Quality of Life and Loneliness in Stroke Survivors Living in Appalachia

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Abstract

Background and Purpose—Negative outcomes of stroke are associated with poorer quality of life (QoL) and impact stroke recovery. The purpose of this study was to characterize QoL and loneliness in a sample of rural Appalachian stroke survivors within 1 year of stroke.

Methods—Using mail survey methodology, survey data were collected from 121 ischemic and hemorrhagic stroke survivors living in West Virginia using 13 subscales from the Neuro-QOL survey and the three-item UCLA Loneliness Scale. Statistical Package for Social Sciences v. 20 was used to conduct descriptive, comparative, and predictive analyses. Multiple linear regression models were used to assess explanatory value of loneliness for QoL domains while controlling for comorbidities. Results: Participants who were discharged to a nursing home had poorer QoL when compared with those who were discharged to home. Stroke survivors who continued to smoke were less satisfied with social roles and reported higher mean loneliness and depression scores. History of psychological problems negatively correlated with all QoL domains and loneliness scores. Loneliness predicted poorer QoL even when controlling for age, gender, and significant comorbidities.

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Conclusion—Nurses need to assess for loneliness, include loneliness in care planning, and implement smoking cessation and cognitive behavioral interventions. Interventions that target loneliness for stroke survivors could potentially diminish psychological sequelae after stroke and enhance QoL.

Keywords

health care in Appalachia; loneliness; Neuro-QOL; quality of life; stroke

Stroke is the leading cause of serious long-term adult disability (Roger et al., 2012) in the United States, the leading cause of death in the United States (Kochanek, Xu, Murphy, Minino, & Kung, 2011), and the fourth leading cause of death in West Virginia (WV; Kenneth et al., 2009). With improvements in healthcare, more people survive stroke and then have to cope with the negative physical, psychological, social, and functional sequelae (Opara & Jaracz, 2010). Negative outcomes after stroke vary widely depending on stroke etiology, region of the brain affected, and the severity or extent of the infarct.

Stroke, QoL, and Loneliness

Health-related QoL (HRQoL) and loneliness are understudied in stroke survivors. A literature search of Pubmed, Cinahl, Academic Search complete, PsycArticles, and PsycInfo using search terms of "loneliness," "quality of life" (QoL), and "stroke," only 12 studies resulted. One was a duplicate, and two were studies of caregivers, not stroke survivors. Wyller, Holmen, Laake, and Laake (1998) reported that stroke and loneliness negatively influence subjective well-being but that the relationships between loneliness and QoL in stroke survivors are not well explored.

The HRQoL is a multidimensional measure that includes physical, social, and emotional health (Nichols-Larsen, Clark, Zeringue, Greenspan, & Blanton, 2005). Stroke recovery is seldom complete, and new impairments after stroke can be associated with poor QoL. Severe physical disability, dependency in activities of daily living, depression, cognitive impairment, and speech disturbance have all been associated with poor QoL after stroke (Kim et al., 2005). When studying disablement, functional limitations were associated with higher levels of loneliness in samples of U.S. older adults (Warner & Kelley-Moore, 2012). Historically, studies of stroke have focused on physical function, likely because physical function has been reported as the main determinant of QoL in samples of stroke survivors (Funaydin, Karatepe, Kaya, & Ulutas, 2011). The care needs of stroke survivors have been determined by poststroke functional health status and predisposing variables such as living arrangements and social situation. However, recently, it has been reported that nearly half of stroke survivors experienced significant negative psychological outcomes associated with stroke such as depression and that social support mediated both QoL and functional ability (Huang et al., 2010). In a Danish and Netherlands cohort, stroke survivors who experienced depression were less likely to regain their baseline QoL when compared with those who did not experience depression (De Weerd, Rutgers, Groenier, & van der Meer, 2011; Muus, Petzold, & Ringsbert, 2010).

Broadening our nursing knowledge to include studies of the negative psychological outcomes of stroke, such as anxiety(De Weerd et al., 2011), depression (De Weerd et al., 2011; Huang et al., 2010), and loneliness (Hilari et al., 2010), and enhancing our understanding of how they relate to QoL could lead to new nursing interventions that target the emotional health needs of the stroke survivor. Few studies have focused on loneliness as a specific negative psychological outcome of stroke. However, loneliness is known in the literature to be a major influence on QoL for chronically ill rural adults (Ekwall, Sivberg, & Hallberg, 2005; Liu & Guo, 2007; Theeke, Goins, Moore, & Campbell, 2012). In addition, recent studies indicate that loneliness is predictive of functional decline and mortality in older adults (Perissinotto, Stijacic Cenzer, & Covinsky, 2012), the most likely population to experience stroke. Hilari and colleagues reported that loneliness contributed to psychological distress in a sample of 87 stroke survivors with aphasia. Because loneliness is linked to a physiological stress response that contributes to hypertension (Hawkley, Masi, Berry, & Cacioppo, 2006; Momtaz et al., 2012), addressing loneliness in stroke survivors could potentially lead to improved cardiovascular and cerebrovascular health outcomes as well (Thomas & Greenop, 2008).

Stroke and Rural Appalachia

Appalachians are a unique rural population that experiences many of the negative social and behavioral determinants of health such as poverty, rurality, low education, and lack of access to care; all of which are challenges to rehabilitation after stroke and may influence poststroke QoL. WV ranks fourth in the nation for prevalence rate of stroke hospitalizations (32.1 per 10,000, respectively) and is the only state that sits entirely in the Appalachian region (Commission, 2012). Sixty-seven percent of WV residents live in rural areas with limited access to resources to aide in health recovery and rehabilitation (Griffith, Lovett, Pyle, & Miller, 2011). Improving negative outcomes of stroke in rural areas is challenging because of a lack of healthcare resources. Residents of WV report higher prevalence of tobacco use, sedentary lifestyle, and high-caloric or high-fat nutritional intake, all of which contribute to stroke risk (Office of Surveillance, 2011).

Furthermore, region-specific cultural values may play a role in poststroke care and influence QoL. Appalachian cultural perspectives such as fatalism or resiliency may influence poststroke outcome and QoL. Although these parameters contribute to poor QoL after stroke (Kim et al., 2005), there is a significant gap in the literature when seeking stroke outcome data for the Appalachian population with stroke. The primary purposes of this study were to characterize QoL and loneliness and to understand the explanatory value of loneliness for QoL in a sample of Appalachian adult stroke survivors. The study was guided by three research questions:

1. What are the self-reported sociodemographics, health behaviors, rehabilitation type, comorbidities, QoL domains, and loneliness scores in adult stroke survivors in Appalachia?

