The Association Between Changes in Health Status and Nursing Home Resident Quality of Life

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Purpose: Previous research on nursing home resident quality of life (QOL) has mainly been cross-sectional. This study examined the association between changes in QOL and changes in resident clinical factors. Design and Methods: A longitudinal study of resident QOL was conducted in two nursing homes. Self-report interviews using a multidimensional measure of QOL were linked with clinical data from the Minimum Data Set. Five waves of interviews were conducted at 6-month intervals. Results: Residents with one or more Stage II or higher pressure ulcers for two consecutive 6-month periods reported declines in autonomy, security, and spiritual well-being QOL domains; those with declines in physical disability reported declines in the dignity domain. Increases in depressive symptoms were associated with decreases in comfort, meaningful activities, and food enjoyment domains, and increases in pain were associated with decreases in functional competence and dignity domains. Implications: There is evidence of an association between physical health and self-reported QOL. However, not every dimension of QOL exhibited the same pattern. Further research is needed on the link between specific clinical factors and aspects of QOL.

Key Words: Health status, Nursing homes, Quality of life
good quality of care is often defined as the absence of negative outcomes (Arling, Kane, Lewis, & Mueller, 2003; Wiener). QOL is not addressed in these various studies; thus, the question remains open regarding whether improvement in QOL would follow from improvements in quality of care. It is vitally important, therefore, to establish whether improvement in the underlying health of nursing home residents—which is the fundamental goal of quality-of-care improvement—and in nursing home environments can have a beneficial effect (or no effect) on aspects of QOL.

Many studies have used health-related QOL (Borowiak & Kostka, 2004; Ozcan, Donat, Gelecek, Ozdirenc, & Karadibak, 2005; Wodchis, Hirdes, & Feeny, 2003), physical function (i.e., activities of daily living; see Liao, McGee, Cao, & Cooper, 2000), or the prevalence of physical restraints as indicators of the QOL in a facility (Zimmerman et al., 1995). Although not without merit, these definitions of QOL do not address aspects of everyday life from the perspective of elderly nursing home residents themselves (Kane, 2003; Kane & Caplan, 1990; Kane et al., 1997; Rodin, 1986). Health-related QOL measures typically generate a single score that measures individuals’ self-assessment of their own health (Erickson, Kendall, Anderson, & Kaplan, 1989; Kaplan et al., 1989; Kaplan, Atkins, & Timms, 1984; Kaplan, Bush, & Berry, 1979) or the impact of their physical or mental health on their life and lifestyle (Haley, McHorney, & Ware, 1994; Ware & Sherbourne, 1992). These measures are not developed specifically for nursing facility residents (Andresen, Gravitt, Aydelotte, & Podgorski, 1999; Beusterien, Steinwald, & Ware, 1996; Seymour et al., 2001; Wodchis et al.) and do not capture important aspects of their lives. The recent development of a reliable, valid, self-report QOL measure that captures the impact of the care, services, and nursing facility environment makes it possible to investigate the link between QOL and clinical changes that are responsive to care processes (Kane et al., 2003).

Assuming that quality of care is an antecedent of QOL, we hypothesize that decline (or improvement) in clinical indicators should be associated with decline (or improvement) in QOL. Our goal in this study was therefore to examine whether changes in resident health and functioning are associated with change in QOL. Our approach is exploratory to the extent that we do not have a priori expectations about which domains of QOL will be associated with changes in each aspect of health status. Recognizing that there are many other aspects to living in a nursing home than clinical care, we anticipate that the association with QOL will be relatively modest.

Methods

We examine the cross-sectional and longitudinal association between resident clinical factors and QOL. Five waves of interviews with residents in two nursing homes generated QOL data that we merged with resident clinical data from the Minimum Data Set (MDS) files. We obtained these files from the CMS.

Setting

The resident sample is from two nonprofit nursing homes in Western Pennsylvania that were participating in a 4 year study of quality-improvement processes (Rosen et al., 2005, 2006). Facility A has 145 beds and is in an urban location; Facility B has 139 beds and is in a suburban location. Both are certified by Medicare. During the period of the study, no interventions were implemented that had the specific goal of modifying or improving resident QOL.

Data Sources

We used two data sources for the present study: we conducted interviews with residents to collect self-reported QOL information, and we obtained MDS files from the CMS.

