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Quality of Life of Older Adults in Canada and Norway: Examining the Iowa Model

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Abstract

In this study, Glick and Tripp-Reimer's (1996) Iowa Model for Gerontological Nursing serves as a guiding framework for a descriptive exploratory study of quality of life (QOL) of older adults. Using secondary data, we explored whether the effects of health appraisal, morbidities, social support transitions (SST), and the environment on QOL would be partly mediated by cognitive developmental transitions (CDT). Data sets were available from studies with random samples of community-dwelling older adults from Canada (n = 202) and Norway (n = 490). The partly and fully mediated effects found in this study suggest positive CDT's in older age might be significantly enhanced by the presence of intimate ties, positive perceptions of one's health limitations, and residing in a healthy, safe, and resource-rich physical environment. These findings represents a novel attempt at testing complex linkages between aspects of elder, environment and nursing concepts within the Iowa model warranting further research.

Keywords: quality of life, conceptual model, replication, gerontology, Iowa model

Quality of Life of Older Adults in Canada and Norway: Examining the Iowa Model

The Iowa Conceptual Model of Gerontological Nursing (ICMGN; Glick & Tripp-Reimer, 1996) was developed in response to concerns about the lack of theoretical work in gerontological nursing. In this model, gerontological nursing encompasses three spheres: elder, environment and nursing. Although there is research pertaining to selected concepts in the ICMGN, examination of the propositions or relationships hypothesized among its variables is lacking. While the ICMGN has been used as a framework for gerontological nursing textbooks, further research has not yet been conducted (Toni Tripp-Reimer, personal communication, January 3, 2007). We also selected this model for further exploration because of commentary on another paper (Paskulin & Molzahn, 2007) that the ICMGN would "add depth to the meaning of these research findings" (Gerdner, 2007, p.30).

Conceptual models include broad abstract concepts and general propositions about relations between concepts that are not intended to be tested empirically (Fawcett, 2005). By operationalizing concepts and examining relationships among variables, conceptual models can evolve into theories and be tested. In this study, we test explicitly examine some of the propositions within the ICMGN, to identify key variables that enhance quality of life (QOL) of older adults. Specifically, we explored some aspects of the elder and environmental spheres (health appraisal, comorbidity, social support transitions, cognitive developmental transitions (CDT), and the physical environment. QOL is the nursing-sensitive outcome, located within the ICMGN nursing sphere.

Quality of Life

Over the past three decades, there has been much research on QOL. Major national surveys drew attention to a wide range of facets of life considered by adults of *all* ages in rating

QOL, including physical health, social relationships and support, the physical environment, financial and material circumstances, and cognitive beliefs (Abrams, 1973; Burckhardt, 1985; Campbell, Converse, & Rodgers, 1976; Cantril, 1965; Flanagan, 1978). QOL has since been described as an evolving, amorphous, and nebulous concept (Anderson & Burckhardt, 1999; Bernheim, 1999; Bowling et al., 2003; Brown & Gordon, 1999; Cummins, 1996). There is general agreement that QOL is a multidimensional and complex concept (Dijkers, 2003; Ferrans, Zerwic, Wilbur, & Larson, 2005; Higgs, Hyde, Wiggins, & Blane, 2003) and that conceptual or theoretical frameworks are needed to guide and interpret research findings (Bullinger, 2002; Prutkin & Feinstein, 2002; Taillefer, Dupuis, Roberge, & LeMay, 2002). As suggested by George and Bearon (1980), age-specific analyses of older adults' QOL are more likely to result in valid findings (Dijkers, 2003; Power, Quinn, Schmidt, & WHOQOL-OLD Group, 2005). While there is considerable research pertaining to QOL, results are often conflicting, definitions of QOL vary, and many studies are not specific to older adults. Also, while QOL is an important outcome of nursing care, we are less clear about the factors that might contribute to this outcome.

Using the ICGMN (Glick & Tripp-Reimer, 1996), we explored the influence of health appraisal, comorbidity, and the physical environment coupled with the social support and cognitive developmental transitions in older age that may influence QOL. In this study, QOL was defined as "an individual's perception of their position in life …affected in complex ways by a person's physical health, psychological state, level of independence, social relationships, and their relationships to salient features within the environment" (WHOQOL Group, 1995, p. 1405). Although QOL could be viewed as an indicator of well-being in the elder domain of the ICMGN, in this study, it is used as a nursing-sensitive outcome.

