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Personality Trait and Quality of Life in Colorectal Cancer Survivors

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Colorectal cancer is the third most commonly diagnosed cancer globally, and its prevalence is increasing in Asia (Yee et al., 2009). In Taiwan, colorectal cancer is the third most frequent cause of cancer-related deaths, accounting for 4,531 deaths in 2009 (Department of Health, Executive Yuan, R.O.C., 2011). However, with advances in early detection and treatment, the five-year survival rate for all stages of colorectal cancer has risen to 60% (Denlinger & Barsevick, 2009). Therefore, colorectal cancer has become a curable illness with a rapidly growing number of survivors (Denlinger & Barsevick, 2009; Faul, Shibata, Townsend, & Jacobsen, 2010).

Colorectal cancer survivors frequently experience gastrointestinal symptom distress, depression, and negative body image for as long as three years following diagnosis (Denlinger & Barsevick, 2009; Phipps, Braitman, Stites, & Leighton, 2008; Schneider et al., 2007). Although considerable research has demonstrated that disease-related factors (Shun et al., 2008), other physical factors (e.g., symptom distress, fatigue) (So et al., 2009), and psychological distress (e.g., depression, anxiety) (Bellizzi, Latini, Cowan, DuChane, & Carroll, 2008; Llewellyn, McGurk, & Weinman, 2005; Reich, Lesur, & Perdrizet-Chevallier, 2008) can be associated with quality of life (QOL) in patients with cancer, much less research has focused on QOL in cancer survivors (Ayanian & Jacobsen, 2006; Aziz, 2007).

Studies conducted since 2000 have reported that personality can be significantly related to QOL (Hartl et al., 2010; Michielsen, Van der Steeg, Roukema, & De Vries, 2007). The personality known as type D has been found to be an independent predictor of poor health status and impaired QOL among cardiovascular patients (Denollet, Pedersen, Vrints, & Conraads, 2006; Pedersen, Herrmann-Lingen, de Jonge, & Scherer, 2010; Pelle, Pedersen, Szabo, & Denollet, 2009) and melanoma

Purpose/Objectives: To explore the association between quality of life (QOL) and type D personality, which is characterized by the traits of negative affectivity and social inhibition, and to further identify impacts of these traits after controlling for biophysical and psychological factors in colorectal cancer survivors.

Design: Cross-sectional and correlational.

Setting: Oncology and surgical outpatient clinics of a medical center in Taiwan.

Sample: 124 patients diagnosed with colorectal cancer who had completed active treatment.

Methods: Data were collected using a set of structured questionnaires to explore type D personality, biophysical and psychological factors, and QOL. Their associations were verified with Mann-Whitney U test and Spearman's rho correlation. Significant factors associated with QOL were identified with generalized estimating equations.

Main Research Variables: Type D personality and QOL.

Findings: Patients with type D personality experienced higher physical and psychological distress than those with non-type D personality. Social inhibition remained an important factor leading to impairment in the mental component of QOL after controlling for other associated factors. Negative affectivity was associated with fatigue intensity and interference of fatigue with life activities.

Conclusions: Personality trait was found to be an important factor associated with QOL. The trait of social inhibition was a significant factor influencing mental aspects of QOL, whereas negative affectivity was associated with fatigue.

Implications for Nursing: Assessing patients' personality, including negative affectivity and social inhibition, could help nurses to develop supportive groups or social networks for these patients and thereby improve QOL for cancer survivors.

survivors (Mols & Denollet, 2010a). Type D is associated with two personality traits: negative affectivity and social inhibition (Denollet et al., 2006; Ferguson et al., 2009). Negative affectivity indicates the tendency

to experience negative emotions, and social inhibition indicates the tendency to inhibit the expression of emotions and behaviors in social interaction (Denollet, 2000, 2005; Fruyt & Denollet, 2002).