Resident Interviews.—All residents who were 65 years of age or older, spoke English, and were not in a coma or completely uncommunicative were eligible to participate. Residents and their families were informed one week in advance that interviews were going to take place and were given the opportunity to decline. Trained interviewers approached all eligible residents to conduct an in-person interview. If a resident was unable to respond comprehensibly to six consecutive questions, the interviewer terminated the interview. There were 208, 205, 200, 188, and 194 residents approached at each wave (including residents who were present in more than one wave). We obtained complete surveys from approximately 62% of the resident population of the two facilities (624 surveys; 307 unique residents); 30% of the residents were unable to participate as a result of cognitive impairment, and refusal rates averaged 8.5% across all waves and did not vary between the two facilities (sum is more than 100% because of rounding).

Minimum Data Set.—We linked the resident interviews with data from the MDS. The MDS data derive from the federally mandated Resident Assessment Instrument (Morris, Murphy, & Nonemaker, 1995). A full resident assessment is done at admission and again each year, and a partial assessment is performed each quarter or upon a significant change of status. The Resident Assessment Instrument was designed as a tool for clinical care planning and thus covers physical function, cognitive function, and other health care needs in detail (Morris et al., 1997).
We obtained data for all residents in the study facilities from the CMS. For each resident in the sample, we extracted the most proximate MDS assessment record to the interview and linked it to the interview data. To enhance the external validity and generalizability of our findings, we extracted variables measuring resident health status from the MDS (we made an exception for pain, as noted in subsequent paragraphs). We constructed resident age, gender, and length of stay from the MDS and used them as control variables.

### Table 1. Descriptive Statistics

<table>
<thead>
<tr>
<th>Wave</th>
<th>Unique Residents</th>
<th>Two or more Interviews</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>(n = 142)</td>
<td>(n = 307)</td>
</tr>
<tr>
<td>2</td>
<td>(n = 122)</td>
<td>(n = 140)</td>
</tr>
<tr>
<td>3</td>
<td>(n = 121)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>(n = 126)</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>(n = 113)</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:** Length of Stay measured in months; hearing and vision impairment based on MDS score > 3; Bladder and bowel incontinence based on MDS score > 3; Pressure Ulcer based 1 or more Stage II, III, or IV; Physical Restraints are daily use of bed rails, trunk, limb, or chair that prevents rising; physical disability based on 0 to 3.771 magnitude estimation score; cognitive disability based on 0-3 score; depression rating scale range 0 to 14; pain based on 6 point pain thermometer.

Based on first wave resident was in the sample.

As we noted, our conceptual framework is that physical and mental health provide a necessary but not sufficient set of conditions for having a good life and lifestyle. We therefore hypothesize that declines in the clinical status of nursing home residents will be associated with declines in QOL. We do not hold any a priori expectations that specific dimensions of QOL will be associated with particular aspects of residents’ health.

### Dependent Variables

The dependent variable for this study was resident self-reported QOL, which we measured by using a multidimensional resident self-report instrument developed by Kane and colleagues (2003). The instrument measures 11 dimensions of QOL relative to a resident’s experience: comfort, functional competence, privacy, dignity, autonomy, meaningful activities, relationships, food enjoyment, spiritual well-being, security, and individuality. We used an improved version of the individuality scale (Kane, Kane, Bershadsky, Degenholtz, & Kling, 2004). Each dimension is measured with a multiple-item scale using a 4-point Likert-type response set, with points labeled as often (4), sometimes (3), rarely (2), or never (1). Residents who are unable to use the 4-point scale have the option of responding “generally yes” or “generally no.” These responses are scored as 3.8 and 1.5, respectively, based on a z score approximation method (Kane, 2003). Reliability scores (Cronbach’s alpha) from the current study and from previously published sources are reported later in Table 2.

### Main Independent Variables

The main independent variables are as follows: depressive symptoms, physical disability, use of physical restraints, pressure ulcers, and pain. We extracted all independent variables from MDS files, except for pain, as we note in a subsequent paragraph.

### Depressive Symptoms

The 12-item Depression Rating Scale was calculated from the MDS (Anderson, Buckwalter, Buchanan, Maas, & Imhof, 2003; Burrows, Morris, Simon, Hirdes, & Phillips, 2000). This scale has acceptable reliability (α = 0.75) and is highly correlated with criterion measures. Higher scores indicate greater presence of depressive symptoms. We coded residents with a score of 3 or more on the Depression Rating Scale as having a positive screen (Burrows et al.). This cutoff point has a sensitivity of 91% for detecting depression. Residents with a positive screen are residents who should be followed up with a diagnosis and treatment plan (Burrows et al.).
Physical Disability.—We computed an index of physical function for level of independence in eating, dressing, toileting, transferring, and walking by using magnitude estimation weights (Finch, Kane, & Philp, 1995). Each level of disability on each activity is given a weight, rather than a simple count. The resulting score ranges from 0 (no limitation) to 3.77 (completely disabled on five activities of daily living) and has ratio scale properties.