Associations among QOL and Concepts in the 'Elder Sphere'

In previous studies, health and social support were found to be related to QOL (Borglin, Jakobsson, Edberg, & Hallberg, 2006; Bowling & Gabriel, 2004; Hilleras, Jorm, Herlitz, & Winblad, 2001; Sarvimaki & Stenbock-Hult, 2000; Tseng & Wang, 2001). Comorbidities significantly detract from QOL (Bowling et al., 2003; c.f., Hellstrom & Hallberg, 2001; Sarvimaki & Stenbock-Hult, 2000). Members of support networks are lost through retirement and death. In both cross-sectional (Bowling & Iliffe, 2006; Kleinpell & Ferrans, 2002; Tang, Aaronson, & Forbes, 2004; Tseng & Wang, 2001) and longitudinal (Courtens, Stephens, Crebolder, & Philipsen, 1996) studies, perceived social support, particularly its emotional facets, are associated with QOL. In theory, older adults selectively invest their time and energy with people when they feel a more meaningful or closer connection (Carstensen, Fung, & Charles, 2003). Intimate ties might play a key role in enhancing social participation in older age.

CDT is a complex concept, similar to self-transcendence; it is marked by a continual emotional and behavioral adjustment to illness-related changes, the temporal integration of past, present and future life experience, and the pursuit of activities beneficial to self and others (Glick & Tripp-Reimer, 1996). Living with chronic illness may motivate older persons to find meaning in their lives and with this, a desire to plan for the future, and set new life goals or strivings (Fife, 1994; Fryback & Reinert, 1999). Positive perceptions of health enhance opportunities for achieving (Fisher, 1995) and coming to terms with past accomplishments (Raphael, Brown, Renwick, Cava, Weir, & Heathcote, 1997). Coming to terms with past, present, and future life experiences might directly influence QOL in (Bowling & Gabriel, 2004; Power et al., 2005) and at the cusp of older age (Ventegodt, Flensborg-Madsen, Andersen, & Merrick, 2006). The sense of coherence and positive illness appraisals have also been found to mediate perceived health limitations, including comorbidities (Nesbitt & Heidrich, 2000) and changes in physical

disability over time (Schneider, Driesch, Kruse, Nehen, & Heuft, 2006). Carr and colleagues (2001a; 2001b) did, however, find differences in emotional and behavioral adjustment among persons with the same kinds of physical disability**.** Elders with similar physical health complaints also significantly differ in terms of their sense of coherence and QOL (Borglin et al., 2006), and subjective ratings of successful aging, including adaptation, growth and mastery have been correlated with QOL (Montross et al., 2006).

Chronically ill older adults also attribute positive QOL to their engagement in meaningful, pleasurable and altruistic activity (Albrecht & Devlieger, 1999; Bowling et al., 2003; Hilleras et al., 2001; Richard, Laforest, Dufresne, & Sapinski, 2004), and being socially active and involved (Borglin et al., 2006; Bowling et al., 2003; Hilleras et al., 2001). Frail older-olds also report that participating in meaningful activity and maintaining linkages with close others is requisite to preserving their sense of self in the midst of declining physical health (Walker, 2006). While having close ties enhances older adults' sense of purpose and meaning in life (Low & Molzahn, 2007), the links among social support transitions (SST), CDT, and QOL among older adults require further empirical attention.

Associations of QOL with Facets of the 'Environment Sphere'

In the ICGNM, the environment is conceptualized as the physical, sociopolitical, economic, and cultural context in which late life transitions take place (Glick & Tripp-Reimer, 1996). Older adults' appraisals of the overall desirability and safety of their physical surroundings (Borglin et al., 2006; Bowling et al, 2003; Netuveli, Wiggins, Hildon, Montgomery, & Blane, 2006), area facilities, and safe places to walk (Bowling & Iliffe, 2006) have been found to positively influence QOL. There is mixed empirical support for the effects of owning and residing in one's own home in later life (Blane, Higgs, Hyde, & Wiggins, 2004;

Bowling & Gabriel, 2004). Potential and actual changes in the usual living environment significantly reduce QOL (Stephens-Ratchford & Diaz, 2003; Tang et al., 2004).