Several studies have reported that type D personality had negative effects on mental and physical health status in the general population (Mols & Denollet, 2010b). This personality was associated with the reporting of more severe gastrointestinal symptoms (Hansel et al., 2010), increased severity of reported health complaints, heightened perception of negative emotions (e.g., depression) (Mols & Denollet, 2010a), and impaired QOL (Denollet, 1998, 2005; Pedersen & Denollet, 2003). Patients with type D personality may be at risk for alterations in the immune system that might promote the spread of cancer (Denollet, 1998).

Only two previous studies have examined the associations between type D personality and health status in patients with cancer (Denollet, 1998; Mols, Holterhues, Nijsten, & van de Poll-Franse, 2010). Denollet (1998) reported that type D personality was a predictive factor of the development of different type of cancers, including colon cancer, in men with coronary heart disease. Mols, Holterhues, et al. (2010) determined that melanoma survivors with type D personality reported less favorable general health, social functioning, and mental health than non-type D patients, along with more emotional role limitations and less vitality.

No prior study has specifically examined QOL in colorectal cancer survivors who have completed active treatment or the possible association of QOL with type D personality. Therefore, the aims of the current study were (a) to explore the association between QOL and type D personality and its personality traits (i.e., negative affectivity and social inhibition) and (b) to further examine whether these personality traits are a significant factor associated with QOL in colorectal cancer survivors after controlling for biophysical (i.e., demographic factors, cancer-related factors, symptom distress, and fatigue) and psychological factors (i.e., anxiety and depression).

Methods

Setting and Sample

A cross-sectional survey with convenience sampling was conducted in the outpatient clinics at oncology and surgical departments of a leading medical center in northern Taiwan. Inclusion criteria were (a) having been diagnosed with colorectal cancer and informed of the diagnosis, (b) having completed active treatment at least one month prior to the study, (c) being an adult (aged 18 years or older), (d) being able to communicate verbally, and (e) being willing to sign a consent form after receiving a detailed explanation of the study pur-

poses and procedures. The study was approved by the institutional review boards of the medical center, and patient consent was obtained before data collection. A set of questionnaires was administered by two well-trained research assistants when patients came to the clinic for follow-up visits. Participants completed the questionnaires after the visit. Of 165 eligible patients approached, 124 participants completed the data collection process from March 2009 to April 2010.

Instruments

Data were collected using a structured questionnaire consisting of the Type D Scale-14 (DS-14) (Denollet, 2005), the Symptom Distress Scale (SDS) (Lai, 1998), the Fatigue Symptom Inventory (FSI) (Hann et al., 1998), the Hospital Anxiety and Depression Scale (HADS) (Zigmond & Snaith, 1983), the Short Form-12 Health Survey (SF-12®) (Ware, Kosinski, & Keller, 1996), and an investigator-designed background information form.

The **DS-14** is a 14-item scale specifically developed to assess two characteristics of type D personality: negative affectivity and social inhibition (Denollet, 2005). It is a five-point Likert-type scale ranking from 0 (false) to 4 (true); each of the two subscales (negative affectivity and social inhibition) has seven items with a total score ranging from 0–28. Higher scores on each subscale indicate a greater presence of that personality trait. A cutoff score of 10 on both subscales is used to classify participants with type D personality (Denollet, 2005). The DS-14 has been used on populations with coronary heart disease (Denollet, 2005; Pedersen & Denollet, 2003) as well as noncardiovascular patient populations (Mols & Denollet, 2010a, 2010b) with good psychometric properties. The DS-14 also has been used with cancer survivors (Mols, Holterhues, et al., 2010). The Chinese version of the DS-14 was rigorously translated by the research team for the current study after the team obtained permission for this use. Cronbach's α was 0.85 for negative affectivity and 0.75 for social inhibition in the current study.

The **Chinese version of the SDS**, modified by Lai (1998), is a 22-item scale derived from the original instrument (McCorkle & Young, 1978). The SDS is a Likert-type scale ranging from 1 (no distress at all) to 5 (as much distress as possible). Higher scores indicate greater levels of symptom distress. Symptom distress after completion of treatment was assessed by the SDS; Cronbach's α for the SDS was 0.78 in the current study.

