Published in final edited form as:

Psychosomatics. 2009 ; 50(2): 138–146. doi:10.1176/appi.psy.50.2.138.

Uncertainty, Symptoms and Quality of Life in Persons with Chronic Hepatitis C Undergoing Watchful Waiting

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Abstract

Chronic hepatitis C (CHC) is the most common blood-borne infection in the U.S., but little is known about illness uncertainty in these patients. In this cross-sectional study, Mishel's Uncertainty in Illness Scale (MUIS) was used to examine the constructs of illness uncertainty (ambiguity, complexity, inconsistency, unpredictability) and their relationships to fatigue, pain, depressive symptoms, co-morbidity, and quality of life (QOL) in 126 CHC patients undergoing a watchful waiting protocol. The ambiguity subscale had the strongest relationships with depressive symptoms, QOL, and fatigue. Three of the four subscales were significantly correlated with pain. Our results suggest targets for patient self-management interventions.

Illness uncertainty, which occurs when patients are unable to define the meaning of illness-related events, is a major psychological stressor for those with life-threatening illness.^{1,2} Uncertainty occurs in situations where the decision maker cannot assign definite values to objects and events and/or is unable to accurately predict outcomes because sufficient cues are lacking. Uncertainty develops if the patient cannot formulate a cognitive schema for illness events.

While chronic hepatitis C (CHC) is the most common blood-borne infection in the U.S. and affects at least 4 million individuals, little is known about illness uncertainty in CHC patients undergoing a watchful waiting protocol. Watchful waiting is sometimes referred to as observation, expectant management, active monitoring, or deferred treatment. Foster³ was an early advocate of a wait and see approach for patients with CHC who had biopsy proven mild disease. Today, up to 50% of patients with CHC are not undergoing active treatment

because a) the benefits of therapy are unclear for those who are asymptomatic, have co-morbid illnesses or are elderly; b) they have relapsed after treatment or discontinued therapy due to troublesome side effects; or c) they have elected to forego treatment.^{4–6}

Unless there is an exacerbation of illness, patients with CHC who are not receiving active treatment are typically seen every 6 to 12 months by their healthcare provider, with alanine aminotransferase serum (ALT) values monitored at each visit; subsequent liver biopsies may be performed every 4 to 5 years. Lack of aggressive treatment can leave patients wondering how the illness will unfold in the future. Thus, patients in watchful waiting must live with uncertainty about disease progression and simultaneously manage life with illness.

One way to explore illness-related uncertainty in patients electing a watchful waiting approach to chronic hepatitis C is with the Mishel Uncertainty in Illness Scale (MUIS-A).⁷ The MUIS has been available since 1981 and has undergone repeated psychometric evaluation. Four factors have been identified: *ambiguity* (bodily cues about the state of the illness are unclear or ever-changing and they may be confused with other illness concerns), *complexity* (treatment management or the healthcare system are difficult to understand), *inconsistency* (receiving information from health care providers that changes frequently or is not viewed as consistent with previously received information) and *unpredictability* (present illness experience is not congruent with prior illness experiences). Unlike prior studies, we systematically examine whether the subscales of the MUIS relate differently to other variables of interest. Our findings may have important substantive and practical implications. On a substantive level, they may enable us to understand which specific dimensions of the MUIS (ambiguity, complexity, inconsistency of unpredictability) affect respondent health and well-being (fatigue, pain, depressive symptoms, co-morbidity, quality of life). On a practical level, they may suggest subscale specific areas of intervention which may have the greatest impact on specific components of health and well-being. Sample items from each subscale are listed in Table 1.

