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**AUTHOR POST PRINT VERSION**

Gail Low and Anita Molzahn. A replication study of predictors of quality of life in older age. *Research in Nursing & Health* 30.2 (2007), 141-150.

A Replication Study of Predictors of Quality of Life in Older Age

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Acknowledgements:

This research was funded by doctoral fellowships from the Michael Smith Foundation for Health Research and the Social Science and Health Research Council of Canada. The authors wish to acknowledge the contributions of the WHOQOL-OLD Group, who designed the original study. Dr. Anita Molzahn was the principal investigator of the Canadian WHOQOL-OLD center.

Keywords: older adult; quality of life; causal model; replication

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## Abstract

A replication study was undertaken to validate a model of quality of life (QOL) generated in an earlier study on a random sample of 202 older adults. Pathways found to be significant were retested using QOL data from a convenience sample of 420 older adults. Using path analysis, we found that financial resources, health, and meaning in life directly and positively influenced QOL. Health, emotional support, and the physical environment indirectly affected QOL through spirituality. All but one pathway were replicated, explaining 50.5% of the variance in QOL. Further explorations of the influence of spirituality, emotionally close ties, and opportunities for active engagement on QOL in older age are warranted.

### A Replication Study of Predictors of Quality of Life in Older Age

Providing care to older adults involves maintaining or improving their quality of life (QOL). Many studies have been conducted on QOL of community-dwelling older adults (Grundy & Bowling, 1999; Keister & Blixen, 1998; Nilsson, Ekman, & Sarvimaki, 1998; Raphael et al., 1997; Sarvimaki & Stenbock-Hult, 2000).

Researchers have adopted various theoretical approaches in their studies of QOL among older adults, including cognitive adaptation (Cowan, Graham, & Cochrane, 1992; Nesbitt & Heidrich, 2000), social productivity (Ormel, Lindenburg, Steverink, & Vonkorff, 1997), social comparison (Zissi, Barry, & Cochrane, 1998), human need and development (Fisher, 1995; Higgs, Hyde, Wiggins, & Blane, 2003; Raphael et al., 1997; Sarvimaki & Stenbock-Hult, 2000), and general systems (Wilder, 1995). Human welfare (Nordenfelt, 1993) and self-regulative processes (Leventhal & Coleman, 1997) have been used as theories of QOL in general populations. These works draw attention to a number of key factors thought to influence QOL, including physical health and functioning, self-esteem, self-efficacy, autonomy, coherence, the physical environment, social relationships, and economics. Ferrell, Grant, Padilla, Vemuri, and Rhiner (1991) and Ferrans (1996) added spirituality as a factor influencing QOL.

In studies pertaining to older adults with a variety of chronic illnesses, positive QOL has been reported among those perceiving themselves to be in good health and independent with their activities of daily living (ADLs; Bowling, Banister, Sutton, Evans, & Windsor, 2002; Hellstrom & Hallberg, 2001; Hilleras, Jorm, Herlitz, & Winblad, 2001). Psychological well-being also plays a role in QOL appraisals of older adults. The older adult's perceptions of efficacy, esteem, autonomy, and coherence have been found

to mediate the influence of perceived health and health-related behaviors on their QOL (Cowan et al., 1992; Nesbitt & Heidrich, 2000; Stuifbergen, Seraphine, & Roberts, 2000; Zissi et al., 1998). Spirituality may also help older adults to find meaning in their lives and to develop goals that can bring a sense of accomplishment and achievement, despite changes to routines, roles, and rituals imposed by chronic illness (Baker, 2003; Fryback & Reinert, 1999; Tanyi, 2002). Having a sense of meaning and purpose in life has been found to directly enhance the QOL of older adults (Richard, Laforest, Dufresne, & Sapinski, 2004; Tang, Aaronson, & Forbes, 2004). Others have reported similar findings for meaningful activity (Fisher, 1995; Higgs et al., 2003). Subjective health has been found to predict older adults' perceptions of meaning and past accomplishments in life (Raphael et al., 1997; Sarvimaki & Stenbock-Hult, 2000), but still unclear is whether meaning and purpose in life would play a similar role in relation to QOL. These findings led us to explore the mediating and direct effects of meaning in life and purpose, defined as a sense of achieving and accomplishing, in relation to perceived health and QOL.

