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Correlates of Mental Health in Survivors of Colorectal Cancer: The Influence of Individual, Family, and Community Level Factors

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Abstract

An often neglected factor in the examination of the mental quality of life of survivors of colorectal cancer is the role of family and community level resources and support. The aim of this study was to develop a deeper understanding of the influence of family and community level resources over and above previously examined mental health variables. A survey-based pilot study was conducted with 101 colorectal cancer survivors. Four multiple linear regression models were developed to examine the associations between demographic, health-related, individual psychosocial, family and community level factors, and specific dimensions of mental quality of life (measured using the mental health subscales of the SF-12). In addition to examining all of the correlates of mental quality of life, the unique role of family and community level factors over and above previously examined factors was examined. Analyses found that family and community level factors, as a whole, explained a significant portion of the variance in role emotional health, mental health, and social functioning over and above demographic, health-related, and individual psychosocial factors. Family cohesion was a significant, unique predictor of role limitations due to mental health, and family and community social support was a significant, unique predictor of role limitations due to mental health and overall mental health. These results suggest the potential importance of considering family and community level resources when conducting research and designing interventions to improve mental quality of life in colorectal cancer survivors.

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Introduction

Colorectal cancer survivors have received little attention in the post-treatment mental quality of life research[1]. Colorectal cancer is the third most common cancer in the United States[2]. With an increased utilization of screening tests and treatments, the 5-year survival rate for early, localized stage colorectal cancer is 90%[2]. Due to the high occurrence and survival rate of this type of cancer, and lack of research regarding this population, the aim of this study was to better understand the factors that influence the mental quality of life in survivors of colorectal cancer in order to identify potential mechanisms through which survivors' mental well-being may be increased.

The few quality of life studies that have been conducted with post-treatment colorectal cancer survivors found that despite a trend for improvement in quality of life over time[3] [4] [5] a significant segment of the population experiences considerable challenges in a variety of domains, such as psychosocial and relational health[5] [6]. However, little is known about how commonly examined psychosocial correlates of mental quality of life in other cancer populations, such as perceived stress[7] perceived control[8], fear of recurrence[9] [10] and constructed meaning[11], are associated with mental quality of life in colorectal cancer survivors.

Additionally, research has often overlooked family and community level resources, such as family hardiness, family cohesion, and social support, and their role in adjustment to illness. Families characterized by high levels of family resources are often able to endure and adjust better under difficult circumstances, develop a strong emotional bond among family members, and support family members during difficult times[12] [13] [14]. Research with various cancer populations have found increased family resources to be associated with positive outcomes such as improved illness adjustment, higher quality of life, lower emotional distress, and improved post-illness adjustment and coping[15] [16] [17] [18]. Similarly, cancer survivors who perceive higher levels of social support reported a higher quality of life[19] [20] [21]. With family and community level resources providing important protective factors in other cancer populations, it is important to examine their role in survivors of colorectal cancer.

The current analyses aimed to add to the scientific discourse by examining the influence of psychosocial, family, and community level factors on mental quality of life. The current study explored the influence of demographic, health-related, individual psychosocial, family and community level factors on colorectal cancer survivors' mental quality of life, specifically by examining mental health, vitality, ability to perform daily roles, and social functioning. The following research questions were examined:(1) How do demographic, health-related, individual psychosocial, family, and community level variables affect the survivor's mental quality of life? (2) Do family and community level factors play a unique role in explaining the variance in mental quality of life in colorectal cancer survivors over and above other commonly examined factors? We hypothesized that family and community level factors will explain variance in mental quality of life above and beyond demographic, health-related and psychosocial factors.

