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Predictors of Quality of Life for Long-Term Cancer Survivors With Preexisting Disabling Conditions

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National data from the Centers for Disease Control and Prevention ([CDC], 2011) indicate that 12 million cancer survivors had survived five years or longer as of January 2007. Although all cancer survivors may experience long-term effects following the acute survivorship phase (National Cancer Institute [NCI], 2004), those with functional limitations resulting from preexisting impairments may have special concerns related to their diagnosis and treatment. Previous research has shown that comorbid health problems or disabling conditions can directly impact treatment, prognosis, and longer-term outcomes for cancer survivors, including the ability to maintain health and carry out activities of daily living (Beck, Towsley, Caserta, Lindau, & Dudley, 2009; Gonzalez, Ferrante, Van Durme, Pal, & Roetzheim, 2001; Grov, Fossa, & Dahl, 2010; NCI, 2004; Piccirillo et al., 2003; Piccirillo, Tierney, Costas, Grove, & Spitznagel, 2004). Those with prior limitations in activities of daily living struggle to promote their health and prevent secondary disabling conditions under the best of circumstances (U.S. Department of Health and Human Services [USDHHS], 2005). Cancer diagnosis and treatment may create additional challenges. For example, lymphedema could seriously impact wheelchair users who engage in repetitive upper body motion. People who already experience fatigue (e.g., those with multiple sclerosis) may find increased fatigue following cancer treatment particularly difficult to manage. If those individuals have limited access to routine health services (Iezzoni, Kilbridge, & Park, 2010; Nosek, 2000; USDHHS, 2005), they may have difficulty getting needed health care following active treatment, thereby delaying the diagnosis of recurrence or late effects of cancer treatment.

Purpose/Objectives: To explore whether measures of resources, barriers, and health-promoting behaviors would add significantly to the prediction of health-related quality of life among survivors with disabilities that occurred prior to their cancer diagnosis once contextual factors were controlled for.

Design: A descriptive correlational study.

Setting: Adult cancer survivors with preexisting disabling conditions who had completed active treatment were recruited from throughout the United States.

Sample: Most of the 145 respondents were breast cancer survivors with preexisting neuromuscular conditions such as polio and multiple sclerosis. The average time since cancer diagnosis was nine years.

Methods: Respondents completed a mailed survey.

Main Research Variables: Health-promoting behaviors, self-efficacy, barriers to health promotion, social support, functional limitations, cancer-related variables, depression, and quality of life.

Findings: The sample reported poorer physical well-being than other cancer survivors without preexisting disabling conditions. Health-promoting behaviors and psychosocial factors, such as depressive symptoms and self-efficacy, added significantly to the prediction of physical, social, emotional, and functional components of health-related quality of life after contextual factors entered the equations.

Conclusions: The findings underscore the importance of providing this population with the means to promote their health to the greatest extent possible, given the multiple threats to their health status.

Implications for Nursing: Nurses may be able to help survivors with preexisting disabling conditions reduce the negative influence of poorer health status and functional limitations on quality of life by providing interventions that reduce depression and build perceived ability to engage in health-promoting behaviors.

Health Promotion Among Survivors

Health-promoting behaviors have been associated with greater quality of life for cancer survivors (Blanchard et al., 2004; Conn, Hafdahl, Porock, McDaniel, & Nielsen, 2007; Courneya, 2009; Haas, 2011), as well as those with other disabling conditions (Moore, Von Korff, Cherkin, Saunders, & Lorig, 2000; Rimmer, 1999; Tate, Roller, & Riley, 2001). For cancer survivors, physical activity and exercise have been associated with lower levels of depression and anxiety (Segar et al., 1998), greater self-esteem (Baldwin & Courneya, 1997), less fatigue (Brown et al., 2011), better control of treatment side effects (Reigle, 2006), and higher quality of life (Galvao & Newton, 2005; Haas, 2011). Self-efficacy is an important predictor of exercise behavior among cancer survivors (Haas, 2000; Lev, 1997), and exercise interventions that focus on building self-efficacy have been particularly effective (Bennett, Lyons, Winters-Stone, Nail, & Scherer, 2007). Unfortunately, physiologic sequelae can impact strength and endurance, which in turn affects survivors' ability to be physically active (Aziz, 2002a, 2002b).