The course of CHC is slow and insidious. Unfortunately, the first signs of ill health may manifest relatively late in the progression of the disease as joint pain, jaundice, ascites, end-stage liver disease or hepatocellular carcinoma; in the latter two conditions, the prognosis is poor.⁸ Individuals with CHC frequently experience symptoms such as fatigue, musculoskeletal complaints, depressive symptoms, and poorer quality of life (QOL).^{4,9–17} Fatigue, the physical symptom most commonly reported by individuals with CHC, affects patients' activities of daily living and their quality of life (QOL),¹⁸ and has been associated with depression in patients with CHC.¹⁹ Musculoskeletal complaints such as arthralgias (pain), arthritis (inflammation), backache, morning stiffness, and myalgias are also frequently reported in patients with CHC;^{20–23} a recent review provides compelling evidence of the link between Hepatitis C virus and rheumatic disorders.²⁴ Depression also is a significant problem for CHC patients. A recent study found depression rates of 59% in a sample of 157 patients who had not received treatment for CHC.²⁵ Kraus et al.²⁶ found that older patients (50–64 yr) and patients diagnosed for more than 5 years reported significantly higher levels of depressive symptoms than younger or newly diagnosed patients. QOL is negatively affected by CHC.^{27–32} A study of 642 CHC patients found that their QOL was significantly poorer than that of healthy controls.³³ In a study examining QOL and co-morbid illness in 220 CHC patients, those with no co-morbid conditions reported lower levels of QOL than the general population; patients with co-morbidities reported even lower levels of QOL; and those with three or more co-morbid conditions reported the lowest QOL.³⁴

Persons with CHC who report adverse physical and psychological problems may experience symptom exacerbation from the uncertainty inherent in chronic illness.^{35,36} In a sample of

CHC patients not receiving treatment, 41% said that they did not know the effects that CHC would have on their health.³¹ Bergmann³⁷ found moderate levels of uncertainty in patients diagnosed six years with the disease; patients with higher levels of uncertainty reported lower levels of emotional well-being and increased stress. Conrad et al.³⁸ found that uncertainty and fear were major themes in focus group interviews with CHC patients.

In CHC, evidence suggests that illness uncertainty stems from the newness of the disease and the incomplete knowledge in the medical community about it, loss of control, and the unpredictability of the disease trajectory and prognosis.^{38–41} The experience of uncertainty with CHC may become more apparent as the illness progresses and becomes more serious. However, uncertainty may also be common in asymptomatic patients, and it may increase when these patients experience fatigue, musculoskeletal complaints or depression. Thus, over time, illness uncertainty may undermine patients' quality of life.

The MUIS-A was developed for use with hospitalized or acutely ill adults.⁷ However, this measure has also been used extensively with chronically ill populations including HIV, cystic fibrosis, renal disease and multiple sclerosis. In this cross-sectional study, the MUIS-A was used to examine the constructs of illness uncertainty and their relationship to fatigue, musculoskeletal complaints (pain), depressive symptoms, co-morbidity, and QOL in patients with CHC undergoing watchful waiting.

METHODS

Design

This study is part of a larger longitudinal descriptive study of CHC-related illness uncertainty, symptoms, and QOL in patients who were cooperating with their healthcare providers to monitor their disease through a watchful waiting protocol consisting of regularly scheduled clinic appointments and laboratory testing. A convenience sampling strategy was used to recruit participants who were not receiving active treatment for their disease. The setting for participant recruitment was the GI clinic of a tertiary care medical center located in a southeastern state. After approval by the Committee for the Protection of Human Subjects, a nurse or research assistant met with eligible patients following their scheduled clinic appointments to explain the study and answer questions. Patients who expressed a desire to think about participating were given a number to call, or the study staff member agreed to call the patient at home. All patients who agreed to participate were asked to sign a consent form.

Sample

A total of 135 individuals were invited to enroll in the study and 126 (93%) agreed to participate. Patients who did not participate declined because they were unable to schedule time for the interview or were concerned about their confidentiality. Inclusion criteria included English-speaking men and non-pregnant women over the age of 21, who had been diagnosed with CHC and were not receiving active treatment, had a telephone or access to a telephone, and residency in the state. Telephone access and state residency were necessary because additional data collection for this longitudinal study will occur over the telephone and in participants' homes. Patients co-infected with HIV were excluded as they may have been in active treatment for that disease and unable to differentiate the uncertainties of the two illnesses.