Emotional support, defined as confiding, companionship, and intimacy (Berkman, Glass, Bissette, & Seeman, 2000; Lin, Ye, & Ensel, 1999), has been found to have a moderate to strong positive effect upon QOL (Kleinpell & Ferrans, 2002; Tang et al., 2004; Tseng & Wang, 2001) and to enhance QOL over time among cancer patients (Courtens, Stephens, Crebolder, & Philipsen, 1996). Other significant factors include residing in a desirable living space and physical surroundings, and physical environments with few barriers to activity (Bowling et al., 2002; Farquhar, 1995; Fisher, 1995; Stuifbergen et al., 2000; Tang et al., 2004). Additionally, as Zhan (1992) contended,

having adequate financial resources has been found to be beneficial to the QOL of older adults (Farquhar; Fisher; Richard et al., 2004).

The World Health Organization Quality of Life (WHOQOL) Group (1995, p. 1405) defined QOL as:

an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns. It is a broad ranging concept that is 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.

This definition reflects an individual appraisal of QOL influenced in complex ways by a broad array of factors (Bernheim, 1999; Bowling et al., 2003; Cummins, 1996; Dijkers, 2003; Higgs et al., 2003; Pukrop, 2003) and corroborates research findings.

Accordingly, we conceptualized QOL as a global or overall self-appraisal of older adults' position in life in relation to their physical, psychological, social, and environmental circumstances.

We developed a model of QOL based on previous research findings from the literature. We hypothesized that older adults' perceptions of their health, financial circumstances, meaning and purpose in life, emotional support, and home and surrounding physical environment would positively predict overall QOL. Meaning and purpose in life were also expected to mediate the effect of perceived health on QOL. In the sample of 202 randomly selected older adults from British Columbia, Canada (ranging from 60 – 95 years of age,  $M=72.9$  years; 58.5% female), the following effects

shown in Figure 1 were significant and explained 56.8% of the variance in QOL: (a) the direct effect of perceived health and its indirect effect through purpose and meaning in life; (b) the direct effect of financial resources and meaning in life; and (c) the indirect effect of emotional support and the physical environment through purpose and meaning in life.

The purpose of the present study was to retest the model shown in Figure 1 using QOL data from an independent sample of healthy older adults measuring the same variables. Replication studies are rarely undertaken to further validate models of QOL, yet they enable researchers to re-evaluate a model and to disentangle sample-dependent findings from those generalizable to older adults beyond those in the studied sample.

### Method

To validate the findings of our previous study, we conducted a secondary analysis of data from a larger study examining predictors of QOL among older adults (Power, Quinn, Schmidt, & WHOQOL-OLD Group, 2005). The data were collected from a convenience sample of 432 people living in British Columbia, Canada. They had responded to advertisements placed in local community newspapers, posters in seniors' centers, and to invitations offered during presentations. Inclusion criteria were that respondents would: (a) be English speaking; (b) be a resident of British Columbia; (c) be 60 years of age or older; and (d) have no illness likely to cause death in the next 6 months, and (e) have no dementia or other significant cognitive impairment. A waiver of ethical review was obtained from the University of Victoria Human Ethics Research Committee prior to engaging in the secondary analysis of these data. Table 1 shows demographic data for the study sample.

*Research Instruments*

The WHOQOL-100 was designed by an international team to measure QOL across cultures (The WHOQOL Group, 1998). It consists of 100 items in 6 domains, including physical health, psychological well-being, level of independence, social relationships, environment, and spirituality, religion, and personal beliefs. The reliability (consistency, stability) and validity (face, content, convergent, divergent) of this instrument have been demonstrated in many previous studies (Power, Harper, & Bullinger, 1999; Skevington, Carse, & de C. Williams, 2001; Skevington & Wright, 2001; The WHOQOL Group, 1998).

The WHOQOL-OLD is a new instrument that has recently been developed and tested in 22 countries; this instrument is an add-on module for the WHOQOL measures to be used for older adults (Power et al., 2005). It includes 24 items, 4 in each of six domains, including sensory abilities, autonomy, past, present and future activities, social participation, death and dying, and intimacy. Cronbach's alpha for each of the WHOQOL-OLD and -100 domains ranged from .83 to .94.

The independent variables of interest in the study presented here were emotional support, purpose and meaning in life, perceived health, financial circumstances, ADL performance, and the physical environment. These independent variables were operationalized using 5-point items from particular domains of the WHOQOL-100 or –OLD. Higher scores on domain items indicated more positive perceptions of physical, psychological, social, and environmental life circumstances. Items from the WHOQOL-OLD and -100 were also selected to parallel items used in our previous study. This permitted a more direct and meaningful comparison of findings. To avoid the possibility



of tautological effects, specific items were selected to measure variables of interest rather than the entire WHOQOL-100 and -OLD instruments.