Methods

Participants and Procedures

Mail-based questionnaires were sent to 400 randomly selected colorectal cancer survivors from the Helen and Harry Gray Cancer Center's Cancer Registry at Hartford Hospital in Hartford, CT, USA. The inclusion criteria for this study included being over 50 years of age, able to speak and read English, diagnosed with pathologically confirmed colorectal cancer, be at least one year from diagnosis, be currently in remission, and colorectal cancer being their first cancer diagnosis (other than non-melanoma skin cancer). Eight hundred and sixty-seven individuals fit these inclusion criteria. Institutional Review Board (IRB) approval was received by both Hartford Hospital and the University of Connecticut prior to mailing out the questionnaires. The mailing included an invitation letter from the Cancer Center Director, an informed consent document, the questionnaire, and a prepaid return envelope. Of the 400 surveys mailed, 43 surveys were undeliverable and 117 were returned for a 32.7% response rate for this pilot study. Because of the nature of our data collection method, we were unable to determine demographic information about the non-response group. Therefore, we could not examine if the non-response group significantly differed from the sample used in the current analysis. After excluding eight questionnaires due to incomplete data, 109 participants remained. An additional eight participant questionnaires were discarded because they did not fit the inclusion criteria. Five individuals were eliminated because they were not in remission, 2 individuals were eliminated because they were younger than 50 years of age, and 1 person was eliminated for being only one year from diagnosis. Therefore, the final analytic sample for this study included 101 participant questionnaires.

Measures

Mental quality of life:

Mental quality of life was measured using the validated SF-12[31]. As the dependent variable of the study, we utilized all four subscales of the SF-12 in our analyses.

Role emotional:

The role emotional subscale measured how daily roles were impacted by the person's emotional well-being, and was measured with three questions. As an example, participants were asked, "During the past 4 weeks, how much of the time have you had any of the following problems with your work or other regular activities as a result of any emotional problems (such as feeling depressed or anxious)?"

Social functioning:

The social functioning subscale measured how an individual's social functioning was impacted by their health (either physical or emotional health). The question measuring social functioning was, "During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting friends, relatives, etc.)?"

Mental health:

The mental health subscale measured the mental health state of the individual, and was analyzed using two questions. The questions were, "How much of the time during the past four weeks have you felt calm and peaceful?" and "How much of the time during the past four weeks have you felt downhearted and depressed?"

Vitality:

The vitality subscale measured the perceived energy level of the individual, and one question was used to assess this subscale. The question used was, "How much of the time during the past four weeks did you have a lot of energy?"

By using the norms from the 1999 general US population, scores in each subscale were standardized on a T-score metric, such that scores ranged from 0 to 100 with a score of 50 representing the average score in the US general population with a standard deviation of 10. All questions used a five-point Likert scale with response options ranging from "none of the time" to "all of the time." Higher scores reflected better mental quality of life on each subscale.

Demographic and health-related variables:

Demographic and health-related variables, including gender, marital status, age, race, level of education, employment status, living arrangement, years since diagnosis, type of treatment, and recurrence and remission status were measured via self-report. The additional health-related variables of comorbidity and symptoms were collected using specific measures.

Comorbidity:

Comorbidity was measured via a 13 item checklist[22] including conditions such as: heart failure, heart attack, high blood pressure, chronic lung disease, liver disease, or diabetes. Participants were asked to indicate whether they had the comorbid condition by responding yes or no. Scores ranged from 0 to 13 with higher scores indicating more comorbid conditions.

Symptoms:

The 22-item Rotterdam Symptom Checklist Physical Distress subscale[23] was used to measure physical symptoms. Symptoms included options such as tiredness, lack of energy, headaches, vomiting, difficulty sleeping, and difficulty concentrating. Focusing on the previous four weeks, participants rated the degree to which they experienced each symptom on a four-point Likert scale with options ranging from "not at all" to "very much." Because of little variability in responses to this measure, participants were given a score of 0 if they did not have the symptom ("not at all") and a score of 1 if the symptom occurred, at any level, within the last month. Possible scores ranged from 0 to 22 with higher scores indicating more physical symptoms.

Individual psychosocial factors: Individual psychosocial factors were chosen based on previous empirical research examining mental quality of life in different cancer populations.