Measures

Participants completed a questionnaire in the clinic or by telephone at a convenient time, usually within 3 days of initial contact. They answered demographic questions about their

gender, age, race, and educational level, and provided basic illness information, including the reason for adopting watchful waiting. Participants also completed the following measures: Mishel Uncertainty in Illness Scale (MUIS-A); Revised Piper Fatigue Scale (RPFS); Bodily Pain subscale item from the Medical Outcomes Study, Short Form 36 (MOS-SF-36); Center for Epidemiological Studies Depression Scale (CES-D); and Cantril's Ladder, measuring quality of life. Participants were compensated with a \$20.00 gift card.

Uncertainty Measure—Illness uncertainty was measured with the original Mishel Uncertainty in Illness Scale (MUIS-A).⁴² A community form of the scale (MUIS-C) is available for use with chronically ill adults who may not be hospitalized or receiving medical intervention.⁷ However, the MUIS-A was selected for this group of CHC patients, who are at risk of acute illness and may require hospitalization, enroll in an experimental trial, or undergo evaluation for liver transplant during the course of the longitudinal study. The MUIS-A scale has 33 items, each scored from 1 (strongly disagree) to 5 (strongly agree), so that total scores range from 33–165. Participants respond to the items to describe how they are feeling today. The MUIS-A includes four subscales or factors, each representing a distinct dimension of uncertainty. The four factors use 32 of the 33 items (item 15 is not included in the four-factor form), and items were re-worded for this study to be specific to watchful waiting.

Established subscale reliabilities (Cronbach's alphas) are 0.86 for *ambiguity* (13 items), 0.81 for *complexity* (7 items); 0.78 for *inconsistency* (7 items) and 0.65 for *unpredictability* (5 items), which Mishel has retained for theoretical reasons.⁷ Mishel reported a Cronbach's alpha of 0.87 for the total scale,⁷ indicating a high level of internal consistency. In this study, Cronbach's alpha for the MUIS-A was 0.90.

Symptom Measures—Fatigue was measured with the Revised Piper Fatigue Scale (RPFS),⁴³ which is composed of 22 items with responses ranging from 0–10. Four dimensions of fatigue are measured: behavioral/severity, affective meaning, sensory and cognitive/mood. The RPFS is scored by summing the scores on all items and dividing the total by 22, which keeps the total score on a 0 to 10 numeric scale. Five open-ended questions are included for participants to provide information on symptom distress not captured in the quantitative ratings; those qualitative data are not included in the score. Piper et al.⁴³ report a Cronbach's alpha of .97 for the scale; in this study, the value was .99.

Musculoskeletal complaints were measured using one of the two items in the Bodily Pain subscale of the MOS-SF-36.⁴⁴ The item used in this study assesses the amount of bodily pain experienced during the past 4 weeks, using a scale ranging from 1 (none) to 6 (very severe). The mean value reported in this study was 3.0 (SD=1.5), representing mild pain.

Depressive symptoms were measured with the 20-item Center for Epidemiological Studies Depression Scale (CES-D)⁴⁵ with all items scored yes=1/no=0.⁴⁶ The total score can range from 0–20, with scores ≥ 9 representing clinically significant depressive symptoms.⁴⁶ Participants respond to the items based on how they have felt during the past week. Cronbach's alpha in this study was .92.

Co-morbidity Index—The Co-morbidity Index was used to assess the number of co-morbid conditions. The 26 conditions were adapted by Satariano et al.⁴⁷ from those used by the Human Population Laboratory in the Alameda County survey. Each item is scored 1 if the condition is present, 0 otherwise. The total score is summed across items and can range from 0 to 26.