2. What are the relationships among sociodemographics, health behaviors, rehabilitation type, comorbidities, QoL domains, and loneliness scores in a sample of adult stroke survivors in Appalachia?

> 3. What is the predictive value of loneliness for QoL domains in stroke survivors in Appalachia?

Methods

Sampling

Convenience sampling was used to identify eligible stroke survivors discharged from a 531-bed academic hospital and a 393-bed teaching hospital in WV. Feasibility of the sampling plan was supported by a retrospective data review of 2010 stroke discharges at these facilities. Stroke survivors were screened for inclusion and exclusion criteria using a preexisting database of stroke—International Classification of Disease, Ninth Revision, diagnosis codes—at both sites resulting in 590 potential participants. Inclusion criteria were (a) aged 18 years; (2) able to speak English; (3) able to hear and answer questions, both on a paper survey and by use of a telephone; and (4) have a principal diagnosis of either ischemic or hemorrhagic stroke at discharge. Exclusion criterion was diagnosis of illness that would dominate poststroke care (e.g., terminal diagnosis, dialysis patient, and severe dementia/Alzheimer disease). Among the 590 potential participants, 26 (4.4%) could not be reached because of mailing address errors, and 11 (1.86%) were identified as deceased via return mailing, leaving 553 potential participants. Overall response rate was 21.9% with 121 participants returning the mailed self-administered survey.

The survey included sociodemographic information, 13 subscales from the QoL in Neurological Disorders (Neuro-QOL; Cella, 2010) survey, and the three-item UCLA Loneliness Scale (Hughes, Waite, Hawkley, & Caccioppo, 2004). A cover letter describing the purpose was mailed with the surveys along with a prepaid return envelope. Surveys were premarked with International Classification of Disease, Ninth Revision, diagnosis code of either ischemic or hemorrhagic stroke at discharge to allow for differentiation in the data analysis. The study was conducted in compliance with the requirements of the WV University Institutional Review Board.

Measures

Demographic Data—Age, gender, and race/ethnicity were determined by participant report. Subjects identified their marital status as married, separated/divorced, widowed, or never married. Educational level was assessed categorically as completion of grade school, middle school, high school, some college, associate's degree, bachelor's degree, master's degree, or doctoral degree. Living arrangement was assessed categorically as living alone, living with one or more other adults, assisted living facility, or nursing home. Employment status was assessed categorically as retired, unemployed, working part-time, or working full-time. County of residence was assessed by having the participant report the name of the county where they were currently living.

Health Behaviors, Rehabilitation, and Comorbid Conditions—Participants were asked if they were currently smoking, and alcohol use was reported as consumption days/week on average over the past 3-month period. Type of rehabilitation after initial hospital discharge was assessed categorically as nursing home, outpatient physical therapy, physical

therapy in the home, or none. Participants were asked to circle all that applied to their situation since their stroke.

For comorbid conditions, participants were asked to report no/yes if they had a diagnosis of any of the following chronic illnesses: high blood pressure; cancer other than skin cancer; lung disease; heart condition; emotional, nervous, or psychiatric problems; and arthritis.

Health-Related Neuro-QOL—The Neuro-QOL is a psychometrically sound and clinically relevant QoL measurement tool of self-reported domains that assess specific aspects of HRQoL in adults and children with neurological disorders. The Neuro-QOL instrument was developed through a collaborative, multisite research initiative sponsored by National Institute of Neurological Disorders and Stroke to construct a psychometrically sound and clinically relevant HRQoL measurement tools for individuals with neurological conditions. Neuro-QOL is composed of item banks and scales that evaluate symptoms, concerns, and issues that are relevant across disorders (generic measures) along with instruments that assess areas most relevant for specific patient populations (targeted). The Neuro-QOL instruments enable within-disease as well as cross-disease comparisons and are intended for use in both neurology clinical trials and clinical practice (Cella, 2010; Gershon et al., 2012).

Internal consistency and 1-week test–retest reliability of the short forms are high, with Cronbach's alphas ranging from .78 to .95 and internal consistency correlations ranging from .73 to .94. The validity of the Neuro-QOL measures for adults with stroke is supported with good internal consistency, test–retest reliability, and significant correlations with many external validity measures. All Neuro-QOL short forms except for applied cognition (executive function and general concerns) were responsive to self-reported change in conceptually related aspects of well-being (Cella, 2010; Gershon et al., 2012).

Thirteen (13) short forms of the Neuro-QOL domains were used in this study: ability to participate in social roles and activities (eight items), anxiety (eight items), applied cognition: executive function (eight items), applied cognition: general concerns (eight items), depression (eight items), emotional and behavioral dyscontrol (eight items), fatigue (eight items), lower extremity function: mobility (eight items), positive affect and well-being (nine items), satisfaction with social roles and activities (eight items), sleep disturbance (eight items), stigma (eight items), and upper extremity function (eight items). Participants answered items on a Likert scale with potential answers variant based on the domain assessed. The score for each short form is totaled with higher scores indicating more of the specific domain that is being assessed giving the eight-item scale a range of 8–40 and the nine-item scale a range of 9–45 (Cella, 2010; Gershon et al., 2012).

Loneliness—The three-item short scale UCLA Loneliness Scale (Cronbach's alpha = .72) for measuring loneliness in large surveys(Hughes et al., 2004) was used to assess loneliness. This scale significantly correlates with the Revised UCLA Loneliness Scale ($r = .82$, $p < .001$; Russell, Peplau, & Cutrona, 1980). The scale is composed of three questions—"How often do you feel that you lack companionship?", "How often do you feel left out?", and

"How often do you feel isolated from others?"—with potential answers being *hardly ever* (1), *some of the time* (2), and *often* (3). The sum of all of the items is the scale score.

Statistical Analysis

Data were analyzed using Statistical Package for Social Sciences version 20. To answer research question 1, baseline descriptive statistics were computed for the sociodemographics, health behaviors, rehabilitation after stroke, comorbidities, QoL domains, and loneliness scores.

To answer research question 2, correlations and chi-square testing were used to assess significant relationships between sociodemographics, health behaviors, rehabilitation type after stroke, comorbidities, QoL domains, and loneliness scores. *t* Test mean comparisons were conducted based on stroke type, health behavior of smoking, type of poststroke rehabilitation, level of education, living arrangements, and comorbidities to ascertain differences in HRQoL and loneliness. One-way ANOVA was conducted to assess differences in QoL and loneliness based on educational level. Because of small cell size, education was collapsed into high school or less, some college, or completion of a college degree, and the analysis of living arrangement only included those who live alone or live with other adults.