Given that many cancer survivors engage in health-promoting behaviors and those who do tend to report more positive outcomes, the following research question was addressed: After controlling for selected contextual factors, resources, barriers, and self-efficacy for health promotion, do health-promoting behaviors add significantly to the prediction of health-related quality of life reported by long-term cancer survivors with preexisting functional limitations?

Model of Health Promotion and Quality of Life

The current study was guided by Stuijbergen's model, which proposes that contextual and attitudinal factors influence health-promoting behaviors and quality of life for people with disabilities (Stuijbergen, 1995; Stuijbergen & Becker, 1994; Stuijbergen, Seraphine, Harrison, & Adachi, 2005; Stuijbergen, Seraphine, & Roberts, 2000). Model predictors have explained as much as 66% of the variance in quality of life (Stuijbergen et al., 2000), and findings have been used to design health-promoting interventions, including one for cancer survivors with low incomes. The nursing research has shown that cognitive perceptual factors, such as self-efficacy and barriers, are more powerful predictors of health promotion and quality of life than degree of impairment (Stuijbergen et al., 2000, 2005).

In the model, health-promoting behaviors include (but are not limited to) physical activity, nutrition, health responsibility (including management of chronic conditions), and stress management. Health

promotion can limit secondary disabling conditions (Marge, 1988; Rimmer, 1999; Tate et al., 2001), but many find those behaviors difficult to implement. Despite impediments, research has shown that interventions designed to address their special needs can positively impact health promotion and quality of life for people with disabilities (Froehlich-Grobe & White, 2004; Mengshoel, Komnaes, & Forre, 1992; Moore et al., 2000; Rimmer, 1999; Stuijbergen, Becker, Blozis, Timmerman, & Kullberg, 2003; Stuijbergen, Morris, Jung, Pierini, & Morgan, 2010; USDHHS, 2005). The current investigation incorporated contextual information on the cancer experience into the model and examined how resources, barriers, and health promotion added to the contextual factors in predicting quality of life for cancer survivors.

Methods

Sample

The survey sample consisted of community-residing adult cancer survivors who reported functional limitations that existed prior to their cancer. Eligibility criteria were a self-reported cancer diagnosis and a prior functional limitation, completion of active treatment, aged at least 21 years, and the ability to read and write English. Those in active cancer treatment were excluded because they may have different challenges to health promotion. However, survivors taking long-term hormonal treatment were included.

The following question on the recruitment flier was used to determine disability: "Are you limited in any way in any activities because of physical, mental, or emotional problems?" That question is used in the Behavioral Risk Factor Surveillance System and the National Health Interview Survey to determine disability status (CDC, 2005). Although the question may exclude some individuals whose impairments do not result in limitations, the Healthy People 2010 work panel addressing disability issues endorsed the item as adequate for surveillance (National Center on Birth Defects and Developmental Disabilities, 2001). Respondents also were asked to confirm that the limitation existed prior to their cancer.

Instruments

Survey participants were asked to report their age, education, gender, employment status, ethnicity or race, state of residence, insurance status, smoking status, cancer screening behaviors, type of cancer diagnosis, stage of cancer, type of treatment (e.g., chemotherapy, radiation, surgery), time since diagnosis, and completion of active treatment. Self-perceived health was assessed by asking respondents to rate their health on a five-point scale ranging from 1 (excellent) to 5 (poor). A

modified version of the **Charlson Comorbidity Index** (Charlson, Pompei, Ales, & MacKenzie, 1987) was used to quantify comorbidities. The 16-item index produces a weighted score that reflects both the number and seriousness of comorbid conditions. Self-reports on the Charlson Comorbidity Index were significantly related ($r = 0.63$) to ratings from medical records and test-retest reliability of self-report scores (0.91) (Katz, Chang, Sangha, Fossel, & Bates, 1996). Participants' ratings on the eight items that assess functional limitations from the **National Health Interview Survey** (CDC, 2005) were compiled to create a total limitations score. The investigators' previous research yielded a Cronbach alpha of 0.73 for the total score on those eight items.