Quality of Life Measure—Quality of Life was measured with Cantril's Ladder,^{48,49} which asks participants to rate their life now and in 6 months on a scale from 0–10, with 0 representing the worst possible life and 10 the best possible life. The measure is global and allows patients to respond according to facets of their lives they believe are most important.

Analysis

Bivariate Pearson correlations were used to (1) examine relationships among the subscales of the Mishel Uncertainty in Illness Scale (MUIS-A), and (2) determine whether the associations of the subscales with demographic variables and other symptom measures differ in magnitude or direction. In examining relationships between the uncertainty subscales and other variables of interest, we also estimated partial Pearson correlations to determine whether particular subscales accounted for relationship(s) between uncertainty and these other variables.⁵⁰ Correlations in Tables 3 and 4 were estimated with SAS PROC CORR,⁵¹ and regression results in Table 5 were estimated using SAS PROC REG.⁵¹

RESULTS

Data regarding participant characteristics, their rationales for watchful waiting, and means and standard deviations of measures used in the study are shown in Table 2. Participants identified themselves as Caucasian, African American, Latino, Asian American, American Indian, or of mixed race. Their ages ranged from 27–78 yr (mean=53); years of education ranged from 7–22 yr (mean=14).

The mean MUIS-A total score for this sample was 87.3 (SD 17.6, range 33–165), indicating a moderate level of illness uncertainty. The mean score on the Revised Piper Fatigue Scale was 3.3 (SD=3.15, range 0–10), indicating mild levels of fatigue. The mean score on the CES-D for this sample was 5.9 (SD= 5.6) (range 0–20), 3 points below the recognized level for clinically significant depressive symptoms. The number of co-morbidities reported by participants ranged from 0–13 with a mean of 4, representing a total of 5 health problems for the sample. The mean score on the SF-36 pain measure was 3.0 (SD=1.5, range 1–6) representing mild levels of discomfort. The mean score for the Cantril's Ladder item assessing current quality of life was 6.9 (SD=2.5) indicative of a moderate to high quality of life.

Bivariate correlations among the MUIS-A subscales are shown in Table 3. To stage our findings, the four subscales with their definitions are described. *Ambiguity* is defined as unclear or ever-changing bodily cues about the state of the illness that may be confused with other illness concerns. *Complexity* refers to difficulty understanding one's treatments or the healthcare system. *Inconsistency* is characterized by frequently changing or inconsistent messages from the healthcare provider. *Unpredictability* is defined as incongruence between the present and prior illness experience.⁷ Ambiguity and inconsistency were highly correlated ($r=.83$), suggesting that there may be considerable overlap between these two uncertainty subscales. In contrast, correlations of complexity with both ambiguity and inconsistency were more moderate in magnitude ($r<.55$). Unpredictability was not significantly correlated with either ambiguity or inconsistency, but did show a small positive correlation with complexity ($r=.22$). In general, the pattern of correlations shown in Table 3 suggests the possibility that there may be differences among MUIS-A subscales with respect to their patterns of association with health-related and/or demographic measures.

The correlations shown in Table 4 confirm this outcome. Although both ambiguity and inconsistency were strongly and significantly correlated with scores on all five health-related measures, complexity was correlated only with three (fatigue, depressive symptoms, QOL), and unpredictability with two (pain and fatigue). Correlations between uncertainty subscales

and health-related measures were generally strongest for ambiguity (correlated with measures of depressive symptoms, pain, and fatigue at levels above or approaching 0.50). Associations between the inconsistency subscale and health-related measures were comparable in direction but not quite as strong. All correlations between uncertainty subscales and health-related measures were positive for the four health-related measures in which higher scores indicate more severe symptomatic distress, and negative for the QOL measure, in which lower scores indicate decreased or worsening quality of life. Fewer significant correlations were seen between scores on uncertainty subscales and demographic variables. Ambiguity, inconsistency, and complexity scores were negatively correlated with years of education. Only one other correlation (between inconsistency and age) was significant at $p < .05$.