The items selected to measure emotional support and purpose in life fit with conceptual definitions of these variables from the literature review. With respect to emotional support, no data were available to us pertaining to confiding and companionship; hence, we used two other items pertaining to the intimacy aspect of emotional support from the WHOQOL-100 social domain. These items were: “How satisfied are you with your opportunities for physical contact and closeness?” and “How satisfied are you with the level of intimacy in your life?” Given that the scores on these two items were highly correlated ( $r = .89, p < .001$ ), scores were added to create a two-item index ( $\alpha = .796$ ) to counter their collinear effects, as Hayduk (1987) suggested. As in our earlier study, purpose in life--defined as an impetus for developing goals and plans that bring a sense of accomplishment or achievement--was measured by a corresponding item (facet 27.3) present in the WHOQOL-OLD activities domain asking respondents to appraise the extent to which they had opportunities to continue to achieve in life.

Other items selected pertained to physical, psychological, and environmental aspects of their lives. For example, to measure older adults’ appraisals of the meaning their lives held, we selected the corresponding item from the WHOQOL-100 spirituality domain: “To what extent do you find your life to be meaningful?” To measure perceived health, we used the WHOQOL-100 global item on overall health satisfaction. In the WHOQOL-100 environmental and independence domain, two items pertaining to overall ADL performance and financial circumstances were used: “How satisfied are you with your ability to perform your activities of daily living?” and “Do you have enough money

to meet your needs?” The physical environment was measured using two items from the WHOQOL-100 environmental domain: “How healthy is your physical environment?” and “How satisfied are you with the conditions of your living space?”

In total, nine items were selected from various domains of the WHOQOL-100 and WHOQOL-OLD instruments to measure variables of interest in this study. In their entirety, these nine items yielded a Cronbach’s alpha coefficient of .795.

The dependent variable, QOL, was measured by the WHOQOL-100 global item, “How would you rate your QOL?” Test-retest reliability coefficients for global QOL ratings have ranged from .795 to .870 (DeBoer et al., 2004; Matsumoto et al., 2002; Molzahn & Page, in press; Osoba et al., 1997; Wahl, Burckhardt, Wiklund, & Hanestad, 1998).

#### *Data Collection and Analysis*

The QOL survey data used in this secondary analysis were collected between September and December of 2002 by the Canadian WHOQOL-OLD Center. Path analysis was used to retest or validate the pathways found to be significant in our previous study (see Figure 1). Path analysis is an extension of the regression model, used to test the fit of a correlation matrix against models (Byrne, 2001). The variables on the left of Figure 1 are exogenous variables (those that are independent of other variables in the model, or have no prior influencing factors in the model) that, in turn, influence endogenous variables (those whose value is determined or directly affected by other variables), specifically meaning and purpose in life as mediators and QOL as the outcome variable of interest. Path analysis allows the researcher to test the plausibility of these relationships in their entirety against an independent dataset. To do so, the researcher

imposes the structure of the hypothesized model on the sample data and then tests how well the observed relationships or correlations between variables from the sample data fit this restricted structure (Byrne, p. 7). Hence, in addition to examining the significance of hypothesized effects of exogenous and endogenous variables, overall measures of model-to-data fit are generated.

Measures of model-to-data fit include: model chi-square ( $\chi^2$ ), goodness of fit (GFI), adjusted goodness of fit (AGFI), and the root mean square error of approximation or RMSEA (Byrne, 2001; Ullman, 2001). Model  $\chi^2$  is indicative of goodness of fit of model-implied relationships with those observed in the actual data set; hence, a value indicating non-significant differences is desired. The GFI indicates the percentage of match between model-implied relationships and those observed in the actual data set. The AGFI corrects the GFI by accounting for instances where unexpected statistically significant relationships over and above those implied by the model are observed in the actual data. RMSEA provides a measure of average lack of model to data fit when these additional over-and-above relationships are taken into account. Standardized residual values provide further evidence of fit, with values greater than 2.58 indicating a lack of fit (Byrne, 2001). They are analogous to z-scores representing the number of standard deviations observed residuals are from the zero residuals that would exist if model fit were perfect; observed residuals represent the discrepancy between model implied variable relationships and those observed in the sample data. In its more rigorous form, path analysis is concerned with the association or fit between the structures deemed significant in a model when compared with what is significant in the actual data (Hayduk,

1987). In other words, can what Figure 1 implies about QOL be generalized or applied beyond the 202 older adults participating in the earlier study?