To answer research question 3, loneliness was assessed for significant relationship with each of the 13 domains of QoL, and all were significant based on correlations. Thus, multiple linear regressions were carried out for the continuous outcomes of the 13 sub-scales of the Neuro-QOL. Sociodemographics, health behaviors, and comorbidities that related significantly to any of the QoL domains (age: gender; smoking status; rehabilitation type; and diagnoses of cancer, lung disease, heart disease or emotional, nervous, or psychiatric problem) were entered as covariates in the regression models.

Results

Results for Research Question 1: Description of Sociodemographics, Health Behaviors, Rehabilitation After Stroke, Comorbidities, QoL Domains, and Loneliness Scores

Responders were primarily women (58%) with a discharge diagnosis of ischemic stroke (89, 74%). Fifty-one percent of the participants were married, 89% had finished high school or some college, 67% lived with other adults, 70% were retired, and 82% were non-smokers. Most participants were living with a chronic illness with 105 (87%) having a diagnosis of hypertension, 57% with heart disease, and 62% with arthritis. Nearly one quarter (22%) of the sample reported an emotional, psychological, or nervous problem. Sample characteristics are displayed in Table 1. The groups of hemorrhagic and ischemic stroke types did not differ based on study demographics. The psychometric properties of the Neuro-QOL and Loneliness scale based on the study sample are reported in Table 2.

Results for Research Question 2: Examination of Relationships Among Sociodemographics, Health Behaviors, Rehabilitation After Stroke, Comorbidities, QoL Domains, and Loneliness Scores

Mean Comparisons of HRQoL and Loneliness for Stroke Type—Ischemic stroke survivors reported higher ability to participate in social roles and activities, less anxiety, higher applied cognition (general concerns), and less sleep disturbance when compared with hemorrhagic stroke survivors (Table 3). Perhaps, the most significant finding in this study is that both ischemic and hemorrhagic stroke survivors had relatively low scores for ability to participate in social roles, applied cognition, lower extremity function, positive affect and well-being, and upper extremity function, with upper extremity function being the highest mean for the hemorrhagic stroke group ($M = 65.64$, $SD = 7.18$). When considering that the possible range of scores on the subscales is 8–40 (40 indicating more of the specific area of QoL), the mean scores displayed in Table 3 illustrate that, regardless of stroke type, stroke survivors in Appalachia are not ranking themselves as having high QoL. In addition, these study participants had relatively high means on anxiety, depression, fatigue, sleep disturbance, and stigma, and both hemorrhagic and ischemic stroke survivors had mean scores on the loneliness scale indicating that loneliness is a problem for stroke survivors in Appalachia.

Mean Comparisons of HRQoL and Loneliness Based on the Type of Poststroke Rehabilitation—The QoL based on type of rehabilitation after stroke was significantly different when comparing those who had no rehabilitation, those who were discharged to a nursing home, and those who were able to go home to outpatient rehabilitation. Stroke survivors who went to the nursing home had a mean of 5.99 on the loneliness scale indicating that loneliness is a significant problem for this group. Participants who went to a nursing home or from a nursing home to an outpatient rehabilitation services reported higher depression scores, higher perception of stigma, lower positive affect and well-being, much lower satisfaction with social roles and activities, and higher loneliness scores than those who were able to go home and have either outpatient therapy, in-home therapy, or a combination of both (Table 4). It is possible that those who were discharged to a nursing home had more severe stroke because they also had lower mean scores for upper and lower extremity function, which may be a reflection of severity of stroke.

Mean Comparisons of HRQoL and Loneliness Based on Educational Level and Living Arrangement—Participants with some college had the highest report on ability to participate in social roles and activities ($F = 3.127$, $p = .047$) and Applied Cognition-General Concerns scale ($F = 5.094$, $p = .008$). Participants with some college also reported higher scores on the Emotional and Behavioral Dyscontrol scale ($F = 3.74$, $p =.027$). Participants with high school or less reported more fatigue ($F = 3.573$, $p = .031$) and more sleep disturbance ($F = 3.15$, $p = .046$) when compared with those who had some college or an earned college degree. There were no significant differences for the means on the Neuro-QOL subscales or the UCLA Three-Item Loneliness Scale for those who lived alone compared with those who lived with others.

HRQoL, Loneliness, and Smoking Status for Stroke Survivors—Current stroke survivors who smoke self-reported less satisfaction with social roles and activities and were more depressed (Table 5). Although the findings were not statistically significant, it may be clinically significant that current smokers had lower means on applied cognition for executive function and general concerns, positive affect and well-being, and upper and lower extremity function. Furthermore, current smokers had higher scores on anxiety, depression, fatigue, stigma, and loneliness indicating that they may be more likely to experience psychological sequelae after stroke.

Mean Comparisons for HRQoL and Loneliness Based on Comorbid Physical Illness—Stroke survivors with hypertension ($N = 98$) did not differ from survivors without hypertension on the Neuro-QOL subscales or UCLA Three-Item Loneliness Scale. Participants who experienced arthritis ($N = 66$) reported higher scores for emotional and behavioral dyscontrol ($t = 2.08$, $p = .04$). Participants who also reported a diagnosis of heart disease ($N = 62$) had higher depression scores ($t = 9.95$, $p = .002$) and more experience of stigma ($t = 2.10$, $p = .037$). Stroke survivors who also had a diagnosis of cancer (excluding skin cancer, $N = 19$) reported lower scores on the Lower Extremity Function (Mobility) scale ($t = 2.035$, $p = .044$) and the Upper Extremity Function (Fine Motor, ADL) scale ($t = 3.08$, $p = .003$). Study participants who had lung disease ($N = 16$) reported higher depression scores ($t = 3.02$, $p = .003$), higher fatigue scores ($t = 2.49$, $p = .014$), poorer lower extremity function ($t = 2.61$, $p = .010$), less satisfaction with social roles ($t = 2.80$, $p = .006$), more sleep disturbance ($t = 2.20$, $p = .030$), and poorer upper extremity function ($t = 2.48$, $p = .015$).

Mean Comparisons for QOL and Loneliness Based on Comorbid Psychological, Emotional, Psychological, or Nervous Problem—Twenty-two percent (22%) of the stroke survivors in this study self-reported a current emotional, nervous, or psychiatric problem ($N = 27$), and this group differed on every domain of the Neuro-QOL and UCLA Three-Item Loneliness scores. First, they reported more depression ($t = 6.69$, $p < .001$), more emotional and behavioral dyscontrol ($t = 4.17$, $p < .001$), lower scores on positive affect and well-being ($t = 3.15$, $p = .002$), more experience of stigma ($t = 4.59$, $p < .001$), more anxiety ($t = 6.24$, $p < .001$), and higher loneliness scores ($t = 5.2$, $p < .001$). They also reported lower scores for ability to participate in social roles and activities ($t = 3.83$, $p < .001$), less satisfaction with social roles and activities ($t = 4.10$, $p < .001$), poorer scores on applied cognition (executive function; $t = 3.09$, $p = .003$), poorer scores on applied cognition (general function; $t = 3.22$, $p = .002$), more fatigue ($t = 4.39$, $p < .001$), less lower extremity function ($t = 3.07$, $p = .003$), less upper extremity function ($t = 3.01$, $p = .003$), and more sleep disturbance ($t = 3.95$, $p < .001$).