The strength of the positive correlation between the ambiguity and inconsistency subscales (Table 3) and the similarity in relationships of scores on the two subscales with other variables of interest (Table 4) suggest that at least some of the bivariate correlations listed in Table 4 may be spurious. For example, the positive correlation between complexity and depressive symptoms ($r = .23$, Table 4) may be due to the facts that complexity is correlated with ambiguity ($r = .47$, Table 3), and ambiguity is correlated with depressive symptoms ($r = .51$, Table 4). This issue is addressed with the partial correlations shown in Table 5. For each subscale, partial correlations estimate the relationships between that subscale and the demographic and health-related variables, while controlling for each of the other three subscales.

For depressive symptoms, quality of life, and fatigue, ambiguity is the only uncertainty subscale having a significant partial correlation ($p < .01$). This indicates that the significance of the correlations between these health-related measures and other uncertainty subscales seen in bivariate analysis may be due to the positive correlations between those subscales and ambiguity. Both ambiguity and unpredictability have significant positive partial correlations with the pain measure, while complexity has significant negative partial correlations with the pain item and with co-morbidity. In contrast, none of the partial correlations between uncertainty subscales and demographic measures were significant at $p < 0.05$. For example, the negative correlations between years of education completed and the ambiguity, complexity, and inconsistency subscales are reduced to a single negative trend (for inconsistency) when controls are applied (Table 5). This pattern suggests that the most of the covariation between education and these uncertainty subscales is joint variation – shared by education on the one hand and the three subscales (jointly) together on the other. As a result, the partial correlation procedure is unable to disentangle and estimate associations between each specific subscale and education.

DISCUSSION

The findings here have both substantive and practical implications. On a substantive level, the partial correlations in Table 5 indicate that the ambiguity component of the uncertainty scale (unclear or ever-changing bodily cues about the state of one's illness) exerts the strongest effect on relationships between illness uncertainty and health-related measures such as depressive symptoms, quality of life, and fatigue. However, with regard to levels of depression, pain and fatigue, the participants in this study were minimally affected; moderate levels of illness uncertainty were seen as the main problem. On a practical level, these patterns suggest that interventions designed to ameliorate depressive symptoms, quality of life, or fatigue should be tailored to help patients deal with their uncertainty about illness cues rather than problems associated with overly complex or inconsistent information from the health care system. Nursing interventions designed to teach patients to self-manage their disease must be preceded by assessment of patients' coping styles and perceptions of

medical threat,⁵² current levels of disease monitoring, and educational levels. Patients can also be taught self-care management behaviors to improve their dietary intake, eliminate alcohol, and maintain an ideal body weight. Providing and helping patient process information and identifying sources for up-to-date information may enhance their ability to self-manage the uncertainty related to vague or ever-changing bodily cues.

Positive and significant partial correlations between pain and three of the subscales (ambiguity, unpredictability, and complexity) raise the possibility that interventions tailored to manage these components of uncertainty may lead to a reduction in the patients' perception of pain. Co-morbidity is also related to complexity (in Table 5), and trends are present for inconsistency and unpredictability, but these relationships are mostly weaker in magnitude than those involving pain.

Mishel² describes four primary methods to manage symptom and medical uncertainty associated with chronic conditions. They include the following: 1) creating cognitive schemas and a normative framework for the illness; 2) developing timelines and benchmarks; 3) managing unpredictability; and 4) focusing on the positives to maintain hope. Patients can be taught to cognitively rearrange information in a manner that provides a satisfactory explanation for their illness-related symptoms and concerns. The uncertainty or ambiguity of the illness-related event may facilitate the development of these schemas. Providing information and promoting self-care behaviors also support the creation of a normative framework, which permits the ill individual to redefine the uncertain situation as one that is manageable. Timetables and benchmarks can be created cognitively and graphically by the patient with support from the healthcare provider to manage symptoms and medical uncertainty. Teaching patients to manage unpredictability involves a) focusing on the present and containing or limiting the investment of energy in future activities, and b) filtering information such that the individual gives serious consideration only to information that is perceived as supportive in order to minimize internal conflict. Lastly, patients can be taught to view their illness in a new light and according to Mishel (1990), they can use uncertainty to reorganize and recreate their life view. Uncertainty can serve as the catalyst for them to move from an old life view with limited choices to a new one with multiple opportunities.

