects of leadership and commitment to personal care that have been associated with the culture change movement but are not available in our data (although these are speculative). Additionally, some quality improvement activities by facilities may not have been reflected in the annual survey. At the level of resident experience,

individuals might reduce their expectations the longer they remain in the facility, meaning that facility and environmental factors may have weaker associations with QOL for those with longer stays. As such, the percent of variance explained by facility characteristics may be masked by unmeasured correlates or measurement error.

Several policy and research recommendations emerged based on the findings. Facilities might want to increase mandated number of hours for activities staff (and/or increase funding for activities staff), as more hours had a consistently positive impact on QOL across domains. Also, it would be useful to consider structuring activities to accommodate more frail/sicker residents—if activity staff can have a positive impact, it could help to balance out the negative effects of poor health/functional limitations. One of the main findings was that ADL, mental health, chronic conditions, and other resident health characteristics had some of the strongest and most consistently negative effects on QOL. Thus, more needs to be done to address and treat those conditions to improve resident QOL. For ADL limitations, environmental modifications might make a difference (more grab bars, facilities that are easier to maneuver around, etc). A more detailed qualitative study of how different residents do within the same facility might be a useful next step, given that resident characteristics were more salient predictors. This might give better insight into how to intervene with particular programs/activities/environmental modifications for the highest-need residents.

This study has some limitations. Our data come from only one state. However, Minnesota is unique because it is one of few states to implement resident-reported QOL measures to all Medicaid-certified NHs in the state (over 95% of all Minnesota NHs); thus, national data using these measures are not available. Second, we only examine data from 2010. Although it would be useful to longitudinally examine predictors of QOL over time, our data are collected from a random sample of NH residents in all Medicaid-certified NHs in the state, thus permitting longitudinal analyses only on a facility level (analyzed in a subsequent manuscript).

Despite limitations, this study overcomes several of the weaknesses of previous research by simultaneously incorporating additional resident and facility predictors; using more recent data (2010) and a revised, multidimensional QOL instrument; and employing multilevel models to account for resident- and facility-level predictors across all domains. Results also have policy relevance vis-à-vis risk assessment for low QOL, identification of resident and facility factors that promote QOL, and develop strategies for addressing weak areas for QOL. Also, results emphasize the measurement of QOL that is able to identify facility-level characteristics that are more consistently predictive of

QOL (e.g., organizational culture, administrator turnover) as key steps toward further research.

Supplementary Material

Supplementary material can be found at: <http://gerontologist.oxfordjournals.org>.

Funding

Support for this research was provided by the Fessler-Lampert Chair on Aging, University of Minnesota Center on Aging, and a grant from the National Center for Research Resources of the National Institutes of Health to the University of Minnesota Clinical and Translational Science Institute (1KL2RR033182-02) to T.P. Shippee.

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