Physical Restraints.—We constructed an indicator for daily use of full bed rails, trunk or limb restraints, or a chair that prevents rising. Physical restraints are not an aspect of the individual resident, but they are a clinical care process that is modifiable by the facility. Restraint use is considered an indicator of poor quality of care and an infringement on individual autonomy that diminishes QOL (Institute of Medicine, 1986).

Pressure Ulcers.—We used an indicator for the presence of one or more Stage II or higher pressure ulcers noted on the MDS. This definition has been used in prior research (Berlowitz, Bezerra, Brandeis, Kader, & Anderson, 2000).

Pain.—We included a direct, resident self-report measure of pain in the resident interview using a 6-point pain thermometer (Weiner & Hanlon, 2001) rather than the MDS pain items, which capture pain assessment and treatment processes (Cadogan, Schnelle, Yamamoto-Mitani, Cabrera, & Simmons, 2004) and may underestimate the prevalence of pain (Chu, Schnelle, Cadogan, & Simmons, 2004). Higher scores indicate greater levels of pain.

Control Variables

We controlled for cognitive disability, sensory impairment, continence, age, gender, race, and length of stay in all of our analyses. We extracted information for all control variables from MDS files.

Table 2. Descriptive Statistics for Quality of Life Scores

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Reliability†</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Current Sample</td>
</tr>
<tr>
<td>Comfort</td>
<td>679</td>
<td>2.82</td>
<td>0.63</td>
<td>0.64</td>
</tr>
<tr>
<td>Functional Competence</td>
<td>659</td>
<td>3.15</td>
<td>0.78</td>
<td>0.81</td>
</tr>
<tr>
<td>Privacy</td>
<td>639</td>
<td>3.20</td>
<td>0.63</td>
<td>0.61</td>
</tr>
<tr>
<td>Dignity</td>
<td>637</td>
<td>3.60</td>
<td>0.55</td>
<td>0.84</td>
</tr>
<tr>
<td>Autonomy</td>
<td>633</td>
<td>2.98</td>
<td>0.62</td>
<td>0.59</td>
</tr>
<tr>
<td>Meaningful Activities</td>
<td>651</td>
<td>2.82</td>
<td>0.52</td>
<td>0.49</td>
</tr>
<tr>
<td>Relationships</td>
<td>648</td>
<td>3.21</td>
<td>0.59</td>
<td>0.68</td>
</tr>
<tr>
<td>Enjoyment</td>
<td>657</td>
<td>3.17</td>
<td>0.81</td>
<td>0.79</td>
</tr>
<tr>
<td>Spiritual Well Being</td>
<td>644</td>
<td>3.03</td>
<td>0.75</td>
<td>0.64</td>
</tr>
<tr>
<td>Security</td>
<td>633</td>
<td>2.74</td>
<td>0.44</td>
<td>0.60</td>
</tr>
<tr>
<td>Individuality</td>
<td>624</td>
<td>3.07</td>
<td>0.74</td>
<td>0.83</td>
</tr>
</tbody>
</table>

Notes: †Cronbach’s Alpha
‡Estimate from Kane et al. (2004).

Cognitive Disability.—We computed a 6-point cognitive function scale by summing the scores for the short- and long-term memory and cognitive skills for daily decision-making items from the MDS. Higher scores indicate greater levels of impairment. This scale correlates very highly with the Cognitive Performance Scale (Morris et al., 1994), and it does not confound physical function (i.e., eating) with cognitive function.

Sensory Impairment.—Hearing and visual acuity are central to being able to interact with the external world, both from a functional point of view and to engage in social relations. We defined hearing impairment as being able to hear in special situations only or being highly impaired on the MDS. We defined visual impairment as being either moderate, highly, or severely impaired on the MDS.

Continence.—We computed indicators for bowel and bladder impairment on the basis of MDS ratings of being frequently or completely incontinent.