The **Economic Adequacy Scale** (Lobo, 1982) assessed perceived adequacy of economic resources. Becker and Stuifbergen (2004) reported a Cronbach alpha reliability coefficient of 0.96 and a significant inverse relationship with barriers to health promotion among people with disabilities. Many individuals in the sample were beyond the childbearing years and left blank the item about childcare costs; that item was subsequently eliminated from the scale. Respondents also rated the adequacy of the assistance and supports available to help them for work; care for themselves and their families; and participate in social, community, and leisure activities. The 10-point rating scale ranged from 1 (not at all) to 10 (much more than adequate).

The **Personal Resource Questionnaire (PRQ)** measured perceptions of social support (Weinert & Brandt, 1987). Higher scores on the 25-item scale indicate greater perceived support. The reliability, content, construct, and criterion-related validity of the scale have been supported with various clinical groups, including women with breast cancer and people with disabilities (Northouse et al., 2002). Stuifbergen et al. (2000) reported a Cronbach alpha of 0.93 in a longitudinal study of individuals with multiple sclerosis. Scores on the PRQ were positively related to health-promoting activities ($r = 0.58$) and quality of life ($r = 0.64$).

Factors that inhibit health-promoting behaviors were measured by the 18-item **Barriers to Health-Promoting Activities for Disabled Persons scale** (Becker, Stuifbergen, & Sands, 1991). Internal consistency reliability has been reported as greater than 0.8 in previous studies and test-retest reliability was 0.75 (Becker et al., 1991; Becker, Stuifbergen, Oh, & Hall, 1993). Significant negative correlations have been found between barrier scale scores, measures of self-efficacy for health-promoting behaviors, and frequency of health-promoting behaviors among people with functional limitations (Stuifbergen et al., 2000).

Another key barrier, depressive symptoms, was measured with the **Center for Epidemiological Studies Depression Scale-10 (CESD-10)** (Andersen, Malmgren,

Carter, & Patrick, 1994). Scores range from 0–30, with higher scores indicating more depressive symptoms. The CESD-10 has demonstrated good reliability and validity (Radloff, 1997). The CESD-10 has been used extensively with cancer survivors, particularly those with breast cancer (Badger, Segrin, Dorros, Meek, & Lopez, 2007; Bower et al., 2000; Given, Given, & Stommel, 1994; Hann, Winter, & Jacobsen, 1999). Roberts and Stuifbergen (1998) reported a Cronbach alpha coefficient of 0.86 and a 0.28 correlation coefficient between scores on the CESD-10 and incapacity status among people with multiple sclerosis.

Self-efficacy for health promotion was measured with the **Self-Rated Abilities for Health Practices scale** (Becker et al., 1993; Stuifbergen et al., 2000). Designed to measure perceived ability to perform health-promoting practices, the 28 items sum to create a total score encompassing nutrition, well-being, physical activity and exercise, and responsible health practices. Stuifbergen et al. (2003) reported Cronbach alpha coefficients ranging from 0.92–0.95. Callaghan's (2005) study also supported the reliability and validity of the scale among older adults.

Health-promoting behavior was measured by the **Health-Promoting Lifestyle Profile II (HPLP-II)** (Walker, Sechrist, & Pender, 1995). Self-reported frequency of behavior on the 52-item HPLP-II yields scores on six subscales (physical activity, health responsibility, spiritual growth, interpersonal relations, nutrition, and stress management). Reliability and validity of the HPLP-II have been supported in multiple studies, including those with patients with cancer and other chronic health conditions (Berger & Walker, 2001; Ott, 1997; Walker & Nies, 1998). Stuifbergen et al. (2003) reported Cronbach alpha coefficients ranging from 0.93–0.95 in a study of people with multiple sclerosis.