Using SPSS 13.0, the 51 missing responses randomly scattered throughout cases and variables were replaced with converging predicted values through using maximum likelihood estimation (Schafer & Graham, 2002). This latter approach yielded a final sample size of 420, representing a loss of only 3% of cases ( $n = 12$ ) for the independent and dependent variables of interest in Figure 1. With the exception of negatively skewed QOL scores (usual in QOL research), the assumptions of multivariate analysis were met. Data were then analyzed using maximum likelihood estimation with AMOS 5.0, with fit criterion values for GFI, AGFI, and RMSEA being .90, .90, and less than .05, respectively (Ullman, 2001). The model shown in Figure 1 tested in our earlier QOL study among a random sample of 202 older adults met these criteria ( $\chi^2 = 7.501$ ,  $df = 6$ ,  $p = .277$ ; GFI = .99; AGFI = .94; RMSEA = .03).

### Findings

We retested the path model shown in Figure 1, using data from a new study of QOL reported here (correlation matrix shown in Table 2) measuring the same variables. As shown in Figure 2, all but one of the paths found to be significant in our earlier QOL study were replicated as significant. This less parsimonious model explained 50.5% of the variance in QOL; however, it did not reach acceptable fit ( $\chi^2 = 46.026$ ,  $df = 6$ ,  $p < .001$ ; GFI = .98; AGFI = .83; RMSEA = .13). This lack of fit was evidenced by the path from the physical environment to meaning in life not being replicated and new direct effects for ADL performance, emotional support, purpose in life, and the physical and home environment upon overall QOL. The large standardized residual or model-to-data

discrepancy between ADL performance and purpose in life (3.971) was significantly greater in value than in our previous study (1.204), providing further evidence of lack of fit; adding this path ( $\beta = .221$ ) to Figure 2 would reduce its  $\chi^2$  value to 13.234.

### Discussion

The pathways shown in Figure 1, each found to be significant in our previous study, were tested again in this model. Though the model as a whole did not fit the data well, the replicated pathways corroborate the prior works upon which this model was built. In particular, having enough money to meet one's needs, good health, and meaning in life bolstered overall QOL (Bowling et al., 2002; Farquhar, 1995; Richard et al., 2004). Good health also enhanced the capacity to keep achieving in life (Raphael et al., 1997). Physically close and intimate ties enhanced meaning and purpose in life; it may be that close contacts facilitate active engagement, or that the relationships are meaningful in and of themselves. This finding suggests a possible mechanism that further supports the beneficial effect of emotional support upon older adults' QOL (Kleinpell & Ferrans, 2002; Tang et al., 2004; Tseng & Wang, 2001). Healthy environments were also found to be those in which opportunities to achieve were abundant (Stuifbergen et al., 2000). The path from purpose to meaning in life also supports Fisher's (1995) and Richard et al.'s claim that pursuing meaningful and favorite activities enhanced QOL. Purposive goals and activities may also serve as a stimulus for reflection on the meaning of life (Antonovsky, 1987).

The replicated paths shown in Figure 2 have several implications. Older adults in good health and with adequate financial resources who perceive life to be meaningful may experience higher QOL. Providing seniors with information about health promotion

programs in the surrounding community may, then, sustain or further enhance their overall QOL. Doing so may also offer opportunities meaningfully to connect with peers. The beneficial effect of having enough money to meet one's needs also emphasizes the importance of assessing older adults' perceptions of their financial circumstances. In addition to being in good health, the surrounding physical environment was directly linked with having opportunities to continue to achieve in life. Older adults in better health may perceive themselves as being well enough to pursue activities and goals; positive health is, therefore, an enabling mechanism. Nurses can also collaborate with older adults to identify community centers offering meaningful activities. Also prudent would be to involve key support persons with whom the older adults feels a positive emotional connection in care planning as they are likely to be able to facilitate meaningful activities and encourage active engagement. Nurses play a key role in helping older adults realize these opportunities and, in turn, in enhancing their overall QOL.