Fear of recurrence:

The five-item Fear of Recurrence Scale (FRS)[24] was used and scored on a five-point Likert scale with response options ranging from "strongly disagree" to "strongly agree". Questions included "I am certain that I have been cured of cancer," and "I will probably relapse within the next five years". Possible scores ranged from 5 to 25 with higher scores indicating greater fear of recurrence.

Perceived stress:

Perceived stress was measured with the 10-item Perceived Stress Scale[25]. The scale included questions such as: "How often have you been upset because of something that happened unexpectedly" and "How often have you felt that you were unable to control the important things in your life." Participants responded to each question using a five-point Likert scale ranging from "never" to "very often." Possible scores ranged from 0 to 40 with higher scores indicating higher levels of perceived stress.

Constructed meaning:

The Constructed Meaning Scale[26] included eight items that measured the impact the illness had on the individual's sense of identity, interpersonal relationships, and expectations for the future. Participants responded to items such as: "I feel my illness is something I will never recover from," "I feel my illness has changed my life permanently so it will never be as good again," and "I feel that my relationships with other people have not been negatively affected by my illness." Possible scores ranged from 8 to 32 with higher scores indicating a higher illness impact.

Perceived control:

The 4-item Perceived Control Scale [27] was used to measure participants' perception of the control they had over their illness. Questions included items such as "Your emotional responses to your cancer" and "The physical side of your cancer," and were answered on a five-point Likert scale ranging from "no control at all" to "complete control." Possible scores range from 4 to 20 with higher scores indicating more control.

Family and community level factors: Family and community level factors were chosen based empirical research conducted with other cancer populations.

Family hardiness:

The Family Hardiness Index[28] was used to measure the internal strength of the family in regard to commitment, challenge and control of family experiences. The index asks participants to assess the statements to the degree of "False," "Mostly False," "Mostly True," and "True." Questions included items such as "We work together to solve problems," "Trouble results from mistakes we make," and "We listen to each others' problems, hurts and fears." Possible scores range from 0 to 60 with higher scores indicating greater family hardiness.

Family relations and cohesion:

The Family Relations and Cohesion Scale[29] was used to measure the emotional bond between family members. The measure asks participants questions such as, "I listen to what other family members have to say, even when I disagree," "Family members ask each other for help," "Family members feel very close to each other," and "We can easily think of things to do together as a family" utilizing a four-point Likert scale ranging from "not true" to "always true or most always." Possible scores range from 6 to 24 with higher scores indicating closer, more cohesive relations among family members.

Social support:

Using the 17-item Social Support Index[30], social support was evaluated by the extent to which an individual is integrated into the community and views the community as a support source. Participants responded to items such as, "If I had an emergency, even people I do not know in this community would be willing to help," and "People can depend on each other in the community," on a five-point Likert scale ranging from "strongly disagree" to "strongly agree." Scores range from 17 to 68 with higher scores indicating greater degrees of social support.

Data Analysis:

One-way ANOVAs (for categorical IVs) and correlational analyses (for continuous IVs) were conducted with the demographic, health-related, psychosocial, family and community level variables to examine statistically significant relationships with the four mental quality of life variables. Based on these results, four separate multiple linear regression models were built and tested for each mental quality of life subscale. Therefore, for each mental quality of life subscale, only significant demographic and health-related variables were included in the first step, only significant individual psychosocial variables were included in the second step, and only significant family and community level variables were included in the final step. All analyses were performed using the SPSS 22 statistical package, all tests two-sided, and significance was set at $p < .05$.

Due to the small sample size and missing data in this pilot study, bootstrapping was utilized during the regression analyses. Regression diagnostics were analyzed for each of the four multiple regression models, including multicollinearity, Cook's Distance, leverage, Mahalanobis distance, homoscedasticity, and distribution of residuals. Based on the results from each set of diagnostics, only the homoscedasticity assumption was violated. To correct for this violation, we used bootstrapping methods. Therefore, one thousand bootstrap samples were generated, as well as 95% bias corrected and accelerated (BCa) confidence intervals for each of the four multiple regression models.