Quality of life was measured with the **Functional Assessment of Cancer Therapy-General (FACT-G) scale**, originally developed for patients with cancer (Webster, Cella, & Yost, 2003). The developers report test-retest reliability ranging from 0.82–0.88, and reliability and validity has been demonstrated with many patient groups (Cella et al., 1993; Ward et al., 1999; Wenzel et al., 1999). The scale contains four domains: physical well-being (seven items), social and family well-being (seven items), emotional well-being (six items), and functional well-being (seven items). Unlike more global quality-of-life measures, the FACT-G addresses acceptance of the cancer diagnosis, which Aziz (2002b) identified as key to survivors' quality of life.

Survey Procedures

Following approval from the institutional review board at the University of Texas at Austin, packets with postage-paid fliers describing the study and asking

potential participants to self-disclose their cancer diagnosis, disability status, and contact information were sent to other disability researchers, independent living centers, and disability or cancer programs throughout the United States. In addition, the study was advertised through disability publications and online networks (many of which have national readership), as well as to individuals with disabilities who had participated in previous research. When fliers (or phone or e-mail inquiries) were received and eligibility was determined, the questionnaire packet was mailed with a stamped, self-addressed envelope. The cover letter indicated that the questionnaire should be completed by cancer survivors with preexisting functional limitations, not proxies. Participants were asked to call the project's toll-free number if they needed assistance completing the questionnaire. They also were instructed to take breaks as needed if they became fatigued while completing the questionnaire.

After three weeks, reminders were sent to those who had not returned their surveys. Additional contacts were made when clarifications were needed or key information was left blank. Participants who returned the packets were sent a handwritten thank you note (with a link to a Web site regarding cancer survivorship) and a \$25 money order. Forty-three of those who expressed interest in participating (N = 164) were determined to be ineligible; 89% (n = 145) of those who initially expressed interest and were eligible subsequently returned completed questionnaire packets.

Results

After data were entered into SPSS®, version 16.0, error checking was performed with a random sample and showed a 0.06% error rate. Strategies including case deletion, variable deletion, and mean substitution were used with missing data as appropriate. Descriptive statistics and distributions for each variable were inspected, both to clean data and create a sample profile. Prior to conducting regression analyses, assumptions concerning normality, skewness, and homoscedasticity were examined. The variance inflation factor and tolerance statistic also were reviewed to detect potential multicollinearity. Internal consistency reliability was determined for all scales. The Cronbach alpha coefficients all were greater than 0.75 for the psychosocial measures. However, the Cronbach alpha coefficients for the eight-item functional limitations scale and the Charlson Comorbidity Index were only 0.65 and 0.51, respectively.

Participants

Demographic information for the 145 survivors can be found in Table 1. The average age was 63 years; 26% were working, but another 39% reported being unemployed because of their disability. Although

Table 1. Demographic Characteristics

Characteristic	n	%
Gender		
Female	116	80
Male	29	20
Race or ethnicity		
Caucasian	138	95
Other	7	5
Employment status		
Full- or part-time	38	26
Unemployed because of disability	56	39
Retired	33	23
Other	18	12
Education		
High school or less	28	19
Some college	36	25
Bachelor's degree	42	29
Post-bachelor's degree	39	27
Types of prior disabilities		
Polio	53	37
Multiple sclerosis	55	38
Other neuromuscular	16	11
Other ^a	21	14
Type of cancer^b		
Breast	81	54
Melanoma	15	10
Prostate	15	10
Gynecologic	10	7
Colorectal	8	6
Other	20	14
Years since cancer diagnosis (N = 144)		
5 or less	67	47
6–10	35	24
More than 10	42	29
Cancer treatments^c		
Surgery	126	87
Chemotherapy	51	35
Radiation	61	42

N = 145 unless otherwise noted.

^a Other disabilities include sensory impairment, benign tumor, mental health, chronic disease with functional limitation, developmental disability, and HIV.

^b Some participants had more than one type of cancer; therefore, the total does not equal 145. Other types of cancer include head and neck, bladder, lymphoma, nonmelanoma skin, and lung.