In four studies, older adults' perceptions of the overall adequacy of their economic and material well-being were correlated with QOL (Borglin et al., 2006; Bowling et al., 2003; Netuveli et al., 2006; Richard et al., 2004). Others report that level of income, per se, is a weak and non-significant predictor of both QOL and life satisfaction (Bowling, Banister, Sutton, Evans, & Windsor, 2002; Bowling & Gabriel, 2004; Bowling & Iliffe, 2006; Jones, Rapport, Hanks, Lichtenburg, & Telmet, 2003; Raphael et al., 1997; Tseng & Wang, 2001), as is social status (Bowling & Gabriel, 2004). These findings suggest adequacy of resources to meet one's needs is relative to one's expectations (Hazelrigg & Hardy, 1997).

In the ICMGN, Glick and Tripp-Reimer (1996) identify generative activity and the temporal integration of past, present, and future (both indicators of CDT), as factors strengthening the older adult's connection with the environment. Yohansson (2003) and Walker (2006) argue that physical environment directly affects QOL. There is evidence to suggest the physical environment in which older adults reside is a source of meaningful activity that, in turn, is related to QOL (Low & Molzahn, 2007; Stephens-Ratchford & Diaz, 2003). Positive QOL is also related to engagement in activity within the limits of disability and the surrounding physical environment (Albrecht & Devlieger, 1999). Physical environments with few barriers to activity have been found to enhance QOL among both younger and older adults (Paskulin & Molzahn, 2007; Stuifbergen, Seraphine, & Roberts, 2000). A more comprehensive understanding of the role of the physical environment in relation to QOL would help clarify its linkage with activity (Lawton, 1991).

Research Hypotheses

In light of the ICMGN and the literature review, we hypothesized that health appraisal, morbidity, SST and the physical environment would directly affect QOL. We also hypothesized that CDT would partly mediate the effect of health appraisal, comorbidities, SST, and the physical environment has on QOL, as shown in Figure 1.

Design of the Study

An exploratory descriptive design was used for this secondary analysis of data. Data on QOL of older adults were collected originally as part of an international study to develop a new measure of QOL for and to identify factors related to QOL of older adults (Power et al., 2005). Data collected in 2004 in both Canadian and Norwegian field trials were used to test the hypotheses noted above. The model shown in Figure 1 was first tested using Canadian data and re-evaluated using Norwegian data, to identify findings generalizable beyond a single sample.

Methods

Data Collection Procedure

The inclusion criteria for the studies in Canada and Norway were: 60 or more years of age and English or Norwegian speaking respectively. Exclusion criteria included illnesses likely to cause death within the next six months and significant cognitive impairment. A sample stratified by age (60-70, 71-80, and 81 and over) was sought. In Canada, letters were sent to eligible randomly selected people from the databases of the British Columbia Ministry of Health Client Registry (n = 1000). A random list of names and addresses of older adults, stratified into age groups was obtained. As per the Ministry's standard procedures regarding access to the registry, a letter was mailed out explaining the nature and purpose of the study, inviting people without significant cognitive impairments, cancer or serious illness to participate. Those affirming participation were sent a questionnaire pack, consent forms and a stamped addressed

return envelope; 251 people responded positively and 169 declined to participate. Of the 251 who were sent questionnaires, 202 completed and returned the questionnaire package, representing a 48% response.

The Norwegian sample (*n* = 490) consisted of two cohorts. The first sample consisted of respondents to an epidemiological survey of stratified randomized healthy adults drawn from 20 communities geographically dispersed. The sample was drawn by allocated proportional design from Statistics Norway (NSB). All potential NSB respondents (*n* = 802) were sent an invitation to take part in the study, and a questionnaire, and of these, 401 consented to participate. A randomized sample from nine communities was also drawn by NSB for 89 older adults receiving formalized health care services, to obtain greater participation from frailer, less independent older adults. These respondents were interviewed and monetarily compensated (32 Euro). No record was kept of those refusing to take part.

Samples

The mean age of participants in the Canadian study was 72.9 (*SD* = +/-8.5), with a range from 60 to 95 years; 58.5% were female and 41.5% were male; 66% were married or partnered, 2% never married, and 32% separated, divorced or widowed. The sample was well educated; approximately 54% had post-secondary education. Approximately 43% reported living at home unsupported and 2.2% resided in nursing homes and residential care facilities.

The Norwegian sample was slightly older (*M* = 75.71; *SD* = +/- 8.0) but the range (60-91 years) was similar. Fifty-eight percent of respondents were female and 42% male. The majority of respondents were married or partnered (88%), 4% separated, widowed or divorced, and 8% never married; 36.5% had post-secondary education. Approximately 65% reported living at home unsupported, with few (3.3%) living in a nursing home or residential care setting.