Results

Demographic and Descriptive Statistics:

The final analytic sample included 101 colorectal cancer survivors. Descriptive statistics of study variables are presented in Table 1. The age of the sample ranged from 50 to 90 years (M=69.4, SD=11.3), and the average participant was 5.4 years from diagnosis (SD=1.7). The sample had slightly more men than women (51.0% male), and the majority of the sample was married (68.4%), highly educated (79.2% of participants reporting having completed some college or higher), and not working (66.7%).

Correlates of Mental Quality of Life:

Results of ANOVAs and correlational analyses indicated that different demographic and health-related factors were significantly related to each of the mental quality of life subscales. Therefore, each regression table reflects the specific significant relationships between demographic, health-related facts and the subscale of interest. The psychosocial factors (perceived stress, constructed meaning, perceived control, fear of

Table 1. Descriptive Statistics of the Sample.

Patients				
Variables	M (range)	(SD)	N	(%)
Gender (male)			50	(51)
Age (years)	69.4 (50 to 90)	(11.3)		
Marital Status[a]				
Unmarried			15	(15.3)
Married/Partnered			67	(68.4)
Widowed			16	(16.3)
Level of Education[b]				
High School			20	(20.8)
College			76	(79.2)
Employment Status[c]				
Working Part-Time			7	(7.1)
Working Full-Time			20	(20.2)
Not Working			66	(66.7)
Years Since Diagnosis	5.4 (1 to 11)	(1.7)		
Treatment Received				
Chemotherapy			42	(50)
Radiation			19	(20.7)
Surgery			91	(95.8)
Other			11	(12)
Comorbidity	2.3 (0 to 9)	(1.9)		
Symptoms	6.8 (0 to 22)	(4.7)		
Fear of Recurrence	9.9 (4 to 20)	(3.6)		
Perceived Stress	12.7 (0 to 27)	(5.7)		
Constructed Meaning	16.0 (9 to 30)	(3.9)		
Perceived Control	12.7 (4 to 20)	(3.9)		
Family Hardiness	48.00 (26 to 60)	(7)		
Family Cohesion	19.7 (9 to 24)	(3.4)		
Social Support	50.8 (2 to 68)	(9.1)		
Mental Health	53.0 (27.97 to 64.54)	(8)		
Vitality	51.3 (27.62 to 67.88)	(9.4)		
Role Emotional	49.5 (11.35 to 56.08)	(10.2)		
Social Functioning	51.7 (26.27 to 56.57)	(8.8)		

[a] Unmarried marital status = divorce, separated, or never married.

[b] High school = individuals who completed at least some high school education, College = individuals who completed at least some college education.

[c] Not working = individuals who are retired, homemakers, or other situations.

recurrence), and family and community level factors (family relations and cohesion, social support, and family hardiness) were all significantly correlated with each of the four subscales, and thus included in all regression analyses. The complete correlation matrix can be found in Table 2.

Models of Mental Quality of Life

Multiple linear regression models were developed for each of the four mental health quality of life subscales. Below we describe the results for each model separately.

Role emotional:

The overall model explained 45.2% of the variance in the role emotional subscale and can be found in Table 3. The first step included the demographic and health variables of employment status, living arrangement, comorbidity, and symptoms. Together these variables explained 23.2% of the variance (Adjusted R^2= .232, p=.000). The addition of the individual psychosocial factors accounted for a significant amount of the variance explained over and above the demographic and health-related variables (R^2 change= .159, p=.002). More perceived stress (b= -.432, p=.049) emerged as an unique, significant predictor of worse role emotional scores over and above the other predictors. The family and community level factors also explained a significant portion of the variance in scores over and above the variance explained by the demographic and individual variables (R^2 change= .098, p=.005). Specifically, higher family relations and cohesion scores (b= .701, p=.045) and increased social support (b= .279, p=.031) emerged as unique, significant predictors of better role emotional scores.