^c Multiple answers were possible.

Note. Because of rounding, percentages may not total 100.

19 types of cancers were reported, 54% were breast cancer survivors. Among the 22 preexisting disabling conditions, 86% had neuromuscular conditions. The average number of years since cancer diagnosis was nine, although 47% had been diagnosed five years or less. Forty-eight percent of the sample had additional diagnoses, most commonly diabetes, asthma, rheumatoid arthritis, renal dysfunction, and peptic ulcers.

Scores, Correlations, and Analyses

As shown in Table 2, average FACT-G scores for the sample generally were within half a standard deviation

of the scores for other groups in all areas except physical well-being. Their average scores were roughly half a standard deviation lower on physical well-being.

Table 3 shows the bivariate correlations among contextual factors, resources, barriers, and quality of life (FACT-G subscales). With the exception of the general health and functional limitations self-ratings, the resource and barriers items, particularly depressive symptoms (CESD-10), social support (PRQ), and barriers to health promotion, as well as frequency of health promotion (HPLP-II), correlated more highly with FACT-G subscales than other contextual factors such as age or cancer-related variables.

The following steps were undertaken to determine the predictors to include in the regression analyses. First, those variables with the most missing data (such as time since treatment ended or cancer stage) or highly skewed distributions were excluded. Next, the bivariate correlations were examined to identify the strength of relationship among variables. In addition, the actual content of the various psychosocial measures were examined so that conceptual overlap among specific scale items could be identified. A number of items on the social support measure (PRQ) were found to be conceptually similar to items on both the HPLP-II and the FACT-G outcome measure. Consequently, the PRQ was not used in the subsequent regression analyses. Because items asking about sleep quality were on both the HPLP-II predictor and the FACT-G, the sleep item was removed from the FACT-G.

In summary, 13 predictors were used in the subsequent regression analyses, and the functional subscale of the FACT-G was modified to eliminate the sleep item. Four three-step hierarchical regressions were performed to predict each of the four subscales of the FACT-G quality-of-life measure: physical, emotional, social, and functional. Contextual factors, including general health, employment status (i.e., employed or unemployed because of disability), time since cancer diagnosis, treatment (i.e., radiation or chemotherapy),

total number of functional limitations, and comorbidities were the available predictors on the first block. The predictors entered the equation if they met the stepwise inclusion criteria (probability of F to enter was less than 0.05; probability of F to remove was greater than 0.1). The following predictors were available for entry on the second block: perceived economic adequacy, perceived adequacy of supports, depressive symptoms (CESD-10), Self-Rated Abilities for Health Practices, and the barriers scores. The HPLP-II was made available for entry on the final step.

General health, unemployed because of disability, and total number of functional limitations were the contextual factors that entered on the first step of the equation. The CESD-10 and Economic Adequacy Scale scores added significantly to the prediction of the physical quality-of-life subscale score. The HPLP-II did not meet the statistical criteria for entry. The adjusted R² on the last step was 0.6 (see Table 4).

Because of the conceptual overlap between the CESD-10 measure of depressive symptoms and the outcome measure, the CESD-10 was not a predictor in this equation. As shown in Table 4, the HPLP-II score contributed significantly to the prediction of the emotional subscale score after the general health, barriers score, and Self-Rated Abilities for Health Practices measures entered the equation. Together, they accounted for 50% of the variance.

HPLP-II contributed significantly to the prediction of the FACT-G social score after general health, total functional limitations, Charlson Comorbidity Index, adequacy of supports, CESD-10 scores, and Economic Adequacy Scale scores entered the equation. The adjusted R² for this equation was 0.51.

The HPLP-II score did not contribute statistically to the prediction of FACT-G functional scores after other variables entered the equation. However, the CESD-10, Self-Rated Abilities for Health Practices, and the adequacy of supports did add significant unique variance after general health, employment status, and total number of functional limitations had been accounted for.