Instruments

Data from two instruments, the WHOQOL-BREF and WHOQOL-OLD were used in the analyses. The WHOQOL-BREF is a short version of the WHOQOL-100 questionnaire designed to measure generic QOL across cultures (WHOQOL Group, 1998). It contains one item from each of the 24 facets as well as two global questions on overall QOL and health satisfaction; all items are measured on a 5-point Likert scale. This measure contains four domains: physical, psychological, social, and environmental. Domain scores are transformed to a percentage with higher values reflecting higher QOL (Harper, Power, & the WHOQOL-OLD Group, undated). The reliability, construct and discriminant validity, and domain structure of the WHOQOL-BREF have been established (Hwang, Liang, Chiu, & Lin, 2003; Jaracz, Kalfoss, Gorna, & Baczyk, 2006; Kalfoss, Isaksen, Thuen, & Alve, in press; Molzahn & Page, 2006; Skevington, Lofty, & O'Connell, 2004; WHOQOL Group, 1998).

The WHOQOL-OLD is an 'add-on' module for use with the WHOQOL measures in older adults. The measure addresses six domains including sensory abilities, intimacy, past, present and future activities, death and dying, social participation, and autonomy (Power et al., 2005). Each domain includes four items measured on a 5-point Likert scale. Three domains were used in this study (intimacy, past present and future activities, and social participation). Reliability and validity of this instrument was examined through both structural equation modeling and item response theory analysis of Field Trial data from 22 partnering countries worldwide (Power et al., 2005).

Measurement of Variables

The original study was not designed to measure specific concepts in the ICMGN; as a result, the indicators used in this study are only approximations of the concepts. Health appraisal

was measured using a self-reported dichotomous variable (healthy = 1; unhealthy = 0). Comorbidities were operationalized as the sum of number of conditions listed on an open-ended question. SST was measured using the intimacy facet from the WHOQOL-OLD; it includes four items pertaining to having opportunities for companionship, to experience love, love others, and be loved in return (Canada α = .931; Norway α = .841). CDT was measured using the past, present and future (receiving recognition in life, past achievements and future opportunities, happiness with things to look forward to) and social participation (time use, level of activity, participation in the community, having enough to do each day) facets of the WHOQOL-OLD. Given that scores on these two facets were highly correlated (r = .705, p < .001, Canada; r=.680, p<.001, Norway), they were summed to create a 13 item index. The Cronbach's alpha for this index was α = .874 in the Canadian data and α = .885 in the Norwegian data.

Physical environment was measured using the sum of 8 items from the WHOQOL-BREF environment domain (safety and health of the surrounding environment, satisfaction with the conditions of their living space, their access to health services, transportation, leisure activities, and information, and satisfaction with their current financial circumstances) on 5-point Likert type scales. Cronbach's alpha coefficients for this variable were α = .861 (Canada) and .805 (Norway). QOL was measured on a 5-point scale with a global question, "How would you rate your overall QOL?" Test-retest reliability coefficients for global QOL ratings range from .61 to .87 (De Boer et al., 2004; Matsumoto et al., 2002; Molzahn & Page, 2006).

Analysis of Data

A power analysis was undertaken using Cohen's (1988) method for detecting moderate effect sizes (f^2= .15); the estimated minimum sample size was 101 for a regression equation with six variables, power of .80 and an alpha level of .05. Both study samples met this criterion. A

missing values pattern analysis was conducted; the Little MCAR statistic revealed that missing values were missing at random for the Canadian (χ^2 = 32.996, *df* = 32, *p* = .418) and Norwegian (χ^2 = 39.503, *df* = 38, *p* = .403) datasets (Schafer & Graham, 2002). To preserve variability and produce unbiased estimates of predicted missing values, a residual error drawn from a normal distribution with mean zero and variance estimated by the residual mean square was added to each (Schafer & Graham), yielding a complete data set (Canada, *n* = 202; Norway, *n* = 490).

Initially, we regressed CDT and then QOL on health appraisal, comorbidities, SST and the environment, their statistical significance providing preliminary empirical support for CDT as a mediator (Baron & Kenny, 1986). In the third and final analysis, with all four predictors and, then, the mediator variable regressed on QOL, it was expected that CDT would significantly affect QOL *and* reduce (partial mediation) the effects of all other predictors on QOL. The Sobel test for unstandardized coefficients and their standard errors was used to assess the significance of partly mediated effects (Baron & Kenny).