The **Chinese version of the FSI** is a 14-item self-reported measure designed to assess four aspects of fatigue: intensity (four items), interference (seven items), duration (two items), and daily pattern (one item) (Hann, Denniston, & Baker, 2000; Hann et al., 1998). Items to assess intensity and interference are rated on an 11-point Likert-type scale ranging from 0 (not at all fatigued) to 10 (extremely fatigued); items assessing duration ranged

from 0 (none of the day) to 10 (the entire day). The Chinese version of the FSI has been rigorously translated, and its psychometric properties have been examined on patients with cancer (Shun, Beck, Pett, & Berry, 2006; Shun, Beck, Pett, & Richardson, 2007). In the current study, Cronbach's α for the interference of fatigue on the FSI was 0.91.

The **Chinese version of the HADS** is a 14-item measure used to assess patients' anxiety and depression (Zigmond & Snaith, 1983). Its two subscales each consist of seven items scored from 0–3, so that each subscale's total score can range from 0–21. Higher scores represent higher levels of anxiety and depression. A total score higher than 11 indicates that the patient has been suffering from anxiety or depression. The HADS has been used on patients with cancer with good reliability in Taiwan (Chen, Chang, & Yeh, 2000; Lai et al., 2009). Cronbach's α coefficients for the HADS-A (anxiety) and HADS-D (depression) in the current study were 0.65 and 0.85, respectively.

The **Chinese version of the SF-12** is a 12-item generic measure of health status developed from the widely used SF-36® (Ware et al., 1996). SF-12v2™, the second version of SF-12, can yield scores for eight domains: physical functioning, role physical, bodily pain, general health, vitality, social functioning, role-emotional health, and mental health. The SF-12 also provides overall summaries of the physical and mental components. After reversal and recalibration, the scores can be transformed to a 0–100 scale and then to norm-based scores, with higher scores indicating better health. The Chinese version of SF12v2 was used successfully in a previous study (Lam, Tse, & Gandek, 2005).

A background information form covering demographic and clinical characteristics was composed for the current study. Demographic characteristics included gender, age, employment status, marital status, education, and religious affiliation. Clinical characteristics included disease diagnosis, stage, previous treatment after operation, length of time since completion of treatment (in months), and functional status. Functional status was measured by the **Karnofsky Performance Status (KPS)**, an 11-point scale that uses 10-point intervals ranging from 100 (normal function) to 0 (death) (Mor, Laliberte, Morris, & Wiemann, 1984). The KPS has been used in cancer-related studies in Taiwan (Lai et al., 2003; Shun et al., 2006).

Data Analysis

Data were entered and analyzed using SPSS®, version 15.0. Descriptive statistics were used to analyze the demographic and clinical characteristics in the current study. Nonparametric statistics were used because the data were not normally distributed. Mann-Whitney U test was used to examine differences between patients with type D personality and those without type D personality in physical (i.e., symptom distress, fatigue intensity, and interference) and psychological distress

(anxiety and depression) and the subdomains of QOL. Spearman's rho correlations were used to examine the association among type D personality traits (i.e., negative affectivity and social inhibition), QOL (physical and mental component summary), and physical and

Table 1. Sample Characteristics

Characteristic	\bar{X}	SD
Age (years)	60.1	10.7
Education (years)	11.3	4.9
Months since completion of treatment	27.4	24.7
Characteristic	n	%
Gender		
Male	76	61
Female	48	39
Employment status		
Unemployed	75	60
Employed part-time or full-time	49	40
Marital status		
Married	104	84
Single, divorced, or widowed	20	16
Education		
Illiterate	4	3
Elementary school	30	24
Junior high school	14	11
Senior high school	26	21
College	37	30
Graduate school	13	10
Religious affiliation		
None	25	20
Buddhist, Taoist, Christian, or Catholic	99	80
Karnofsky Performance Status		
80 ^a	1	1
90 ^b	15	12
100 ^c	108	87
Cancer stage		
I	22	18
II	43	35
III	47	38
IV	12	10
Previous chemotherapy treatment		
Yes	82	66
No	42	34
Previous radiation treatment		
Yes	15	12
No	109	88
Had colostomy		
Yes	10	8
No	114	92
Months since completion of treatment		
1–12	42	34
13–24	33	27
24 or more	49	40