Results for Research Question 3: Loneliness as a Predictor of QoL in Stroke Survivors

Loneliness was a significant correlate of poorer QoL as measured by the Neuro-QoL on every subscale (Table 6). Multiple linear regression analyses revealed that loneliness significantly predicted poorer QoL for stroke survivors. Even when controlling for age; gender; smoking status; rehabilitation type; and diagnoses of cancer, lung disease, heart disease, and nervous or psychiatric problem, loneliness explained a significant proportion of

the variance in all 13 subscales of the Neuro-QOL. Regression analyses are reported in Tables 7 and 8 for 10 of the Neuro-QOL subscales. Loneliness did predict upper extremity function ($\beta = -1.41$, $t(113) = 3.54$, $p < .01$.) and lower extremity function ($\beta = -1.72$, $t(113) = 3.8$, $p < .01$) in the regression analyses. However, these two QoL subscales are not included in the table because stroke severity can significantly affect extremity function and a measure of severity was not available in the data collection. Satisfaction with social roles is not included in the table because it is highly negatively correlated with ability to perform social roles, but loneliness did predict satisfaction with social roles as well ($\beta = -2.72$, $t(113) = 5.88$, $p < .01$). Age was also explanatory of sleep disturbance in this sample as seen in Table 8.

Discussion

This study had four main findings based on the research questions, and the Discussion section is organized to compare and contrast these findings with current literature so that logical inferences can be made for future research and practice with stroke survivors.

The first main finding of the study is that stroke survivors who were discharged to a nursing home had more psychological sequelae such as depression, stigma, lower positive affect, and higher loneliness. This finding identifies those discharged to a nursing home as a high-risk group who may need additional psychological assessment, treatment planning, and behavioral health interventions. On the basis of these findings, it is important for nurses to carefully assess stroke survivors for these psychological problems and facilitate care coordination between the hospital and nursing home settings to affect long-term outcomes. Only one study of nursing home residents tested a cognitive intervention and reported enhanced cognition and improved social support when intervening for loneliness (Winningham & Pike, 2007).

The second main finding of the study related to smoking behavior after stroke. Stroke survivors who were still smoking after stroke reported less satisfaction with social roles and activities and higher depression scores. The WV residents, in general, reported higher prevalence of unhealthy behaviors such as tobacco use, sedentary lifestyle, and high-caloric or high-fat nutritional intake (Office of Surveillance, 2011). These factors contribute to stroke as a significant health disparity. Furthermore, in national samples of chronically ill older adults from Health and Retirement Study data, lonely older adults were more likely to engage in smoking behavior when compared with nonlonely adults (Theeke, 2010). This finding is clinically meaningful because continued smoking behavior may lead to a cascade of physiological reactions that could lead to a recurrent stroke, which happens in up to 25% of stroke survivors (Lawrence, Kerr, McVey, & Godwin, 2012).

The third and fourth findings indicate the significance of loneliness as a problem in stroke survivors. The third finding identified that diagnosis of a current emotional, nervous, or psychiatric problem correlated negatively with poorer QoL on every domain of the Neuro-QOL and with loneliness. These findings are consistent with prior reports of lower QoL (Haacke et al., 2006) in poststroke survivors with a history of depression and with studies of loneliness and QoL in older adult samples in WV (Theeke et al., 2012). Previous studies

investigating determinants of HRQOL after stroke suggest that social functioning may be more important than physical functioning in determining QoL (Hartman-Maier, Eliad, Nahaloni, Kelberman, & Katz, 2007). Finally, the fourth finding indicates that loneliness is a significant problem for stroke survivors in Appalachia. Loneliness predicted poorer QoL on every domain of the Neuro-QOL even when controlling for age; gender; and diagnoses of cancer, lung disease, heart disease, and nervous or psychiatric problem. These findings are significant because they are consistent with recent studies of national U.S. samples that report loneliness as predictive of poor QoL and functional decline. Because stroke survivors may experience prominent extremity functional problems, understanding the negative contribution of loneliness to functional ability is important (Perissinotto et al., 2012).

Clinical Implications

There are clinical implications derived from the findings, which included higher risk for loneliness when discharged to a nursing home, higher prevalence of smoking in lonely stroke survivors, and high overall prevalence of loneliness that contributed to poorer QoL in stroke survivors. Nurses could begin by comprehensively assessing patients with stroke for psychologsci constructs such as loneliness. Assessments could be accomplished either face to face or through the use of innovative mobile technologies or electronic health records. To assess for loneliness in the clinical setting, nurses could use the three-item loneliness scale (Hughes et al., 2004). In addition, incorporating the nursing diagnosis of loneliness (ElSadr, Noureddine, & Kelley, 2009) into care planning could affect negative outcomes associated with loneliness. Because lonely stroke survivors continued with poor health behaviors such as smoking, loneliness is a clinically significant priority in this group. Hence, nursing interventions aimed at smoking cessation will improve outcomes because smoking is a major risk factor for second stroke (Lawrence et al., 2012).

Nurses could consider developing expertise with cognitive behavioral type of interventions, which have shown effectiveness for loneliness (Masi, Chen, Hawkley, & Cacioppo, 2011). Recent interventions that focused on the individual's perception of self and using cognitive restructuring techniques were beneficial. Given the recent links between loneliness, physical decline (Perissinotto et al., 2012), social isolation, cognitive decline (Shankar, Hamer, McMunn, & Steptoe, 2013), and mortality (Luo, Hawkley, Waite, & Cacioppo, 2012), innovative development of practice-based interventions by nurses would contribute significantly to improved QoL and, potentially, prevention of second strokes. The types of interventions could include problem-solving therapy, story theory-based interventions (Theeke, 2011), principles of reminiscence (Lawrence et al., 2012; Nicholson & Shellman, 2013), or group cognitive behavioral therapy (Winningham & Pike, 2007).