Table 2. Functional Assessment of Cancer Therapy–General (FACT-G) Subscale Scores by Group

Subscale	Survivors With Disabilities (N = 145)		Cancer (N = 2,236)		General Population (N = 1,078)		Breast Cancer (N = 202)		Older Adults With Cancer (N = 85)	
	\bar{X}	SD	\bar{X}	SD	\bar{X}	SD	\bar{X}	SD	\bar{X}	SD
Physical well-being	18.2	6	21.2	6	22.7	5	23.8	5	21	5
Social and family well-being	20.1	5	22.3	5	19.1	7	21.1	5	22	5
Emotional well-being	17.4	4	18.1	5	19.9	5	17.6	4	15.3	4
Functional well-being	17.9	6	18.8	6	18.5	7	21.2	6	17.3	7
Total FACT-G	73.6	18	80.4	16	80.1	18	—	—	—	—

Note. Average age of older adult patients with cancer was 75 years (range = 65–90 years). Comparison data reported in Avis et al. (2005), Brucker et al. (2005), and Overcash et al. (2001).

Those six predictors accounted for 68% of the variance in predicting the FACT-G subscale scores.

Discussion

Although researchers and clinicians are coming to understand the key role of comorbidities in cancer diagnosis, treatment, and long-term survivorship, the current study is one of the first to investigate the post-treatment survivorship experience of those who had disabling conditions prior to their cancer diagnosis. Their quality-of-life profile (FACT-G) was similar to other groups of cancer survivors except in the area of physical well-being, where they were roughly half a standard deviation below the mean of the other groups. That may be expected because 43% of the participants reported that their health was poor or fair, many have mobility impairments, and half have other comorbidities. By contrast, CDC (2009) indicated that only 14% of Americans reported their health as fair or poor. That finding underscores the importance of providing this population of cancer survivors with the means to promote their health to the greatest extent possible, given the multiple threats to their health status.

Although anyone with limitations in activities of daily living could participate in the study, most survey respondents had neuromuscular conditions such

as polio and multiple sclerosis. The sample selection bias was likely due in part to the researchers' previous experience conducting research with this population. Although that credibility assisted in participant recruitment, it does limit interpretation of the findings. Future studies should investigate the survivorship experiences of those with other types of disabling conditions, as well as a broader ethnic and racial cross section than were accessed in this exploratory study.

The one-item rating of perceived health status proved to be a stronger predictor of quality of life than the Charlson Comorbidity Index. Other researchers have pointed out the limitations of comorbidity indicators as predictors of health status or quality of life (Extermann, 2000; Reeve, 2010) because, even when using a scoring system that weights for seriousness of the diagnosis, those indicators may not capture the complexity of living with comorbid conditions. Future research should continue to develop and refine more robust comorbidity measures.

The dichotomous variable representing unemployment because of disabilities had a moderately strong relationship with three of the four quality-of-life subscales. That variable may have served as an indicator of the degree of functional limitations and merits additional exploration. Self-reported economic adequacy also was related to FACT-G scores, underscoring the key role of financial resources in maintaining health-related quality of life.

None of the cancer-related variables (i.e., time since diagnosis or type of treatment) were significant predictors of FACT-G scores. About one-third of these respondents were at least 10 years past diagnosis, so they may have associated other health factors with their current quality of life. The fact that 48% had an additional comorbid condition suggests multiple health factors impact their lives, and they may find it difficult to disentangle the effects. Many participants commented through the survey or personal communication that it was not the cancer but the preexisting conditions that made it difficult for them to take care of their health. In addition, the simple indicators for the cancer-related variables may not adequately capture the degree of challenges imposed by diagnoses or treatments. Future studies should examine the clinical experience of selected groups

Table 3. Bivariate Correlations Among Contextual Factors, Barriers, Resources, Health-Promoting Behaviors, and Quality of Life Among Cancer Survivors With Prior Conditions