N = 124

^a Indicates patients can perform normal activity with effort, with some signs and symptoms of disease

^b Indicates patients can perform normal activity with minor signs or symptoms of disease

^c Indicates patients can perform physical activities very well with no evidence of disease

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

psychological distress. Finally, two generalized estimating equations were used to examine whether negative affectivity or social inhibition was a significant factor after controlling for demographic information, clinical disease-related factors, and factors related to QOL (i.e., symptom distress, fatigue intensity and interference, anxiety, and depression). Generalized estimating equation, an extension of the generalized linear model, was developed by Zeger and Liang (1986) and has the statistical power to manage normal as well as non-normal distributions (Ballinger, 2004).

Results

Patient Characteristics

Table 1 presents the demographic characteristics and disease-related information for the 124 patients. Sixty-one percent ($n = 76$) of the participants were men, with ages ranging from 26–82 years ($\bar{X} = 60.1$, $SD = 10.7$). The majority were unemployed and married; the most common religious affiliation was Buddhist. The most frequent cancer diagnosis was stage III (38%), and 66% of patients received chemotherapy after their operation. Only 8% of participants had a colostomy when surveyed. The average period after completion of treatment was 27.4 months ($SD = 24.7$), with a range from 1–123 months. Most patients had good functional status.

Association of Personality, Distress, and Quality of Life

The overall symptom distress ($\bar{X} = 24.58$, $SD = 3.17$), average fatigue intensity ($\bar{X} = 1.13$, $SD = 1.81$), and fatigue interference ($\bar{X} = 3.28$, $SD = 7.32$) were mild. The mean scores for anxiety and depression were 2.16 ($SD = 3.03$) and 3.14 ($SD = 2.79$), respectively. Most participants did not suffer from anxiety or depression (98% and 99%, respectively). Standardized mean scores for the physical and mental components of QOL were 50.91 ($SD = 6.2$) and 52.68 ($SD = 8.47$).

The mean scores for negative affectivity and social inhibition were 4.32 ($SD = 5.72$) and 7.35 ($SD = 5.85$), respectively. Negative affectivity tendencies (negative affectivity score of 10 or higher) were observed in 15% ($n = 19$) of the sample, whereas 31% ($n = 38$) were identified as having social inhibition tendencies (social inhibition score of 10 or higher). The 13 patients (11%) who scored 10 or higher on both subscales were defined as having type D personality.

Table 2 shows the results regarding association of type D personality with physical and psychological distress as well as QOL. Patients with type D personality experienced higher levels of symptom distress ($p = 0.002$), fatigue intensity ($p = 0.042$), fatigue interference ($p =$

0.14), anxiety ($p < 0.0001$), and depression ($p < 0.0001$), as well as lower levels of the mental components of QOL ($p < 0.0001$), compared to those without type D personality.

Association of Negative Affectivity, Social Inhibition, and Quality of Life

Table 3 reports the bivariate correlations between personality traits (i.e., negative affectivity and social inhibition) and factors related to QOL. Negative affectivity was positively associated with symptom distress ($\rho = 0.501$, $p < 0.0001$), average fatigue intensity in the past seven days ($\rho = 0.34$, $p < 0.0001$), fatigue interference ($\rho = 0.392$, $p < 0.0001$), anxiety ($\rho = 0.695$, $p < 0.0001$), and depression ($\rho = 0.416$, $p < 0.0001$) but was negatively associated with the physical ($\rho = -0.213$, $p = 0.018$) and mental ($\rho = -0.415$, $p < 0.0001$) component summary scores on the SF-12. Social inhibition was positively associated with symptom distress ($\rho = 0.206$, $p = 0.021$), anxiety ($\rho = 0.327$, $p < 0.0001$), and depression ($\rho = 0.266$, $p < 0.004$) but was negatively associated with the mental component summary score on the SF-12 ($\rho = -0.303$, $p = 0.001$).