Mental health:

The overall regression model explained 46.1% of the variance in mental health (Table 3). The demographic and health related variables (receipt of radiation and symptoms) accounted for 11.9% of the variance in mental health (adjusted R^2= .119, p=.003). The individual psychosocial variables accounted for an additional 29.0% of variance explained, over and above the demographic and health related factors (R^2 change= .290, p=.000). Higher perceived stress (b= -.439, p=.001) and constructed meaning (b= -.645, p=.005) were significant, unique predictors of worse mental health. The family and community level factors explained an additional 9.1% of the variance in mental health, a significant increase over and above the explanation of the demographic and health and psychosocial factors (R^2 change= .091, p=.000). Higher social support was found to be a unique, significant predictor of better mental health (b= .303, p=.003).

Social functioning:

The overall model explained 30.2% of the variance in social functioning and can be found in Table 4. The demographic and health related variables included in the model (receipt of radiation, comorbidity, and symptoms) accounted for 24.8% of the variance explained in social functioning (Adjusted R^2= .248, p=.000). The individual psychosocial variables did not provide a significant increase in the variance explained over and above the demographic variables (R^2 change= .037, p=.454). However, the family and community level factors, taken as a whole, explained an additional 8.0% of the variance in social functioning, contributing significantly over and above both the demographic and individual variables (R^2 change= .080, p=.042).

Vitality:

The overall model accounted for 45.5% of the total variance in vitality (Table 4). The demographic and health-related variables included in the first step of the model were receipt of radiation, comorbidity, and symptoms. The demographic and health-related variables explained 34.1% of the variance (Adjusted R^2= .341, p=.000). The individual psychosocial factors added an additional 13.4% of the variance explained in vitality (R^2 change= .134, p=.002). The family and community level variables did not provide a significant

Table 2. Correlation Matrix of Study Variables.

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Comorbidity	-												
2. Perceived Stress	0.14	-											
3. Constructed Meaning	0.16	.37**	-										
4. Family Cohesion	0.02	-.24*	-.29**	-									
5. Social Support	-0.08	-.26**	-.38**	.41**	-								
6. Family Hardiness	-.22*	-.33**	-.31**	.56**	.44**	-							
7. Perceived Control	-0.11	-.33**	-.39**	.35**	.32**	.45**	-						
8. Vitality	-.37**	-.32**	-.51**	.26*	.21*	.43**	.30**	-					
9. Social Functioning	-.32**	-.25**	-.37**	.38**	.22*	.43**	.30**	.54**	-				
10. Role Emotional	-.43**	-.30**	-.38**	.42**	.26*	.39**	.26*	.53**	.44**	-			
11. Mental Health	-0.06	-.54**	-.49**	.38**	.41**	.44**	.33**	.44**	.32**	.51**	-		
12. Fear of Recurrence	.25*	.29**	.46**	-.27*	-.26*	-.48**	-.47**	-.43**	-.32**	-.37**	-.29**	-	
13. Symptoms	.46**	.35**	.41**	-.31*	-.26**	-.37**	-.25*	-.52**	-.44**	-.39**	-.34**	.32**	-

* = significant at the .05 level; ** = significant at the .01 level

Table 3. Multiple Linear Regression Analysis Predicting Role Emotional and Mental Health.