Variable	Physical	Functional	Social	Emotional
General health	−0.55**	−0.58**	−0.3**	−0.55**
Number of activity limitation days	−0.6**	−0.47**	−0.23**	−0.45**
Time since cancer diagnosis	0.06	0.04	−0.03	0.05
Radiation	−0.05	−0.06	−0.14	−0.13
Chemotherapy	0.02	0.02	−0.07	−0.02
Surgery	0.14	0.07	−0.08	0.08
Other therapies	—	0.02	0.14	0.11
Age	0.19*	0.05	0.04	0.13
Education	0.06	0.15	0.19*	0.22**
Unemployed because of disability	0.4**	0.38**	0.06	0.27**
Charlson Comorbidity Index	−0.24**	−0.19**	−0.2*	−0.2**
Total functional limitations	−0.32**	−0.33**	−0.23**	−0.28**
Adequacy of assistance and support	0.32**	0.52**	0.57**	0.36**
Economic Adequacy Scale	0.46**	0.42**	0.51**	0.35**
CESD-10	−0.66**	−0.71**	−0.51**	−0.7**
Personal Resource Questionnaire	0.39**	0.62**	0.8**	0.49**
Barriers to Health-Promoting Activities for Disabled Persons scale	−0.51**	−0.48**	−0.42**	−0.56**
Self-Rated Abilities for Health Practices	0.32**	0.53**	0.38**	0.44**
Health-Promoting Lifestyle Profile II	0.28**	0.54**	0.56**	0.52**

N = 145

* $p < 0.05$; ** $p < 0.01$

CESD-10—Center for Epidemiological Studies Depression Scale-10

Note. Employed was coded "1;" unemployed because of disability was coded "0."

Table 4. Hierarchical Regressions to Predict Quality of Life in Survivors With Prior Disabling Conditions

Predictor	Beta	Adjusted R ²	F Δ
FACT-G physical subscale (N = 136)^a			
Self-perceived health	−0.21*	—	—
Unemployed because of disability	0.21*	—	—
Total functional limitations	−0.1	0.42	—
CESD-10	−0.42*	0.58	53.22*
Economic Adequacy Scale	0.18*	0.6	8.72*
FACT-G emotional subscale (N = 135)^b			
Self-perceived health	−0.35*	0.3	—
Barriers total	−0.33*	0.44	35.55*
Self-rated abilities for health practices	−0.04	0.46	5.67*
Health promotion (HPLP-II) total	0.31*	0.5	11.26*
FACT-G social subscale (N = 136)^c			
Self-perceived health	0.06	—	—
Total functional limitations	−0.02	—	—
Charlson Comorbidities Index	−0.03	0.13	—
Adequacy of assistance and supports	0.24*	0.34	43.57*
CESD-10	−0.19*	0.41	17.15*
Economic Adequacy Scale	0.25*	0.45	9.69*
Health promotion (HPLP-II) total	0.3*	0.51	16.03*
FACT-G functional subscale (N = 136)^d			
Self-perceived health	−0.14*	—	—
Unemployed because of disability	0.21*	—	—
Total functional limitations	−0.07	0.42	—
CESD-10	−0.44*	0.63	74.89*
Self-rated abilities for health practices	0.19*	0.67	15.46*
Adequacy of assistance and supports	0.17*	0.68	8.82*

^a Order of variables represents order of entry into model. Beta weights shown for last step in model. * Significant at $p < 0.05$; F for final model = 42.2, $df = 5/130$, $p < 0.001$

^b Order of variables represents order of entry into three-step model. Beta weights shown for last step in model. * Significant at $p < 0.05$; F for final model = 34.74, $df = 4/130$, $p < 0.001$

^c Order of variables represents order of entry into three-step model. Beta weights shown for last step in model. * Significant at $p < 0.05$; F for final model = 20.92, $df = 7/128$, $p < 0.001$

^d Order of variables represents order of entry into three-step model. Beta weights shown for last step in model. * Significant at $p < 0.05$; F for final model = 49.67, $df = 6/129$, $p < 0.01$

CESD-10—Center for Epidemiological Studies Depression Scale-10; df —degrees of freedom; FACT-G—Functional Assessment of Cancer Therapy-General; HPLP-II—Health-Promoting Lifestyle Profile II

of cancer survivors in more detail so more meaningful clinical indicators can be integrated into such research.