Significant Factors Related to Components of Quality of Life

Demographic factors (age, gender, and years of education), clinical factors (functional status, cancer stage, time since completion of treatment, previous treatment, and having had a colostomy), physical and psychological distress factors (symptom distress, fatigue intensity and interference, anxiety, and depression), and personality traits (negative affectivity and social inhibition) were entered into the generalized estimating equation models. The results shown in Table 4 indicate that age

Table 2. Mann-Whitney U Test for Patients With Type D and Non-Type D Personality in Physical and Psychological Distress and Quality of Life

Variable	Type D (N = 13)	Non-Type D (N = 111)	z	p
	\bar{X} Rank	\bar{X} Rank		
Physical distress				
Symptom distress	91.65	59.09	-3.15	0.002
Fatigue intensity	79.42	60.52	-2.04	0.042
Fatigue interference	80.65	60.37	-2.45	0.014
Psychological distress				
Anxiety	108.85	57.07	-5.19	< 0.001
Depression	96.27	58.55	-3.62	< 0.001
Quality of life				
Physical component	53.38	63.57	-0.967	0.334
Mental component	25.69	66.81	-3.9	< 0.001

Table 3. Spearman's Rho Correlations for Physical and Psychological Distress, Personality, and Quality of Life

Variable	Symptom Distress	Fatigue Intensity	Fatigue Interference	Anxiety	Depression	PCS	MCS	Negative Affectivity
Fatigue intensity	0.527***	—	—	—	—	—	—	—
Fatigue interference	0.54***	0.785***	—	—	—	—	—	—
Anxiety	0.61***	0.537***	0.545***	—	—	—	—	—
Depression	0.389***	0.289***	0.318***	0.508***	—	—	—	—
PCS	-0.257*	-0.3**	-0.269*	-0.162	-0.175	—	—	—
MCS	-0.505***	-0.386***	-0.348***	-0.573***	-0.46***	-0.003	—	—
Negative affectivity	0.501***	0.34***	0.392***	0.695***	0.416***	-0.213*	-0.415***	—
Social inhibition	0.206*	0.061	0.107	0.327***	0.266*	-0.013	-0.303**	0.402***

N = 124

* $p < 0.05$; ** $p \leq 0.001$; *** $p < 0.0001$

MCS—mental component summary; PCS—physical component summary

($\beta = -0.147$, $p = 0.002$), years of education ($\beta = 0.258$, $p = 0.017$), employment status ($\beta = -2.073$, $p = 0.038$), and functional status ($\beta = 0.503$, $p = 0.002$) were the significant factors associated with the physical component of QOL. Time since completion of treatment ($\beta = 0.07$, $p = 0.004$), symptom distress ($\beta = -0.507$, $p = 0.022$), depression ($\beta = -0.697$, $p = 0.003$), and social inhibition ($\beta = -0.31$, $p = 0.005$) were the significant factors associated with the mental component of QOL.

Discussion

The current study is the first to examine the relationship between type D personality and QOL among colorectal cancer survivors. Consistent with previous studies of other populations (Mols & Denollet, 2010a, 2010b; Mols, Martens, & Denollet, 2010; Pedersen & Denollet, 2003), individuals with type D personality experienced more symptom distress, fatigue, emotional difficulties, and impaired QOL than those without type D personality. Importantly, 31% of the sample was found to have social inhibition tendencies, and social inhibition was identified as a significant factor having a negative impact on the mental component of QOL after controlling for the other associated factors.

Most studies have reported only results pertaining to type D personality overall without comparing the effects of its two defining characteristics, negative affectivity and social inhibition. The current study indicated that, of the two personality traits, social inhibition was the more important factor in affecting the mental domain of survivors' QOL; social inhibition also was correlated with more severe levels of symptom distress, anxiety, and depressive mood. Colorectal cancer survivors with characteristics of social inhibition appeared to have difficulty in social contacts because of the side effects of treatment (i.e., fatigue, sensory neuropathy, gastrointestinal problems) and because of negative emotions, negative body image, and urinary incontinence (Denlinger & Barsevick, 2009; Schneider

et al., 2007). These factors can change a patient's self-perception and increase one's distress and fear of embarrassment in social interactions.