Findings

In both samples, most respondents (84.7%, Canada; 81.4%, Norway) considered themselves to be healthy. Among Canadians, 29.2% of respondents reported having no chronic illnesses, 41.1% reported having 1, 19.3% had 2, and 10.4% had 3 or more; among Norwegians, the number of chronic illnesses were 50.7%, 27.9%, 12.6%, and 8.7% for none, 1, 2, and 3 or more respectively. Mean scores on intimacy (measure of SST) were 14.73 (*SD* = 4.17) and 15.71 (*SD* = 2.68) respectively. Scores on the CDT variable among Canadians (*M* = 31.70; *SD* = 5.26) and Norwegians (*M* = 29.14; *SD* = 4.77) were similar. Participants' mean scores on the environment measure were 80.11 (*SD* = 14.78) and 70.72 (*SD* = 12.89), and for QOL ratings, 4.29 (*SD* = .69) and 3.91 (*SD* =.73) for Canada and Norway respectively.

The Pearson Product Moment correlation scores were largest between CDT and QOL for both Canada (r = .438, p <.01) and Norway (r = .666, p <.01). A series of least-squares regression analysis were undertaken to explore the hypothesized mediating effects in this study (Baron & Kenny, 1986), first tested using the Canadian data and re-evaluated with identical data from Norway. Regression diagnostics revealed constant variance, no serial correlations between, and normally distributed plots of studentized-deleted residuals for each data set (Tabachnick & Fidell, 2001).

The first two regression analyses of Canadian data (n = 202; see Table 1) indicated that health appraisal, SST and physical environment were significant factors contributing to the variance of CDT (F = 63.755, df = 4, p =.000) and QOL (F = 49.578, df = 4, p = .000). These findings provide preliminary support for CDT as a mediating variable. In the third analysis, when all five variables were regressed on QOL (F = 42.446, df = 5, p = .000), neither health appraisal nor SST were statistically significant and the Sobels' test (see Baron & Kenny, 1986) indicated the direct effect of the physical environment on QOL was significantly reduced (from β = .509 to .411, p = .01) after adding CDT to the analysis. CDT also explained a significant amount of variation in QOL independent of all other predictors. Unlike the environment and contrary to what was hypothesized, health appraisal and SST were no longer statistically significant, indicating these predictors were fully mediated by CDT (Baron & Kenny). Comorbidities significantly explained QOL alone; hence, its effect on this outcome was not mediated by CDT. There was partial support for the mediational model shown in Figure 1.

Using Norwegian data (n = 490; see Table 2), the first two regression analyses, health appraisal, SST, and the physical environment were significant factors contributing to the variance of CDT as hypothesized (F = 129.69, df = 4, p <.001) and QOL (F = 94.64, df = 4, p <

.001). In the third analysis, with all five variables regressed on QOL (F = 103.122, df = 5, p < .001), the smaller but statistically significant standardized regression coefficients for health appraisal, SST and the physical environment indicate that the effects of these variables, as we hypothesized, were partially mediated by CDT. Sobel's test indicated significant reductions in their direct effects on QOL respectively (from β = .277 to .170, p < .001; from β = .237 to .159, p < .001; from β = .347 to .167, p < .001). No empirical support was found for either direct or indirect effects of comorbidities on QOL. As was noted in the Canadian analysis, these findings only partly supported our hypothesized model.

Discussion of Findings

This research extends work on the ICMGN by testing specific relationships among variables in the ICMGN. Exploring the mediating role of integrating past, present and future life experiences (one of our measures of CDT) extends previous research findings (Bowling & Gabriel, 2004; Power et al., 2005; Ventegodt et al., 2006). It represents the first attempt to empirically test a set of propositions within the ICGMN. The findings of this study partly support our hypothesized model with partial mediation as shown in Figure 1. In both analyses, empirical support was found for the mediating role of CDT. The ways in which this mediation manifested differed in the two samples. In the Canadian data, CDT fully mediated the effects of intimacy (SST) and health appraisal on QOL; for Norway, CDT partly mediated their effects. As hypothesized, in both study samples, the effects of the physical environment were partially mediated by CDT and no empirical support was found for the mediating role of CDT in relation to comorbidities. Among older Norwegians, co-morbidity did not significantly affect QOL ratings. In this study, QOL was affected in complex ways by health appraisals, comorbidities, SST, and the physical environment. These results are probably not totally surprising given the

complexity of the ICGMN and the lack of previous research on the relationships among the concepts.