Conceptual overlap was observed among the items on the psychosocial predictors and the quality-of-life outcome measures. That overlap necessitated the removal of some predictor measures so that identical constructs on the predictor and outcome sides of the equations would not be assessed. The rapid growth of research on cancer survivorship has led to a prolif-

eration of measures used to assess psychological as well as physical functioning. As discovered in the current study, many of the measures overlap conceptually. Researchers are advised to clarify conceptual and operational definitions in future works. Efforts by the NCI's Outcomes Research Branch to use strong psychometric approaches to refining outcomes measurement, as well as projects such as PROMIS (www.nihpromis.org), should facilitate that effort.

The bivariate relationships between scores on the HPLP-II and the FACT-G subscales ranged from 0.28 (for the physical subscale) to 0.56 (for the social subscale). HPLP-II scores added significantly to the prediction of scores on the FACT-G emotional and FACT-G social subscales after other variables had entered, but not to the prediction of FACT-G physical or FACT-G functional subscale scores. For those two scales, the CESD-10 was the strongest predictor, and it also was strongly correlated with the health promotion measure, making it difficult for the HPLP-II to enter once the CESD-10 entered.

The hierarchical regressions performed in the current study accounted for at least 50% of the variance in the four FACT-G subscale scores. As expected, different variables were predictive of different subscales on the multi-dimensional FACT-G. However, the CESD-10 measure of depressive symptoms entered all the equations where it was used as a predictor and was the strongest predictor in two equations. Previous studies have shown a link between depression and quality of life for individuals with a variety of chronic conditions, including cancer (Aziz, 2002b; Stuifbergen et al., 2000). Those findings underscore the importance of screening cancer survivors for depression, particularly those with other disabling conditions, and making access to mental health supports readily available. At the same time, because the current study was correlational, causal relationships among variables cannot be determined. Longitudinal

studies are needed to track the impact of psychosocial factors throughout the survivorship process from initial diagnosis into long-term survivorship for cancer survivors with preexisting conditions.

Conclusions

The current study was undertaken to expand the understanding of health promotion and quality of life

for survivors with preexisting disabling conditions. Although self-rated health or the number of functional limitations entered all equations, psychosocial factors such as depressive symptoms or self-efficacy for health promotion added significantly to the prediction of all quality-of-life subscale scores. The importance of those results is that they begin to identify key factors that are amenable to intervention and are consistent with previous research showing that psychosocial variables can mediate the relationship between incapacity and quality of life for people with chronic disabling conditions (Stuifbergen et al., 2000). As such, the findings add to the growing body of scientific evidence supporting the key role of health promotion, holistically defined to encompass mind and body, in enhancing quality of life for cancer survivors.

Implications for Nursing

The findings suggest that nursing interventions that reduce depression and build perceived ability to en-

gage in health promoting behaviors may help ameliorate the negative influence of poorer health status and functional limitations on quality of life experienced by survivors with preexisting disabling conditions. Also, the findings provide valuable guidance for clinicians, particularly for primary healthcare providers who may have limited experience treating cancer survivors who have multiple health issues. Physical needs, such as medication management and physical accessibility, and mental health supports should be addressed when nurses are taking care of this unique group of survivors.

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1. Health-promoting behaviors such as physical exercise have been shown to improve quality of life in long-term cancer survivors. What impact do you think physical limitations might have on a survivor's health-promoting behaviors? On his or her quality of life?
2. How might a cognitive disability or developmental delay affect the quality of life of a cancer survivor?
3. What resources are available in your facility or practice and our community to aid disabled cancer survivors and their care partners? How would you manage patient education for a breast cancer survivor who is wheelchair-bound because of, for example, cerebral palsy?
4. Based on this research, do health-promoting behaviors add significantly to the prediction of health-related quality of life reported by long-term cancer survivors with preexisting functional limitations? In other words, what were the outcomes of this study?

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