Although negative affectivity was not a main predictor after controlling for other associated factors for QOL, one should not overlook the effect of negative affectivity in cancer survivors because this trait was positively correlated with symptom distress, fatigue, anxiety, and depression and negatively associated with both the physical and mental domains of QOL. The results supported the premise that individuals with high-negative affectivity are more likely to experience physical and psychological distress which, in turn, can impair both physical and mental components of QOL. In addition, negative affectivity was positively associated with social inhibition, perhaps because an individual with negative affectivity might experience more anxiety, irritability, negative thoughts, and negative self-perception (Denollet, 2005). These undesirable feelings can be expected to cause discomfort in social interactions (Denollet, 2005), leading cancer survivors to decrease their social activities.

Of note, only negative affectivity was associated with fatigue intensity and with fatigue's tendency to interfere with life activities. Although a relationship is recognized between negative affectivity and the degree of interference caused by fatigue, the characteristics of negative affectivity are similar to those of neurotic personality (Denollet, 2000; Mols & Denollet, 2010b), which has been reported as positively correlated with fatigue among patients with malignant breast disease (Michielsen et al., 2007). The association could be explained by noting that individuals high in negative affect report lower energy because of fatigue and tend to interpret fatigue as threatening (Michielsen et al., 2007; Smets et al., 1998). Most importantly, the trait of negative affectivity influences patients' experience of fatigue not only in terms of its greater intensity, but also in the degree of its interference. This finding supports the results of Mols and Denollet (2010b), who found that individuals with negative affectivity

Table 4. Predictors for Physical and Mental Components of Quality of Life Using the Generalized Estimating Equation Model

Variable	Physical Component				Mental Component			
	β	SE	95% CI		β	SE	95% CI	
			Low	High			Low	High
Age	-0.147*	0.048	-0.241	-0.053	0.024	0.061	-0.095	0.143
Gender (female versus male)	-0.087	0.948	-1.944	1.771	-0.043	1.326	-2.642	2.556
Education (years)	0.258*	0.108	0.047	0.47	-0.206	0.129	-0.458	0.045
Religious affiliation ^a	-0.707	1.107	-2.876	1.462	2.046	1.308	-0.518	4.61
Marital status ^b	-1.042	1.001	-3.003	0.919	-1.082	1.479	-3.981	1.817
Employment status ^c	-2.073*	1.002	-4.035	-0.111	-0.02	1.337	-2.64	2.6
Functional status ^d	0.503*	0.166	0.177	0.829	0.207	0.185	-0.156	0.57
Cancer stage								
• IV versus I	-0.885	2.305	-5.402	3.632	1.591	2.236	-2.792	5.974
• III versus I	-1.014	1.38	-3.718	1.691	1.005	2.068	-3.049	5.058
• II versus I	-1.235	1.193	-3.573	1.102	1.661	1.942	-2.145	5.467
Months since completing treatment	-0.017	0.02	-0.056	0.022	0.07*	0.024	0.022	0.117
Previous chemotherapy treatment (yes versus no)	-0.279	1.089	-2.413	1.855	-0.393	1.369	-3.077	2.291
Previous radiation treatment (yes versus no)	-1.626	1.286	-4.146	0.894	3.029	1.697	-0.297	6.356
Colostomy (yes versus no)	1.201	1.907	-2.536	4.938	-2.441	2.32	-6.987	2.105
Symptom distress	-0.327	0.209	-0.736	0.082	-0.507*	0.222	-0.942	-0.072
Fatigue intensity	0.349	0.347	-0.326	1.024	-0.198	0.44	-1.061	0.664
Fatigue interference	-0.119	0.117	-0.348	0.109	0.044	0.104	-0.161	0.249
Anxiety	-0.417	0.287	-0.978	0.145	-0.646	0.33	-1.292	0.001
Depression	-0.025	0.221	-0.459	0.409	-0.697*	0.231	-1.151	-0.244
Negative affectivity	-0.127	0.115	-0.353	0.099	0.066	0.174	-0.274	0.406
Social inhibition	0.138	0.091	-0.052	0.328	-0.31*	0.109	-0.524	-0.095
Intercept	19.7	19.834	-19.173	58.574	47.678	22.039	4.483	90.872