### *Limitations*

There are several limitations to this study. Our study participants differ from the sample in the previous study; they were self-selected volunteers rather than randomly selected participants, and more women participated in this study. In this study, participants were relatively independent, healthy, well educated and lived in their own homes. Their characteristics suggest privileged life circumstances that may indeed foster meaning, purpose, and QOL in older age. They do not adequately represent the population, particularly frail elders living in institutional settings. Additionally, the nine items representing the independent variables of interest, in total, yielded a Cronbach's alpha of .795. Items selected for analysis were deliberately selected to replicate those of

our previous study in order directly and meaningfully to corroborate earlier significant model pathways. The items selected were congruent with conceptual definitions of emotional support and purpose, and they were specific to respondents' appraisals of, for example, their overall health and ADL performance. The limited pool of available items likely limits the validity of our findings and constitutes a major limitation of this study.

The differences in findings between the first study and this study suggest that factors influencing QOL may very well differ when group comparisons are made. The lack of fit Figure 1 as a whole had with a larger independent data set coupled with the less parsimonious model shown in Figure 2 serve as a case in point. What counts in relation to QOL may be weighted differently and may relate in idiosyncratic ways, manifesting empirically as disparities in the significance of paths in models (Bernheim, 1999; Cummins, 1996). Models may be, to some extent, sample-dependent and as others argue, QOL is affected in complex ways by a broad array of factors (Bowling et al., 2003; Pukrop, 2003). This model did not fit the data and a correct fitting model may look very different; it may or may not contain the significant paths found in this study. While there continues to be a call for greater use of theoretical frameworks to reign in on QOL (Bullinger, 2002; Mast, 1995), researchers adopt a variety of theoretical perspectives ranging from human development to social productivity likely to yield competing models differing in their complexity (Taillefer, Dupuis, Roberge, & LeMay, 2003).

The limitations of this study may direct future research. Collection of identical data from two samples would increase the pool of items for comparative analyses. Primary data collection would also allow the researcher to select instruments that more specifically measure variables of interest. For example, researchers might consider the

WHOQOL-SRPB, a 32-item scale developed and tested using data from 18 countries pertaining to spirituality, religion, and personal beliefs, and specifically measuring meaning and purpose in life, faith, hope, and spiritual strength (WHOQOL SRPB Group, 2006). Standardized residual value patterns reported from our earlier study and those in the present study point to a possible linkage between ADL and purpose. At present, there is evidence to support the direct effect of ADL performance upon QOL, and health upon purpose in life. In the successful aging literature, other research suggests physical independence enhances older adults' opportunities to engage in social, physical, and meaningful and productive activity (Bourque, Pushkar, Bonneville, & Beland, 2003; Menec, 2003; Rowe & Kahn, 1997). The relationship between ADL performance and purpose in life warrants further attention in QOL research and further research to develop and test models of QOL would help to enhance our understanding of ways to improve QOL of older adults.

Based on the findings shown in Figure 2, we recommend that nurse researchers further explore the links between purpose and meaning in life, and their mediating effects on perceived health, emotional support, and the surrounding physical environment. Older adults' appraisals of their financial circumstances may also play a key role in influencing their QOL and should be included in future models and research whenever possible. To strengthen the findings from cross-sectional research, nurses should consider validating QOL models, particularly when tested with a single sample of older adults, through replication studies and the use of a technique such as path analysis. Given the sample-dependent nature of models, differences can be expected to emerge between the findings arising from two independent data sets.



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Table 1.

*Sociodemographic Data (N = 420)*

Variable (Range)	<i>N</i>	<i>M (SD)</i>
<b>Gender</b>		
Female	309 (73.6%)	
Male	111 (26.4%)	
<b>Age (Range 60-99)</b>		
		74.36 (8.5)
60-70	142 (33.8%)	
71-80	171 (40.7%)	
81+	107 (25.5%)	
<b>Education</b>		
Primary school	15 (3.6%)	
High school	95 (22.5%)	
Post-secondary (technical, college, university)	309 (73.9%)	
<b>Marital status</b>		
Never married	19 (4.5%)	
Married/partnered	194 (46.2%)	
Widowed/separated/divorced	203 (48.3%)	
<b>Financial difficulties</b>		
None	242 (58.6%)	
Little/moderate	167 (39.7%)	
Very much/Extreme	7 (1.7%)	
<b>Number of chronic illnesses (Range 0-7)</b>		
		1.4 (1.0)
None	109 (25.8%)	
1-2	244 (58.2%)	
3-4	60 (14.3%)	
4+	7 (1.7%)	
<b>Health Status</b>		
Healthy	368 (89.1%)	
Unhealthy	45 (10.9%)	

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**Living arrangements**

Living in own home	394 (93.8%)
Relative's home/sheltered housing/community care	12 (2.8%)
Nursing home	14 (3.4%)

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**Living in own home**

Needing ADL support	125 (29.9%)
Not needing ADL support	269 (70.1%)

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**Experience limitations in ADLs**

None at all	191 (46.4%)
Little/moderate	196 (47.5%)
Very much/extreme	25 (6.1%)

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Table 2.