	Role Emotional[a]				Mental Health[b]			
Correlate	B	SE B	beta	p	B	SE B	beta	p
Demographics								
Employment	-.098 (-3.251, 3.013)	1.777	-0.005	0.956	-	-	-	-
Living Arrangement	-3.883 (-9.820, 2.016)	2.56	-0.169	0.15	-	-	-	-
Comorbidity	-1.150 (-2.285, -.066)	0.489	-0.238	0.025	-	-	-	-
Symptoms	-.059 -.059 (-.519, .491)	0.238	-0.031	0.807	.008 (-.263, .339)	0.147	0.005	0.95
Radiation	-		-	-	2.342 (-.298, 5.292)	1.404	0.131	0.081
	Adjusted R^2 **= .232, *p = .000***				**Adjusted R^2 = .119, *p = .003***			
Individual psychosocial factors								
Perceived Stress	-.432 (-.850, -.002)	0.216	-0.275	0.049	-.439 (-.662, -.238)	0.116	-0.334	0.001
Constructed Meaning	-.534 (-1.193, -.036)	0.318	-0.233	0.099	-.645 (-1.082, -.295)	0.214	-0.35	0.005
Perceived Control	-.021 (-.521, .440)	0.279	-0.008	0.928	.172 (-.189, .653)	0.205	0.089	0.373
Fear of Recurrence	.029 (-.542, .723)	0.313	0.011	0.929	.107 (-.407, .705)	0.253	0.05	0.665
	R^2**Change = .159, *p = .002***				R^2 **Change = .290, *p = .000***			
Family and community psychosocial factors								
Family Relations and Cohesion	.701 (.169, 1.288)	0.325	0.269	0.045	.198 (-.207, .557)	0.221	0.094	0.357
Social Support	.279 (.058, .482)	0.12	0.236	0.031	.303 (.120, .541)	0.1	0.315	0.003
Family Hardiness	-.212 (-.615, .257)	0.22	-0.158	0.353	-.070 (-.328, .126)	0.122	-0.064	0.547
	R^2 **Change = .098, *p = .005***				R^2 **Change = .091, *p = .000***			

Note: The values with a '-' indicate that these correlates were not included in the regression model because ANOVA and/or correlation analyses were not significant.

[a]Adjusted R^2 for Role Emotional final model = .452, $p < .001$.

[b]Adjusted R^2 for Mental Health final model = .461, $p < .001$.

[c] 95% bias corrected and accelerated confidence intervals (BCa) reported in parentheses

Table 4. Multiple Linear Regression Analysis Predicting Social Functioning and Vitality.

	Social Functioning[a]					Vitality[b]			
Correlate	B		SE B	beta	p	B	SE B	beta	p
Demographics									
Radiation	-1.804 (-6.525, 3.881)		2.409	-0.082	0.458	-1.691 (-7.066, 3.637)	2.332	-0.075	0.464
Comorbidity	-1.069 (-2.376, .359)		0.643	-0.226	0.105	-.571 (-1.724, .567)	0.596	-0.118	0.322
Symptoms	-.276 (-.768, .332)		0.242	-0.143	0.265	-.433 (-.960, .230)	0.275	-0.219	0.116
	Adjusted R^2 = **.248, *p* = *.000***					Adjusted R^2 = **.341, *p* = *.000***			
Individual psychosocial factors									
Perceived Stress	.066 (-.306, .409)	0.202		0.04	0.751	-.174 (-.428, .081)	0.15	-0.103	0.257
Constructed Meaning	-.378 (-1.082, .110)	0.36		-0.166	0.284	-.495 (-1.049, -.130)	0.311	-0.212	0.108
Perceived Control	-.032 (-.776, .502)	0.33		-0.013	0.923	.203 (-.252, .716)	0.281	0.078	0.489
Fear of Recurrence	-.030 (-.634, .777)	0.335		-0.011	0.927	-221 (-.842, .532)	0.319	-0.081	0.478
	R^2 **Change = -.037, *p* = *.454***					**R^2 Change = .134, *p* = *.002***			
Family and community psychosocial factors									
Family Relations and Cohesion	.546 (-.151, 1.144)	0.334		0.21	0.112	-.056 (-.762, .572)	0.314	-0.021	0.85
Social Support	.018 (-.205, .241)	0.124		0.015	0.866	.104 (-.211, .439)	0.152	0.085	0.489
Family Hardiness	.229 (-.219, .647)	0.218		0.169	0.283	.214 (-.109, .491)	0.179	0.154	0.238
	R^2 **Change = .080, *p* = *.042***					R^2 **Change = .026, *p* = *.320***			

[a] Adjusted R^2 for Social Functioning final model = .302, $p < .001$.