Limitations

Most of the sample was survivors of ischemic stroke (74%), which means that our findings may be more representative of neurological QoL after ischemic stroke, rather than hemorrhagic stroke. The research team did not have access to a uniform measure of stroke severity and, therefore, could not control for this specific relationship. All measures were self-reported except stroke type so these variables carry with them the limitations inherent in

self-reported data. In addition, it is possible that participants were experiencing other prevalent life circumstances that are not reflected in the survey questions. Finally, these findings are based on data from a sample that was drawn from a relatively small population of stroke survivors from rural areas of Appalachia. Therefore, these findings may represent HRQoL and loneliness in the Appalachian population with stroke and not the broader national population.

Summary

The findings from this study characterize QoL and loneliness in a sample of stroke survivors within 1 year of stroke. Use of the recently developed Neuro-QOL and three-item Loneliness Scale brings new reliable and valid measures to a sample of stroke survivors living in Appalachia for whom medical services are underdeveloped. The descriptive and predictive analysis used survey data from 121 ischemic and hemorrhagic stroke survivors. Participants who were discharged to home reported a better QoL when compared with those who were discharged to a nursing home. Stroke survivors who continued to smoke were less satisfied with social roles and reported higher mean loneliness and depression scores. History of psychological problems negatively correlated with loneliness and all QoL domains. Loneliness predicted poorer QoL even when controlling for age, gender, and significant comorbidities. To address the findings of this study, nurses need to assess for loneliness, include loneliness in care planning, and implement smoking cessation and cognitive behavioral interventions. The knowledge gained in this study is a critical step forward in understanding how psychological concepts relate to QoL, health behaviors, and functional ability for stroke survivors.

References

Cella, D. Neuro-QOL, measuring quality of life in neurological disorders: Final report of the neuro-QOL study. Vol. 1. Evanston, IL: National Institute of Neurological Disorders and Stroke (NINDS); 2010. p. 28

Commission, AR. The Appalachian region. 2012. Retrieved from http://www.arc.gov/appalachian_region/TheAppalachianRegion.asp

De Weerd L, Rutgers WAF, Groenier KH, van der Meer K. Perceived well being of patients one year post stroke in general practice–Recommendations for quality aftercare. BMC Neurology. 2011; 1110.1186/1471-2377-11-42

Ekwall AK, Sivberg B, Hallberg IR. Loneliness as a predictor of quality of life among older caregivers. Journal of Advanced Nursing. 2005; 49(1):23–32. [PubMed: 15610378]

ElSadr CB, Noureddine S, Kelley J. Concept analysis of loneliness with implications for nursing diagnosis. International Journal of Nursing Terminology Classifications. 2009; 20(1):25–33. doi:IJNT1110[pii]10.1111/j.1744-618X.2008.01110.x.

Funaydin R, Karatepe AC, Kaya T, Ulutas O. Determinants of quality of life (QoL) in elderly stroke patients: A short-term follow-up study. Archives of Gerontology and Geriatrics. 2011; 53:4.

Gershon RC, Lai JS, Bode R, Choi S, Moy C, Bleck T, et al. Cella D. Neuro-QOL: quality of life item banks for adults with neurological disorders: item development and calibrations based upon clinical and general population testing. Quality of Life Research: An International Journal of Quality of Life Aspects of Treatment, Care and Rehabilitation. 2012; 21(3):475–486.10.1007/s11136-011-9958-8

Griffith BN, Lovett GD, Pyle DN, Miller WC. Self-rated health in rural Appalachia: health perceptions are incongruent with health status and health behaviors. BioMed Center Public Health. 2011; 11(229)10.1186/1471-2458-11-229

Haacke C, Althaus A, Spottke A, Siebert U, Back T, Dodel R. Long-term outcome after stroke: Evaluating health-related quality of life using utility measurements. Stroke. 2006; 37:193–198. [PubMed: 16339458]

Hartman-Maier A, Eliad Y, Nahaloni I, Kelberman H, Katz N. Evaluation of a long-term community based rehabilitation program for adult stroke survivors. Neuro Rehabilitation. 2007; 22(4):6.

Hawkley LC, Masi CM, Berry JD, Cacioppo JT. Loneliness is a unique predictor of age-related differences in systolic blood pressure. Psychology and Aging. 2006; 21(1):152–164. doi: 2006-03906-015[pii]10.1037/0882-7974.21.1.152. [PubMed: 16594800]

Hilari K, Northcott S, Roy P, Marshall J, Wiggins RD, Chataway J, Amees D. Psychological distress after stroke and aphasia: The first six months. Clinical Rehabilitation. 2010; 24:9.

Huang CY, Hsu MC, Hsu SP, Cheng PC, Lin SF, Chuang CH. Mediating roles of social support on post stroke depression and quality of life in patients with ischemic stroke. Journal of Clinical Nursing. 2010; 19:10.

Hughes ME, Waite LJ, Hawkley LC, Cacioppo JT. A short scale for measuring loneliness in large surveys—Results from two population-based studies. Research on Aging. 2004; 26(6):655–672.10.1177/0164027504268574 [PubMed: 18504506]

Kenneth, D.; Kochanek, MA.; Jiaquan, X.; Murphey, S.; Minino, A.; Kung, H. National vital statistics report. Vol. 60. Hyattsville, MD: U.S. Department of Health and Human Services; 2009.

Kim JS, Choi-Kwon S, Kwon SU, Lee HJ, Park K, Seo YS. Factors affecting the quality of life after ischemic stroke: Young versus old patients. Journal of Clinical Neurology. 2005; 1:9.

Kochanek, KD.; Xu, JQ.; Murphy, SL.; Minino, AM.; Kung, HC. Deaths: Final data for 2009 National vital statistics reports. Hyattsville, MD: National Center for Health Statistics; 2011.

Lawrence M, Kerr S, McVey C, Godwin J. The effectiveness of secondary prevention lifestyle interventions designed to change lifestyle behavior following stroke: Summary of a systematic review [research support, non-U.S. Gov't]. International Journal of Stroke: Official Journal of the International Stroke Society. 2012; 7(3):243–247.10.1111/j.1747-4949.2012.00771.x [PubMed: 22405279]

Liu LJ, Guo Q. Loneliness and health-related quality of life for the empty nest elderly in the rural area of a mountainous county in China [comparative study]. Quality of Life Research: An International Journal of Quality of Life Aspects of Treatment, Care and Rehabilitation. 2007; 16(8):1275–1280.10.1007/s11136-007-9250-0

Luo Y, Hawkley LC, Waite LJ, Cacioppo JT. Loneliness, health, and mortality in old age: A national longitudinal study [research support, NIH, extramural]. Social Science and Medicine. 2012; 74(6): 907–914.10.1016/j.socscimed.2011.11.028 [PubMed: 22326307]

Masi CM, Chen HY, Hawkley LC, Cacioppo JT. A meta-analysis of interventions to reduce loneliness [meta-analysis, research support, NIH, extramural review]. Personality and Social Psychology Review: An Official Journal of the Society for Personality and Social Psychology, Inc. 2011; 15(3):219–266.10.1177/1088868310377394

Momtaz YA, Hamid TA, Yusoff S, Ibrahim R, Chai ST, Yahaya N, Abdullah SS. Loneliness as a risk factor for hypertension in later life [research support, U.S. Gov't, non-PHS]. Journal of Aging and Health. 2012; 24(4):696–710.10.1177/0898264311431305 [PubMed: 22422758]

Muus I, Petzold M, Ringsbert KD. Health-related quality of life among Danish patients 3 and 12 months after TIA or mild stroke. Scandinavian Journal of the Caring Sciences. 2010; 24:7.