Analysis

We conducted a multivariate longitudinal analysis to examine the association between measures of QOL and changes in health status. Because residents could contribute up to five observations each, we performed all analyses by using generalized estimating equations (GEEs) with resident as the grouping variable and with an exchangeable correlation structure. The GEE technique explicitly takes into account the within-person correlation structure and provides robust standard errors (Diggle, Liang, & Zeger, 1994; Stata, 2005). We estimated separate GEE models for each QOL measure (11 total). Although testing a large number of hypotheses makes it possible that some statistically significant findings will emerge by chance, adjusting the critical value (e.g., Bonferroni) is often too conservative when one is conducting exploratory research.
(Perneger, 1998); it is not appropriate in all circumstances (Veazie, 2006). Our approach is to discuss the pattern of findings relative to what would be expected by chance. We included dummy variables for site, wave, and the interaction between site and wave, and we adjusted all analyses for the prior level of dependent variable.

We constructed independent variables that represented change over a 6-month period. This restricted the data set to 140 unique residents with at least two interviews. There were too few residents with three or more interviews to allow examination of changes over 12 months. We calculated continuous change scores for physical disability, cognitive disability, and pain, with positive values representing an increase and negative values representing a decrease. We treated the presence of pressure ulcers and the use of physical restraints as categorical variables. We constructed indicators for incidence (none in the prior period and present in the current period), recovery (present in the prior period and none in the current period), and prevalence (present in both periods). The reference category for each was absence in both prior and current periods. We classified residents who changed from having a negative to a positive depression screen as “incident,” and those who changed from having a positive to a negative screen as “recovered.” We considered those residents with a positive screen in both periods to be “prevalent,” and the reference category was negative in both time periods. We conducted hypothesis tests for each estimated coefficient, and, for categorical independent variables, for the more stringent hypothesis that all subcategories are jointly equal to zero.

Nursing home residents can be discharged between interview waves for reasons such as hospitalization (with no expectation of return), relocation to assisted living or to the community, or death. Of particular concern is whether residents whose data were missing as a result of death are different than survivors. Of the sample, approximately 27% were discharged as a result of death. We analyzed this subsample separately and did not detect any differences in the pattern of associations between health status and each QOL measure or differences in unadjusted QOL scores. (In other words, residents who died did not have lower QOL than those who did not die within 6 months.) Thus, we retained these cases in the analytic sample. We conducted all analyses in Stata, version 8 (Stata, 2005). This study was approved by the Institutional Review Board at the University of Pittsburgh.

**Results**

**Descriptive Statistics**

Descriptive statistics for the sample at each wave are shown in Table 1. There were 307 unique individual residents interviewed during the study period. The average age of these residents was 85 years (SD = 7.2); the oldest resident was 103. Most of the residents (74%) were female and White (86%). Characteristics of the sample are generally stable across waves in terms of physical and cognitive disability, depressive symptoms, and pain. Some slight differences were seen in rates of incontinence and pressure ulcers. These mostly reflect variation among admitted residents rather than within-person changes over time.

**Longitudinal Multivariate Associations**

Only those residents with two or more complete interviews (n = 140) could be used for our longitudinal multivariate analysis. Descriptive statistics for this subgroup are shown in the final column of Table 1. Because some of the data was missing, the number of unique residents varied for each longitudinal multivariate model, ranging from 117 to 121. Each unique resident contributed an average of 2.2 surveys (range = 1–4); the total number of observations ranged from 253 to 261.

The results of the longitudinal analysis for the main independent variables are shown in Table 3 (coefficients for control variables are available upon request). Residents with one or more Stage II or higher pressure ulcers at two consecutive time periods reported statistically significant drops in autonomy, security, and spiritual well-being. An increase in physical disability was associated with a significant drop in self-reported dignity. An incident depression screen was associated with a significant drop in self-reported comfort, food enjoyment, and meaningful activities, and a change from positive to negative depression screen (recovery) was associated with a significant improvement in food enjoyment. An increase in self-reported pain was associated with a significant drop in functional competence and dignity. Finally, residents who recovered from a Stage II or higher pressure ulcer reported a significant drop in functional competence. The longitudinal models did not have any statistically significant findings for relationships or individuality.

We tested the joint hypothesis that each subcategory of each categorical independent variable (pressure ulcer, restraint use, depression) was equal to zero. With this conservative approach we found that two of the four findings for pressure ulcers (functional competence, spiritual well-being) remained significant; neither finding for restraint use remained significant, and two of the four findings for depressive symptoms (privacy, food enjoyment) remained significant.