We also explored whether intimate ties enhanced CDT among study participants. While empirical support for this effect was found in both study samples, in the Canadian analysis, CDT fully mediated or rendered indirect its effect on QOL. Because of the lower proportion of married/cohabitating Canadian elders (65.8% versus 85.5% in Norway), there may be a need for more social networks outside their homes. The mediating role of CDT in QOL appraisals, overall, indicates generative activities in the form of sharing past accomplishments, receiving recognition in life, and planning future activities with people with whom there were intimate relationships appear to make aging a more positive experience (Erikson, Erikson, & Kivnick, 1986; Fisher, 1995). Others link such ties with older adults' sense of meaning and purpose (Low & Molzahn, 2007) and the sense of identity among older-olds (Walker, 2006). With members of older adults' support network lost to retirement and death, this finding draws attention to the importance of intimate relationships in enhancing emotional adjustment and behavioral engagement (Carstensen et al., 2003). Past, present, and future activities, and connectedness with intimate connections (measures of CDT) imply mechanisms by which social support enhances QOL (Tang et al., 2004; Tseng & Wang, 2002).

Empirical support was found for our hypothesis that a safe, healthy, and resource-rich physical environment would directly affect QOL**.** Others also report that living in a generally desirable and safe physical environment enhances QOL (Borglin et al., 2006; Netuveli et al., 2006; Paskulin & Molzahn, 2007), as do positive appraisals of area facilities and safe places to walk (Bowling & Iliffe, 2006). Our finding that physical environment increased participants' capacity for active engagement supports the ICMGN and extends the work of Stuifbergen et al.

(2000) who reported significant links between environments with few barriers to activity and QOL in a study of adults to older adults. Moreover, living in a healthy, safe, and resource-rich environment might be both a marker of success in achievement in older age and enable social participation through access to information about community events, activities of interest, and leisure facilities. Financial circumstances were part of the environment measure used in this study and may, in part, contribute to the overall effect on CDT. An economically secure later life (Hazelrigg & Hardy, 1997) may serve as a marker of success or perhaps, as Hilleras et al. (2001) argue, monetary resources over and above those for food, clothing and shelter may in turn enhance QOL.

In other studies, sense of coherence and illness appraisals mediated perceived health limitations among women (Nesbitt & Heidrich, 2000) and changes in physical disability over time (Schneider et al., 2006). While others argue that chronic illness provides an impetus to plan for one's future, strive and set new goals (Fife, 1994; Fryback & Reinert, 1999), and meaningful activity preserves the sense of identity among old-olds in the midst of declining physical health (Walker, 2006), in this study, CDT did not mediate the effect of comorbidities as hypothesized. For CDT and health appraisal, our findings, though stronger in the Canadian analysis, suggest that regardless of numbers of chronic illnesses among participants, their perceptions of impairment significantly enhanced their capacity for CDT. In previous QOL research, positive health perceptions have been associated with accepting life accomplishments and opportunities for future achievements in older age (Fisher, 1995; Raphael et al., 1997). Perceptions of disability may influence emotional and behavioral adjustment and adaptation (Carr et al., 2001a; 2001b; Borglin et al., 2006; Montross et al., 2006), as with CDT as integration of past, present and future activity, and social participation in this study.

Among Canadians, as expected, numbers of chronic illnesses was negatively associated with QOL. This was not the case for Norwegian elders; health appraisal alone directly affected their QOL. The Norwegian sample had a higher proportion of married/partnered adults and more lived unsupported; these factors may have affected their QOL (Borglin et al., 2006; Bowling & Iliffe, 2006). Cohabitation may function as a QOL buffer (Boss, 2002; Cohen & Wills, 1985). In other studies of Norwegian elders, associations have been found between comorbidity and QOL (Kristoffersen, Svebak, & Asarod 2002; Rustoen, Wahl, Hanestad, Lerdal, Paul, & Miaskowski, 2005) and dependency, handicap, and long term functional decline (Pettersen, Dahl, & Wyller 2002). Though Norwegian elders had fewer comorbidities than Canadian elders, the lack of significance of the relationship may be explained, in part, by their focus on activities of central importance (generative in this case) as trade-offs not contingent upon physical functioning (Lundh & Nolan, 1996; Ormel, Lindenburg, Steverink, & Vonkorff, 1997). Response shifts relating to chronic conditions might also change their significance in QOL ratings (Albrecht & Devlieger, 1999; Rustoen, Howie, Eidsmo, & Moum, 2005; Sprangers & Schwartz, 1999), as could personality traits (Eriksson & Lindsrom, 2006; Montross et al., 2006; Schneider et al., 2006).