N = 124

* $p < 0.05$ ^a Reference group had no religious affiliation.^b Reference group was single or without partners.^c Reference group was unemployed.^d Measured by Karnofsky Performance Status

CI—confidence interval; SE—standard error

in the general population reported higher feelings of subjective stress and tended to use maladaptive coping strategies such as somatization of psychological distress. Therefore, healthcare providers should pay more attention to the higher degree of interference that could result from those ineffective coping strategies (Mols & Denollet, 2010b) and assess patients' ability to manage their fatigue.

Limitations

First, whereas one previous study found type D personality in 22% of melanoma survivors (Mols, Holterhues, et al., 2010), a low percentage of type D personality (11%) was found in the current study. The type D personality construct was originally developed in studies of patients with coronary heart disease to assess its role in health outcomes (Ferguson et al., 2009), and its prevalence among cardiovascular patients was from 27%–31% (Mols & Denollet, 2010a). However, no previous study has examined the prevalence of type D

personality among patients with colorectal cancer. In the current study, the percentage of type D personality might have been underestimated because those with type D personality may be more likely decline study participation (the current study had a 25% rejection rate). Therefore, a larger replication of this study of type D personality recruiting patients from multiple centers is suggested. Second, the study participants were recruited from outpatient clinics; therefore, the results may not be generalizable to inpatients. Finally, the current study's results may not be generalizable to other cultures.

Implications for Nursing

The current study found that colorectal cancer survivors with type D personality, particularly those with high social inhibition levels, experienced more impaired QOL than survivors without type D personality. Although a previous study reported that the presence of social inhibition

did not change among cardiac rehabilitation patients over three months (Denollet, 2005), cancer diagnosis and anticancer treatment are extremely stressful, life-disrupting events that could affect an individual's personality. Cancer treatment involves considerable interruption of patients' daily routines; as a result, they may struggle to reconstruct their lives, rehabilitate their physical functions, and gain social support from significant others after completing active treatment.

Healthcare providers should assess patients' personality traits and offer nursing interventions based on those traits. For example, patients with high or moderately high negative affectivity or social inhibition scores should be identified so that providers can help them avoid the negative impact of type D personality. In addition, helping cancer survivors build social networks and improve their social and communication skills might prevent them from developing high levels of social inhibition. Social inhibition was positively correlated with negative affectivity, and negative affectivity, in turn, was associated with physical and psychological distress. This finding suggests that clinical nurses should be attentive to patients' expression of negative thoughts and guide them toward taking a more positive view of their experiences to reduce patients' risk of undesirable symptoms during their years as cancer survivors.

Longitudinal research is recommended to examine whether negative affectivity and social inhibition are stable or dynamic traits and to further examine the effect of type D personality on prognosis and long-term QOL in patients with cancer. Although a previous study reported that negative affectivity and social inhibition remained stable over a three-month period among cardiac rehabilitation patients (Denollet, 2005), no study has examined the progress of these traits among patients with cancer during a trajectory of life-threatening diagnosis and treatment that could greatly affect one's personality. In addition, a previous study by Denollet (1998) suggested that cancer may be promoted by dysfunction

in the immune system, and personality distress may be related to alterations in the immune system. Therefore, assessing the status of patients' immune systems in a longitudinal study may be warranted.

Conclusion

The current study supports the premise that type D personality is associated with physical and psychological distress and with QOL. Almost one-third of study participants had social inhibition tendencies, and social inhibition was found to be an important factor contributing to the mental component of QOL. Concurrently, negative affectivity was associated with physical and psychological distress and with impaired overall QOL. In caring for cancer survivors, healthcare providers should pay more attention to assessing not only the presence of type D personality overall, but also its two subcharacteristics: negative affectivity and social inhibition. In addition, development of education programs is recommended to assist cancer survivors in reconstructing their lives through the reestablishment of good social networks and supports.

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