**Discussion**

In a multivariate longitudinal analysis, we found that increases in physical disability and pain, the
incidence of depressive symptoms, and the prevalence of pressure ulcers was related to drops in several domains of QOL. The strongest evidence was for pressure ulcers and depressive symptoms, which were each associated with changes in more than three QOL domains. The number of statistically significant findings exceeds what would be expected by chance, although most QOL domains were associated with fewer than three clinical factors: functional competence, dignity, and security were associated with two clinical factors, and comfort, privacy, autonomy, meaningful activities, food enjoyment, and spiritual well-being were associated with one each.

Previous cross-sectional research using the same instruments found that only a small amount of the variation in individual QOL scores can be explained by health status (Degenholtz, Kane, Kane, Bershadsky, & Kling, 2006). Thus, as anticipated, the self-reported QOL measure was related to the clinical information recorded in the MDS, but the link was not strong. Our findings are compatible with the notion that the different spheres of the so-called good life are partially disengaged (Lawton, 1983): People may report relatively high levels of QOL even as they experience objectively poor health (Tsevat et al., 1998; Winter, Lawton, & Ruckdeschel, 2003). This process may be protective; as people adjust to diminished capacity and restrictive environments, they find new outlets and venues for self-identity and expression that help them maintain a positive sense of their own lives (Heckhausen & Schulz, 1995).

This study makes an important contribution to the literature on the dynamics of health status among nursing home residents. Previous studies have examined changes in physical function (Carpenter, Hastie, Morris, Fries, & Ankri, 2006; Finlayson, Mallinson, & Barbosa, 2005; Sloane et al., 2005), pain (Won et al., 2006), and risk factors for decline in health and function (Corbett, Crogan, & Short, 2002; Crogan & Corbett, 2002; McConnell, Pieper, Sloane, & Branch, 2002; Sato, Demura, Minami, & Kasuga, 2002; Saxer, Halfens, Muller, & Dassen, 2005). To our knowledge, however, few studies have examined longitudinal changes in QOL in the nursing home setting. For example, Selwood, Thorgrimsen, and Orrell (2005) examined changes in QOL in a population of persons with dementia and Dubeau, Simon, and Morris (2006) examined the effect of urinary incontinence on QOL. Our findings are consistent with research on depression and subjective QOL in a community sample (Angermeyer, Holzinger, Matschinger, & Stengler-Wenzke, 2002). As interest in using QOL to evaluate nursing home performance grows, understanding the link between health status and subjective QOL will become more important.

Further research is needed to replicate these findings and examine two counterintuitive results: Residents who recovered from a Stage II or higher pressure ulcer reported a drop in functional competence, and incident use of physical restraints was associated with an increase in self-reported security.
The MDS data do not offer a fine grain of detail regarding the process of care for wound care or restraint use. Previous studies have found that fear of falling is common among nursing home residents and is associated with depressive symptoms (Gillespie & Friedman, 2007) and with lower health-related QOL (as measured with the 12-item Short-Form Health Survey; see Ozcan et al., 2005). Thus, further information about the type of restraints, the rationale for their use, and the amount of time and the context when restraints are used is needed.

To address these questions, it would be necessary to collect detailed data on the clinical status of the resident and process of care, concurrently with resident QOL. A longitudinal design that captured changes in clinical status (i.e., incidence of or recovery from pressure ulcer) or process of care (i.e., use or discontinuation of various forms of restraints) could test directional hypotheses about the link between specific clinical factors and specific QOL domains. It could also examine whether intermediate variables such as fear of falling mediate the link between health status and QOL.

We are cautious to note that the observed associations do not imply causal relationships. It remains to be determined if interventions to improve psychological well-being, reduce pain, or improve physical function can lead to higher self-reported QOL scores. In some situations, the reverse may be true; for example, reports of low QOL related to meaningful activities may be precursors to depression. It is possible that the conditions that lead to limited opportunities for participation in preferred activities also lead to symptoms of depression. Further research using a longitudinal design is also needed on the link between enjoyable mealtimes and depression; because lack of interest in food is a symptom of depression, disentangling these concepts may be problematic. Such research should include a direct measurement of depressive symptoms; it should not rely on the MDS.