[b] Adjusted R^2 for Vitality final model = .455, $p < .001$.

[c] 95% bias corrected and accelerated confidence intervals reported in parentheses

improvement in explanation over and above the demographic and psychosocial variables (R^2 change= .026, p=.320).

Discussion

These findings provide novel information about often overlooked family and community resources. These results may provide both clinical implications for health care providers and implications for interventions focused on improving the mental quality of life of survivors of colorectal cancer. We identified specific demographic, health related, individual psychosocial, and family and community level factors associated with decrements in the mental quality of life in survivors of colorectal cancer. Family and community level factors played a unique role over and above individual factors.

Family and community level resources were found to significantly relate to mental quality of life in colorectal cancer survivors. Specifically, role limitations due to mental health issues, social functioning, and mental health were all impacted by family and community resources. These findings support past literature in which higher levels of cohesion and support were associated with higher levels of mental quality of life[17] [21] [32] [33] [34]. Clinical efforts should be directed toward enhancing family cohesion and support among families and communities in order to increase the mental quality of life of colorectal cancer survivors.

Research on interventions that include family level variables are promising[35], but there is a need for interventions to include more family and community level factors in order to better the mental quality of life in cancer survivors. The literature and the results of this study suggest that close relations, cohesion, hardiness, and support are integral parts of a cancer survivor's mental quality of life, and therefore, should be an integral part of interventions. In addition, many psychosocial interventions only focus on the early diagnostic or treatment phase[36]; thus, there is a need to focus on long-term cancer survivors as well, as the research demonstrates that these colorectal cancer survivors still suffer in various domains of their mental quality of life.

Although not the primary focus of the current study, the results suggest an important role of symptoms in the mental quality of life of colorectal cancer patients. Role limitations due to mental health, poorer social functioning, worse mental health, and lower vitality were all significantly impacted by physical symptoms. Taken as a whole, these results suggest that some survivors may be struggling with adverse consequences of treatment and symptom burden. These findings are supported by previous work that has found that some cancer complications can persist for 10 years after diagnosis of colorectal cancer[6], and identify the need for continued attention to treatment related effects and the need to manage post-treatment impact on mental quality of life.

Our findings should be interpreted in light of potential limitations. The response rate was relatively modest, suggesting the sample may not reflect the qualities and characteristics of colorectal cancer survivors in the U.S. Additionally, we were unable to gather information on the demographic characteristics of the non-responders, and were unable to make comparisons between this group and the study sample. This may introduce bias into our results as those who responded may be significantly different from those who did not, potentially limiting the generalizability of these findings. However, these findings are certainly noteworthy and have potential for clinical importance and should be replicated in larger population based studies. The cross-sectional nature of the study limits the ability to determine causal pathways so it is possible some of these relationships are bi-directional.

Conclusion

Our pilot study focused on different correlates of mental quality of life in an understudied segment of the cancer population. Findings suggest different correlates affect different domains of mental quality of life, and interventions addressing specific aspects of mental quality of life may need to be targeted. The results of this study offer some areas to focus on, including symptom management, type of treatment received, perceived stress, constructed meaning, family cohesion and relations, and family and community social support. By focusing on the positive aspects of constructed meaning and family cohesion, clinicians can identify and employ the strengths of the family and individual when addressing mental quality of life issues of colorectal cancer survivors. Future research and clinical work should focus on gaining a deeper understanding of the relationship between a family's and community's strength and durability and how these family and community characteristics may improve or inhibit patients' mental quality of life. Lastly, one important challenge is that many participants in the current study were just over 5 years from diagnosis – a time when many colorectal cancer survivors are transitioning from oncology care to care from their primary care physician. So the question remains who is responsible for recognizing and referring patients who may be at risk for decrements in mental quality of life.

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