Identifying the constructs of uncertainty in patients undergoing watchful waiting for chronic hepatitis C is an essential step in understanding their experiences and developing interventions to target their specific needs for uncertainty management. Subscale items related to bodily symptoms and the watchful waiting protocol itself contributed to participants' level of uncertainty. However, this study has identified ambiguity as a primary construct of the illness uncertainty experienced by patients who were watching and monitoring their disease in conjunction with their healthcare provider. Patient responses to ambiguity such as limiting investment of energy in future activities, acting only on information they perceive as important, and favoring nonthreatening explanations of symptoms could lead to suboptimal outcomes. These potential dangers should be taken into consideration when developing interventions that target ambiguity in watchful waiting for CHC.

This study is limited by the small sample size, the cross-sectional data, and the lack of a control group. Furthermore, the ambiguity effects on depressive symptoms, QOL, and fatigue are of medium rather than large magnitude, suggesting that ambiguity is one of several factors which are at work and which might be addressed by practitioners. Future analyses could include examining levels of uncertainty and symptoms by reasons for watchful waiting. Some patients could require more intensive intervention for uncertainty

and CHC-symptoms than others, depending upon whether they elected or defaulted to watchful waiting because of treatment side effects or failure.

These findings can be used to refine an Uncertainty Management Intervention for Watchful Waiting (UMI-WW) that has been successfully tested and found effective in men undergoing watchful waiting for localized prostate cancer.⁵⁴ Future research could test the UMI-WW in the understudied and vulnerable population of patients with CHC. Tailoring the UMI-WW to address ambiguity might significantly improve patients' ability to incorporate uncertainty into their lives. Before attempting such interventions, it will be important to make a preliminary assessment of how the intervention can best be implemented in the CHC population.

Acknowledgments

This study was supported by research grants from the National Institute of Nursing Research (NIH/NINR: 1 R15 NR 008794-01A1, Bailey, PI; and NIH/NINR: 1P20NR07795-01, Clipp, PI).

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Table 1

Mishel Uncertainty in Illness Scale: Sample items by subscale with modifications for watchful waiting participants.

Ambiguity Items	
3	I am unsure if my illness is getting better or worse.
13	Watchful waiting is too complex to figure out.
26	Because of watchful waiting, what I can do and cannot do keeps changing.
Complexity Items	
6	The purpose of watchful waiting is clear to me.
28	Watchful waiting has a known probability of success.
33	The doctors and nurses use everyday language so I can understand what they are saying.
Inconsistency Items	
1	I don't know what is wrong with me.
11	The doctors say things to me that could have many meanings.
22	The results of my tests are inconsistent.
Unpredictability Items	
12	I can predict how long my illness will last.
27	I'm certain they will not find anything else wrong with me.
30	My physical distress is predictable; I know when it is going to get better or worse.

Notes. $N = 126$. Cronbach's alpha = .90.

Scoring range for each item is from 1 (*strongly agree*) to 5 (*strongly disagree*).

Items 6, 12, 27, 28, 30, and 33 are reversed when total score is calculated.

Table 2

Characteristics of CHC Patients in Sample (n=126).