Nichols-Larsen DS, Clark PC, Zeringue A, Greenspan A, Blanton S. Factors influencing stroke survivors' quality of life during subacute recovery. Stroke. 2005; 36:4.

Nicholson N, Shellman J. Decreasing social isolation in older adults. Research in Gerontological Nursing. 2013; 6(2):11. [PubMed: 23244565]

Office of Surveillance and Laboratory Services. Prevalence and trends data. 2011. Retrieved from http://apps.nccd.cdc.gov/brfss/

Opara JA, Jaracz K. Quality of life of post-stroke patients and their caregivers. Journal of Medicine and Life. 2010; 3:6.

Perissinotto CM, Stijacic Cenzer I, Covinsky KE. Loneliness in older persons: A predictor of functional decline and death loneliness in older persons. Archives of Internal Medicine. 2012; 172:1078–1083.10.1001/archinternmed.2012.1993 [PubMed: 22710744]

Roger VL, Go AS, Lloyd-Jones DM, Benjamin EJ, Berry JD, Borden WB, et al. Turner MB. Heart disease and stroke statistics—2012 update: A report from the American Heart Association [comparative study]. Circulation. 2012; 125(1):e2–e220.10.1161/CIR.0b013e31823ac046 [PubMed: 22179539]

Russell D, Peplau LA, Cutrona CE. The revised UCLA Loneliness Scale: Concurrent and discriminant validity evidence. Journal of Personality and Social Psychology. 1980; 39(3):472–480. [PubMed: 7431205]

Shankar A, Hamer M, McMunn A, Steptoe A. Social isolation and loneliness: Relationships with cognitive function during 4 years of follow-up in the english longitudinal study of ageing. Psychosomatic Medicine. 2013; 75(2):161–170.10.1097/PSY.0b013e31827f09cd [PubMed: 23362501]

Theeke LA. Sociodemographic and health-related risks for loneliness and outcome differences by loneliness status in a sample of U.S. older adults. Research in Gerontological Nursing. 2010; 3(2): 113–125.10.3928/19404921-20091103-99 [PubMed: 20415360]

Theeke, LA. Story-sharing to diminish loneliness and its sequelae in chronically ill adults; Paper presented at the comparative Effectiveness and Patient-Centered Outcomes Research, Intersection of Nursing Science and Health Care Delivery; Washington, DC. 2011.

Theeke LA, Goins RT, Moore J, Campbell H. Loneliness, depression, social support, and quality of life in older chronically ill Appalachians. Journal of Psychology. 2012; 146(1–2):155–171. [PubMed: 22303618]

Thomas M, Greenop K. Caregiver experiences and perceptions of stroke. Health sa Gesondheid. 2008; 13(1):10.

Warner DF, Kelley-Moore J. The social context of disablement among older adults: Does marital quality matter for loneliness? [research support, non-U.S. Gov't research support, U.S. Gov't, PHS]. Journal of Health and Social Behavior. 2012; 53(1):50–66.10.1177/0022146512439540 [PubMed: 22382720]

Winningham RG, Pike NL. A cognitive intervention to enhance institutionalized older adults' social support networks and decrease loneliness. Aging and Mental Health. 2007; 11(6):716–721.10.1080/13607860701366228 [PubMed: 18074259]

Wyller TB, Holmen J, Laake P, Laake K. Correlates of subjective well-being in stroke patients. Stroke: A Journal of Cerebral Circulation. 1998; 29(2):363–367. [PubMed: 9472875]

> Residents in rural Appalachia experience many negative social and behavioral determinants of health that may pose significant challenges to poststroke rehabilitation and quality of life.

Table 1

Sample Characteristics (N = 121, Mean Age = 67.18 [SD = 13.77])

Variable	Category	n (%)
Stroke type	Ischemic	89 (74)
	Hemorrhagic	32 (26)
Gender	Female	51 (58)
	Male	70 (42)
Marital status	Married	65 (51)
	Separated/divorced	24 (20)
	Widowed	26 (22)
	Never married	9 (7)
Education	Grade school	4 (3)
	Middle school	6 (5)
	High school	59 (49)
	Some college	30 (25)
	Associate's degree	4 (3)
	Bachelor's degree	6 (5)
	Master's degree	8 (7)
	Doctoral degree	4 (3)
Living situation	Lives alone	33 (27)
	Lives with one or more adults	81 (67)
	Assisted living facility	2 (2)
	Nursing home	2 (2)
	Unreported	3 (2)
Employment status	Retired	85 (70)
	Unemployed	14 (12)
	Part-time	9 (7)
	Full-time	13 (11)
Smoking status	Nonsmoker	99 (82)
	Current smoker	22 (18)
Alcohol consumption (days/week)	0	96 (79)
	1	8 (7)
	2	9 (7)
	3	3 (3)
	4 or more	5 (4)
Self-reported	Hypertension	105 (87)
Comorbid conditions	Cancer	19 (16)
	Lung disease	16 (13)
	Heart disease	69 (57)
	Nervous or psych	27 (22)
	Arthritis	75 (62)

Table 2

Psychometric Properties of Neuro-QOL Subscales Based on Study Sample ($N = 121$)

Instrument	Cronbach's Alpha	Mean	SD	Study Range	Scale Range
Ability to participate in social roles and activities (eight items)	.97	30.24	8.98	8–40	8–40
Anxiety (eight items)	.95	19.59	8.05	8–40	8–40
Applied cognition: executive function (eight items)	.95	30.53	9.23	8–40	8–40
Applied cognition: general concerns (eight items)	.97	26.90	9.65	8–40	8–40
Depression (eight items)	.96	16.38	7.91	8–40	8–40
Emotional and behavioral dyscontrol (eight items)	.96	18.08	7.84	8–40	8–40
Fatigue (eight items)	.96	21.96	8.30	8–40	8–40
Lower extremity function (eight items)	.95	32.19	8.31	8–40	8–40
Positive affect and well-being (nine items)	.96	29.43	7.96	9–45	9–45
Satisfaction with social roles and activities (eight items)	.95	27.09	9.37	8–40	8–40
Sleep disturbance (eight items)	.89	18.32	6.52	8–40	8–40
Stigma (eight items)	.93	12.32	6.2	8–40	8–40
Upper extremity function (eight items)	.96	35.72	7.59	8–40	8–40
UCLA Loneliness Scale (three items)	.88	4.69	1.96	3–9	3–9

Note. There was zero variance in two items on the Basic ADL Scale (toileting and eating) so they were removed from the scale analysis. QoL = quality of life.