We did not find a pattern of associations between self-reported QOL and age or gender (not tabled); in regard to race or ethnic identity, we found that African Americans reported lower scores on the autonomy domain, but not on any others. As the number of older adults of color begins to represent a larger proportion of long-term-care users, caregivers will need to take into account differences from what are currently considered so-called mainstream values, and the QOL instrument may have to be revised. The interplay between culture, ethnicity, race, and QOL is an important topic for further research.

Several limitations should be noted. First, although these data form the first longitudinal look at self-reported QOL, the sample is drawn from only two nursing homes, limiting the generalizability of the results. We restricted our focus to individual-level factors and do not examine unit or facility-level variables that might moderate the impact of clinical conditions on QOL. In addition, the long study period (2.5 years) made it possible for us to assemble a fairly large panel for longitudinal analyses; however, the sample size is too small for us to examine important subgroups in sufficient detail.

We retained in our analytic sample those residents who were discharged as a result of death. Assuming QOL and health status decline close to death, this could potentially bias the observed level of QOL upward. Although we did not observe a different pattern of association between health status and QOL for this subsample, it is possible that assessments taken closer to the time of death might have revealed a different pattern of results. It is an important question for further research to determine if the link between change in QOL and change in health status remains the same as people near death.

To assess the potential for other sources of attrition to bias our findings, we compared the analytic sample of residents with residents who completed only one interview for any reason (refusal, decline in cognitive function, discharge, or death). Residents in the analytic sample had a higher rate of bowel incontinence than did residents who completed only one interview. Although there may be other factors that distinguish the analytic sample, there is limited evidence that attrition was associated with any health or clinical factors related to any QOL dimension in the multivariate longitudinal analysis.

These data were drawn from a longitudinal study of organizational change that used quality-improvement techniques to address workplace and clinical care issues identified by management and staff. That study did not target resident QOL explicitly, although a reduction in the incidence of pressure ulcers was related to a training program implemented at one site between Waves 4 and 5 (Rosen et al., 2006). Our conclusions about the link between pressure ulcers and QOL are consistent when we restrict the analysis to the first four waves of data.

The reliability and validity of the MDS are generally considered acceptable (Casten, Powell, Parmelee, & Kleban, 1998; Hawes et al., 1995; Lawton et al., 1998), and these data are increasingly being used for research and policy. However, evidence of interfacility variation in the reliability of MDS data suggests that researchers should take care when drawing conclusions (Mor et al., 2003). Although the QOL data were collected by trained research interviewers monitored for quality, reliability, and “drift,” the strength of the associations between QOL and measures derived from the MDS may be attenuated by measurement error in the MDS and by the fact that the data from the MDS may have been captured up to 90 days prior to the date of the QOL interview. Furthermore, the reliability of the 11 QOL domain scores is modest (0.53–0.77), potentially limiting the strength of the association with the independent variables.
Testing of a large number of hypotheses makes it possible that some statistically significant findings will arise by chance alone. There were 11 dependent variables (QOL domains) and five main independent variables (three categories of pressure ulcers; three categories of restraints; physical disability; three categories of depressive symptoms; and pain). Treating each category of each independent variable as a separate hypothesis yields 121 tests. Using a more stringent joint hypothesis for each categorical independent variable yields 55 tests. In either case, the number of statistically significant findings (12 and 7, respectively) exceeds what would be expected by chance, using $p < .05$ (6 and 2.75, respectively). Nevertheless, further research with a larger sample is needed to confirm these results using a priori hypotheses.

Lastly, we note that our findings are limited to the 60% of residents who were capable of providing responses to a self-report interview and were available for at least two consecutive interviews at 6-month intervals. To the extent that the sample represents those residents in relatively better physical health and underrepresents those with moderate or severe dementia, the representativeness of our sample is limited. The incidence and prevalence of factors such as pressure ulcers and restraints will be lower than in the general nursing home population. In addition, the two nursing homes that we studied were selected on the basis of convenience, and they are not necessarily representative of the industry or the not-for-profit sector. There is a continued need for additional theoretical and empirical work to define and measure the QOL of the large proportion of nursing home residents who are not capable of an in-person interview.

**Conclusions**

This study explored the connection between change in nursing home residents’ self-reported QOL and change in clinical factors. Although we found evidence that pressure ulcers and depressive symptoms are associated with decline in several domains of self-reported QOL, the overall association does not appear strong. Most QOL domains were associated with only one or two of the five clinical factors studied. Further research is needed that uses a direct measurement of clinical factors to confirm these findings about the strength of the relationship with QOL.

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