Demographic Measures	N	% of total	Mean	SD
Age (years)	126		53.1	9.4
Race/Ethnicity				
African American	49	38.9%		
White	69	54.8%		
Hispanic/Latino	2	1.6%		
American Indian	2	1.6%		
Asian	1	0.8%		
Other	3	2.3%		
Total	126	100.0%		
Gender				
Male	62	49.2%		
Female	64	50.8%		
Education (years)	126		13.5	2.7
Health-related Measures				
Mishel Uncertainty (sum)	116		87.1	17.6
Mishel Uncertainty (ambiguity)	126		35.2	10.2
Mishel Uncertainty (complexity)	118		16.4	4.1
Mishel Uncertainty (inconsistency)	126		15.7	5.6
Mishel Uncertainty (unpredictability)	121		18.0	3.4
CES-D Score (depressive symptoms)	126		5.9	5.6
Cantril quality of life	126		6.9	2.5
Comorbidity (# of conditions)	122		4.1	2.7
Pain_1 (SF-36, bodily pain)	126		3.0	1.5
Piper Fatigue Scale (summary score)	126		3.3	3.1
Reasons for Watchful Waiting				
1. Did not want treatment	22	17.4%		
2. Stopped due to no response from treatment	44	35.0%		
3. Stopped because of treatment side effects	20	15.9%		
4. Relapsed after completing treatment	21	16.7%		
5. Mental health concerns of physician	8	6.3%		
6. Other to include the following	11	8.7%		
co-morbid health conditions (6)				
early stage disease (2)				
newly diagnosed and unsure about treatment (2)				
no insurance (1)				
Total number of participants	126	100.0%		

Table 3

Bivariate Pearson Correlations among Mishel Uncertainty in Illness Scale subscales (N=126).

Measures	MUIS ambiguity	MUIS complexity	MUIS inconsistency	MUIS unpredictability
MUIS (ambiguity)	1.00	0.47 **	0.83 **	0.03
MUIS (complexity)		1.00	0.53 **	0.22 *
MUIS (inconsistency)			1.00	-0.05
MUIS (unpredictability)				1.00

NOTE:

**
indicates $p < .01$;*
indicates $p < .05$.

Table 4

Bivariate Pearson Correlations of Mishel Uncertainty in Illness Scale subscales with health-related and demographic measures (N=126).

Measures	MUIS ambiguity	MUIS complexity	MUIS inconsistency	MUIS unpredictability
Health-Related Measures				
CES-D	0.51 **	0.23 *	0.39 **	0.06
Cantril	-0.37 **	-0.19 *	-0.24 **	-0.10
Comorbidity	0.33 **	0.07	0.33 **	0.10
Pain_1	0.50 **	0.12	0.38 **	0.25 **
Piper Fatigue ^a	0.48 **	0.22 **	0.35 **	0.20 *
Demographic Measures				
Age	0.15 ⁺	0.15 ⁺	0.21 *	0.02
White	-0.03	-0.14	-0.06	0.08
Female	0.01	0.08	-0.06	0.05
Education	-0.28 **	-0.21 *	-0.33 **	-0.06

NOTE:

** indicates $p < .01$;

* indicates $p < .05$;

⁺ indicates $p < .10$.

^aCorrelations among the Revised Piper Fatigue subscales all exceeded 0.86. For this reason, we used the overall Piper summary score rather than the subscales in our analyses.

Table 5

Partial Pearson Correlations of Mishel Uncertainty in Illness Scale Subscales with health-related and demographic measures (N=126).

Measures	MUIS ambiguity	MUIS complexity	MUIS inconsistency	MUIS unpredictability
Health-Related Measures				
CES-D	0.36 **	−0.01	−0.05	0.04
Cantril	−0.30 **	−0.04	0.12	−0.07
Comorbidity	0.10	0.17 *	0.16 ⁺	0.15 ⁺
Pain_1	0.35 **	−0.22 *	0.04	0.31 **
Piper Fatigue	0.35 **	−0.03	−0.06	0.20
Demographic Measures				
Age	−0.05	0.04	0.14	0.03
White	0.03	−0.16 ⁺	−0.00	0.12
Female	0.06	0.12	−0.12	0.00
Education	−0.01	−0.03	−0.16 ⁺	−0.06

NOTE:

** indicates $p < .01$;

* indicates $p < .05$;

⁺ indicates $p < .10$.