There are a number of limitations to the study. Although random selection was used, the Canadian study sample was not necessarily representative of Canadian older adults; respondents were from one region of the country, perceived themselves to be primarily healthy, and were living at home and well educated. The Norwegian data set was more representative because efforts were made to access all geographical regions of that country. By using existing data, indicators available to us were limited; hence, we were unable to examine the relationships among all the concepts in the ICMGN, particularly those in the nursing sphere (diagnoses,

interventions and outcomes). In the environment sphere, we were unable to examine the links between its spiritual, social, and cultural dimensions with QOL. No data were available pertaining to specific forms of social support (e.g., tangible or emotional). Having data on length of residence in the current location may have enhanced our interpretation of the elders' capacity for integrating the sense of past, present and future which was partly contingent upon the physical environment. The variables measured did not capture transitions or change as intended by the ICMGN; they reflect the responses to questions pertaining to static aspects of the concept. We did not measure cognitive status to screen participants for cognitive impairment.

Though we replicated some findings in this study, future research needs to include more ICMGN variables to enhance theorizing about QOL through further linking model concepts, especially those from the nursing sphere. Longitudinal studies would help to establish causal order of variables. Given the conflicting findings of the associations between comorbidities and QOL of older Norwegians and Canadians, qualitative exploration of their health-related beliefs might provide further insight, as Strawbridge, Wallhagen and Cohen (2002) suggest.

Summary

Glick and Tripp-Reimer's ICMGN (1996) is a valuable addition to knowledge development in nursing. We found empirical support for relationships among late life transitions, developmental processes, and the environment. Findings from our two study samples suggest positive CDTs in older age might be significantly enhanced by the presence of intimate ties, positive perceptions of one's health limitations, and residing in a healthy, safe, and resource-rich physical environment. The mediating effect of CDT in QOL appraisals warrants further research. Given the complexity of the ICMGN and the lack of empirical work on the interrelatedness of its core concepts as a whole, we recommend further empirical testing of this model.

Notes

Authors' contributions: Anita Molzahn and Mary Kalfoss both collected data in their respective countries. Canadian and Norway data were part of the WHOQOL-OLD project, for which Drs. Molzahn and Kalfoss were the principal investigators. Dr. Low analyzed these data. All authors wrote this manuscript.

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Table 1.
Regression Analysis of Canadian Field Trial data (n = 202)

Dependent variable	Independent variable	Standardized *b* coefficient	p value
Cognitive Developmental Transitions	Health appraisal	.153	.009
	Comorbidities	-.071	.176
	Physical environment	.479	.000
	Social support transitions	.283	.000
	Adjusted R^2 = .555		
Quality of Life	Health appraisal	.130	.037
	Comorbidities	-.127	.025
	Physical environment	.509	.000
	Social support transitions	.161	.004
	Adjusted R^2 = .492		
Quality of Life	Health appraisal	.099	.113
	Comorbidities	-.112	.045
	Physical environment	.411	.000
	Social support transitions	.103	.080
	Cognitive development transitions	.204	.007
	Adjusted R^2 = .508		

Table 2.
Regression Analysis of Norway Field Trial data (n = 490)

Dependent variable	Independent variable	Standardized *b* coefficient	p value
Cognitive Developmental Transitions	Health appraisal	-.270	.000
	Comorbidities	-.053	.114
	Physical environment	.452	.000
	Social support transitions	.194	.000
	Adjusted R^2 = .513		
Quality of Life	Health appraisal	-.300	.000
	Comorbidities	-.054	.081
	Physical environment	.342	.000
	Social support transitions	.235	.000
	Adjusted R^2 = .443		
Quality of Life	Health appraisal	-.195	.000
	Comorbidities	-.033	.213
	Physical environment	.166	.000
	Social support transitions	.160	.000
	Cognitive developmental transitions	.388	.000
	Adjusted R^2 = .516		

Figure 1. Conceptual Model of Quality of Life.