*Correlation Matrix of Variables (N = 420)*

Variable	1	2	3	4	5	6	7	8
1. Home environment	1.000							
2. Emotional support	.203**	1.000						
3. Health	.302**	.344**	1.000					
4. Finances	.356**	.224**	.203**	1.000				
5. Physical Environment	.454**	.253**	.324**	.155*	1.000			
6. ADL performance	.279**	.285**	.648**	.228**	.259**	1.000		
7. Purpose in life	.262**	.288**	.445**	.210**	.315**	.507**	1.000	
8. Meaning in life	.190**	.353**	.318**	.164*	.236**	.323**	.406**	1.000
9. Quality of life	.546**	.399**	.469**	.375**	.435**	.467**	.448**	.368**

Note. \*  $p < .05$ . \*\*  $p < .01$ .

Figure 1

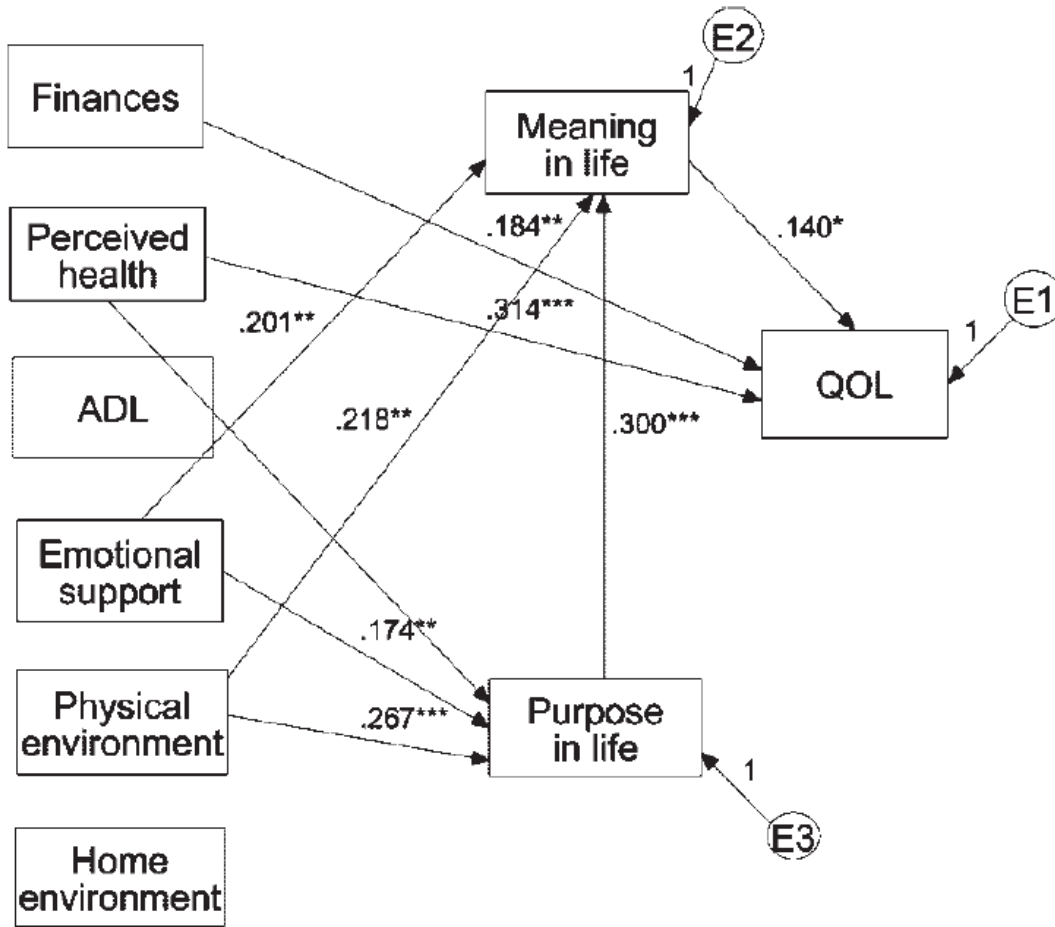


Figure 2