Table 3

Mean Score Comparisons of Hemorrhagic and Ischemic Stroke Survivors on Neuro-QOL Subscales and Loneliness

Variable	Ischemic		Hemorrhagic		Significance	
	Mean	SD	Mean	SD	t	p
Ability to participate in social roles and activities	31.00	8.54	27.35	9.44	2.00	.047*
Anxiety	18.45	7.90	22.69	7.64	2.62	.010**
Applied cognition: executive function	31.29	9.31	27.72	8.33	7.91	.059
Applied cognition: general concerns	28.39	8.72	22.96	10.61	2.85	.005**
Depression	15.86	7.94	17.90	7.72	1.25	.212
Emotional and behavioral dyscontrol	17.62	7.56	18.71	7.78	0.69	.488
Fatigue	21.10	8.13	23.68	8.16	1.54	.127
Lower extremity function (mobility)	32.02	8.44	32.22	7.89	0.12	.906
Positive affect and well-being	33.34	8.39	33.38	8.46	.024	.981
Satisfaction with social roles and activities	27.61	8.78	25.99	10.01	.861	.391
Sleep disturbance	17.64	6.05	20.31	7.26	2.03	.045*
Stigma	12.07	5.74	13.29	6.97	.972	.333
Upper extremity function (fine motor, ADL)	35.54	7.64	35.64	7.18	.067	.947
UCLA Loneliness Scale (three items)	4.67	1.88	4.96	2.09	.717	.475

Note. Neuro-QoL = neurological quality of life.

*
 p < .05.

**
 p < .01.

Table 4

Mean Comparisons of Neuro-QOL Subscales and Loneliness for Stroke Survivors Based on Type of Poststroke Rehabilitation

Variable	Rehabilitation Type	Mean	SD	F	p
Ability to participate in social roles and activities	None	33.19	8.09	13.73	<.01 *
	Nursing home or nursing home and outpatient	22.75	9.12		
	Outpatient, in-home, or both	30.79	7.39		
UCLA Loneliness Scale (three items)	None	4.43	1.96	6.68	.002 *
	Nursing home or nursing home and outpatient	5.99	1.85		
	Outpatient, in-home, or both	4.45	1.75		
Depression	None	14.60	7.79	4.87	.009 *
	Nursing home or nursing home and outpatient	20.56	8.85		
	Outpatient, in-home, or both	16.05	6.91		
Positive affect and well-being	None	34.86	8.22	5.175	.007 *
	Nursing home or nursing home and outpatient	28.61	8.46		
	Outpatient, in-home, or both	34.22	7.87		
Satisfaction with social roles and activities	None	29.58	9.04	11.52	<.01 *
	Nursing home or nursing home and outpatient	19.86	7.61		
	Outpatient, in-home, or both	28.43	8.17		
Stigma	None	11.04	4.65	6.22	.003
	Nursing home or nursing home and outpatient	16.09	7.23		
	Outpatient, in-home, or both	11.89	6.18		
Upper extremity function (fine motor, ADL)	None	37.94	4.55	11.75	<.01
	Nursing home or nursing home and outpatient	29.65	10.03		
	Outpatient, in-home, or both	35.57	7.02		
Lower extremity function (mobility)	None	35.44	6.13	22.15	<.01
	Nursing home or nursing home and outpatient	23.72	8.93		
	Outpatient, in-home, or both	32.90	7.07		

Note. Neuro-QoL = neurological quality of life.

*
$p < .05$.

Table 5

Mean Comparisons of Neuro-QoL Domains and Loneliness for Stroke Survivors Based on Current Smoking Behavior

Variable	Smoking Status	Mean	SD	t	p
Ability to participate in social roles and activities	Nonsmoker	30.57	8.93	1.282	.202
	Smoker	27.35	8.12		
Anxiety	Nonsmoker	19.00	7.61	1.49	.138
	Smoker	21.77	8.84		
Applied cognition: executive function	Nonsmoker	30.83	9.04	1.202	.232
	Smoker	28.25	9.14		
Applied cognition: general concerns	Nonsmoker	27.44	9.07	1.09	.276
	Smoker	24.99	10.96		
Depression	Nonsmoker	15.55	7.64	2.18	.031 *
	Smoker	19.51	7.88		
Emotional and behavioral dyscontrol	Nonsmoker	17.50	7.37	1.04	.298
	Smoker	19.35	7.98		
Fatigue	Nonsmoker	21.11	7.69	1.75	.082
	Smoker	24.42	9.22		
Lower extremity function (mobility)	Nonsmoker	32.11	8.18	0.357	.722
	Smoker	31.41	9.04		
Positive affect and well-being	Nonsmoker	34.08	7.98	1.86	.065
	Smoker	30.50	8.81		
Satisfaction with social roles and activities	Nonsmoker	28.03	8.62	2.04	.044 *
	Smoker	23.76	9.85		
Sleep disturbance	Nonsmoker	17.90	6.11	1.34	.182
	Smoker	18.89	6.96		
Stigma	Nonsmoker	12.08	5.94	0.936	.351
	Smoker	13.39	5.91		
Upper extremity function (fine motor, ADL)	Nonsmoker	35.72	7.39	0.797	.427
	Smoker	34.29	8.29		
UCLA Loneliness Scale (three items)	Nonsmoker	4.62	1.86	1.42	.159
	Smoker	5.26	2.03		

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Note. Neuro-QoL = neurological quality of life.

*
p < .05.

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Table 6

Correlations Between Age, Loneliness, and the Neuro-QoL Subscales Correlation Coefficients for Age, Loneliness, and Quality of Life in Stroke Survivors in Appalachia

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Age	1														
2. Loneliness (three-item UCLA Scale)	−.169	1													
3. Ability to participate in social roles and activities	−.006	−.447*	1												
4. Anxiety	−.221	.554*	−.586*	1											
5. Applied cognition–executive function	−.075	−.371*	.711*	−.501*	1										
6. Applied cognition–general function	−.058	−.478*	.624*	−.716*	.689*	1									
7. Depression	−.141	−.651*	−.645*	.820*	−.560*	−.702*	1								
8. Emotional and behavioral dyscontrol	−.185	.536*	−.520*	.779*	−.449*	−.698*	.748*	1							
9. Fatigue	−.121	.466*	−.554*	.710*	−.436*	−.657*	.728*	.703*	1						
10. Lower extremity function (mobility)	−.133	−.383*	.728*	−.508*	.588*	.500*	−.503*	−.465*	−.519*	1					
11. Positive affect and well-being	.146	−.534*	.651*	−.609*	.494*	.550*	−.709*	−.582*	−.589*	.444*	1				
12. Satisfaction with social roles and activities	.098	−.544*	.753*	−.678*	.526*	.682*	−.754*	−.639*	−.714*	.634*	.742*	1			
13. Sleep disturbance	−.224	.515*	−.489*	.692*	−.414*	−.632*	.708*	.619*	.714*	−.483*	−.433*	−.644*	1		
14. Stigma	−.171	.671*	−.479*	.582*	−.334*	−.491*	.092*	.555*	.528*	−.535*	−.465*	−.630*	.649*	1	
15. Upper extremity function (fine motor, ADL)	−.154	−.339*	.583*	−.418*	.563*	.404*	−.541*	−.384*	−.364*	.829*	.319*	.490*	−.428*	−.514*	1

*
Correlation is significant at the .01 level (two-tailed).

Table 7

Loneliness as a Predictor for Ability to Participate in Social Roles, Anxiety, Applied Cognition Executive Function, Applied Cognition General Concerns, and Depression in Stroke Survivors in Appalachia

Predictor Variables	Ability to Participate in Social Roles			Anxiety			Applied Cognition Executive Function			Applied Cognition General Concerns			Depression		
	β	CI	Sig	β	CI	Sig	β	CI	Sig	β	CI	Sig	β	CI	Sig
Loneliness	−1.98	−2.92, 1.04	<.01	1.72	0.97, 2.47	<.01	−1.75	−2.79, 0.70	<.01	−2.42	−3.52, 1.31	<.01	2.10	1.46, 2.74	<.01
Age	−0.07	−0.22, 0.06	.29	−0.07	−0.18, 0.04	.23	−0.14	−.030, 0.01	.07	0.02	−0.19, 0.14	.79	−0.03	−0.12, 0.07	.58
Female gender	1.43	−1.95, 4.82	.40	−0.38	−3.09, 2.31	.78	−0.07	−3.84, 3.70	.97	0.94	−3.05, 4.92	.64	−1.35	−3.66, 0.96	.25
Cancer	−0.66	−5.19, 3.88	.77	−0.71	−4.33, 2.90	.69	−2.19	−7.24, 2.85	.39	−2.79	−8.13, 2.54	.30	0.79	−2.30, 3.88	.61
Lung disease	−1.30	−6.34, 3.77	.61	2.19	−1.83, 6.23	.28	−1.55	−7.16, 4.07	.58	−1.26	−7.20, 4.68	.68	3.06	−0.38, 6.50	.08
Heart disease	0.72	−2.98, 4.43	.69	−0.63	−3.59, 2.33	.67	2.69	−1.43, 6.82	.19	1.19	−3.18, 5.55	.59	1.11	−1.42, 3.64	.39
Psychiatric problem	−3.24	−7.71, 1.23	.15	6.04	2.48, 9.61	<.01	−3.19	−8.16, 1.79	.21	−2.48	−7.74, 2.78	.35	4.61	1.56, 7.66	<.01
Rehabilitation type	−0.48	−1.42, 0.46	.31	0.27	−0.49, 1.02	.47	−.059	−1.65, 0.45	.26	−0.86	−1.97, 0.25	.13	0.18	−0.46, 0.82	.58
Smoking behavior	−2.08	−6.53, 2.37	.36	0.21	−3.35, 3.76	.90	−2.87	−7.83, 2.08	.25	−1.25	−6.50, 3.99	.64	2.02	−1.02, 5.06	.19

Table 8

Loneliness as a Predictor for Emotional and Behavioral Dyscontrol, Fatigue, Positive Affect and Well-Being, Sleep Disturbance, and Stigma

Predictor Variables	Emotional and Behavioral Dyscontrol			Fatigue			Positive Affect and Well-Being			Sleep Disturbance			Stigma		
	β	CI	Sig	β	CI	Sig	β	CI	Sig	β	CI	Sig	β	CI	Sig
Loneliness	1.79	1.03, 2.55	<.01	1.75	0.85, 2.65	<.01	−2.53	−3.41, −1.65	<.01	1.67	1.07, 2.33	<.01	2.06	1.54, 2.58	<.01
Age	−0.08	−0.19, 0.04	.17	−0.03	0.16, 0.108	.69	−0.01	−0.14, 0.13	.93	−0.11	−0.21, 0.01	.03	−0.07	−0.14, 0.01	.09
Gender	−2.07	−4.82, 0.68	.14	−0.11	−3.35, 3.12	.95	1.19	−1.99, 4.36	.46	−1.50	−3.86, 0.87	.21	−0.88	−2.75, 0.98	.34
Cancer	1.26	−2.43, 4.95	.50	1.45	−2.89, 5.78	.51	2.73	−1.52, 6.98	.21	2.67	−0.50, 5.83	.09	1.74	−0.75, 4.235	.17
Lung disease	1.16	−2.94, 5.26	.58	4.70	−0.12, 9.53	.06	−1.57	−6.30, 3.16	.51	3.13	−0.39, 6.64	.08	0.32	−2.44, 3.09	.82
Heart disease	0.46	−2.55, 3.48	.76	−0.84	−4.39, 2.71	.64	−0.82	−4.29, 2.66	.64	0.30	−2.28, 2.89	.82	1.81	−0.23, 3.85	.08
Psychiatric problem	2.97	−0.66, 6.60	.11	3.14	−1.13, 7.42	.15	−0.32	−4.51, 3.87	.88	1.39	−1.73, 4.51	.38	1.21	−1.25, 3.66	.33
Rehabilitation type	0.03	−0.73, 0.79	.94	0.57	−0.33, 1.47	.21	−0.83	−1.71, 0.06	.07	0.39	−0.26, 1.05	.23	0.45	−0.06, 0.97	.09
Smoking behavior	−0.45	−4.07, 3.18	.81	1.81	−2.45, 6.08	.40	−2.73	−6.91, 1.44	.20	−.30	−3.41, 2.81	.85	−0.43	−2.87, 2.02	.73