

EMPIRICAL CONTRIBUTIONS

Medical Coping Modes Questionnaire: Factor Structure for Adult Transplant Candidates

James R. Rodrigue, Shannon I. Jackson, and Michael G. Perri

This study examined the psychometric properties of the Medical Coping Modes Questionnaire, a rationally and empirically constructed instrument that purports to measure 3 cognitive-behavioral, illness-related coping strategies. The original 3-factor solution as derived by Feifel et al. (1987a) was tested and compared to 2 additional theoretically derived 1- and 2-factor models using confirmatory factor analysis. Because goodness of fit criteria were not acceptable, and because transplant candidates may use different coping strategies than general medical patients, principal components factor analysis was performed. In addition, internal consistency and construct validity of revised scales and their relation to demographic variables were assessed. A sample of 372 liver, kidney, heart, lung, and bone marrow transplant patients was used. Exploratory factor analysis revealed 4 factors (with an acceptable number of items) that accounted for 45.81% of the variance and consisted of 16 of the original 19 items. Generally, the Avoidance and Acceptance/Resignation subscales were replicated, and the Confrontation scale was split into 2 factors: Social Support Seeking and Information Seeking. Correlations between revised factors and measures of affective distress and quality of life were in the directions expected. Implications for the use of this measure with transplant candidates are discussed.

Key words: coping, organ transplantation, psychological assessment

Advancements in tissue typing and immunosuppressant medications have made organ transplantation a viable treatment option for patients with many end-stage organ

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diseases. Specifically, in the last 20 years, there have been notable technological advances in kidney, heart, liver, pancreas, lung, intestine, and bone marrow transplantation. There are now over 270 transplant centers in the world. These centers reported performing 19,998 transplants from January to December of 1997 (United Network for Organ Sharing [UNOS], 1998), representing a significant increase over the number of transplants performed in previous years. In addition, more patients are surviving for longer periods of time after transplantation. One-year survival graft rates continue to improve, ranging from 58.8% (intestinal transplant) to 93.2% (living kidney transplant) in 1995.

Unfortunately, the availability of suitable organs has not increased enough to meet the growing demand for transplants, resulting in larger numbers of persons on waiting lists. Over 58,000 patients were awaiting a transplant as of August 31, 1998 (UNOS, 1998). Nevertheless, medical management of patients awaiting transplants has improved, and survival rates for those on waiting lists are correspondingly higher. Because (a) the number of transplant candidates is steadily increasing, (b) waiting periods continue to increase, and (c) recipients are surviving for longer periods of time, interest has grown in the psychological aspects of transplantation.

There are extraordinary stressors associated with organ failure: terminal illness, the decision to undergo transplantation, awaiting a potentially suitable organ, surgery, and post operative recovery. The emotional and psychiatric aspects of organ transplantation have been described in numerous case studies and clinical samples (Craven & Rodin, 1992). In addition, empirical evidence of psychological correlates of kidney, heart, liver, and bone marrow transplantation has been documented (see Rodrigue, Greene, & Boggs, 1994). Nevertheless, research on the psychological aspects of transplantation remains in its infancy, and there are still wide gaps in our knowledge of the psychological concomitants of these procedures.

COPING: CONCEPTUAL AND METHODOLOGICAL ISSUES

Coping can be seen as a mediational variable between antecedent stressful events and such consequences as psychological distress and somatic symptoms. Most coping researchers have adopted a model that focuses on conscious processes or reactions to external stressful events (Endler & Parker, 1990b, 1993; Folkman & Lazarus, 1980). As such, coping may be most simply conceptualized as an individualized cognitive, affective, and behavioral attempt to reconcile a perceived discrepancy between situational demands and a personal capacity or competence (see Endler, 1988; Endler, Parker, & Summerfeldt, 1993; Lazarus & Folkman, 1984).

A variety of scales have been developed to assess basic coping styles (e.g., Carver, Scheier, & Weintraub, 1989; Endler & Parker, 1990a, 1990b; Folkman &

Lazarus, 1980, 1988; Rosenstiel & Keefe, 1983). Research has identified several modes of coping such as (a) active coping, (b) passive coping, (c) information seeking, (d) social support, (e) emotion-focused coping, and (f) problem-focused coping. These categories tend to overlap conceptually (e.g., problem-focused coping is typically viewed as a type of active coping strategy), lending to some confusion regarding the validity of such constructs. As noted elsewhere (Endler & Parker, 1990b, 1993; Parker & Endler, 1992), many existing coping measures suffer from a variety of psychometric inadequacies: nonexistent empirical validation of coping subscales, unstable or unsubstantiated factor structures, and inadequate construct validity. In addition, coping measures are typically constructed using single homogeneous populations (e.g., college students) and researchers typically fail to examine potential demographic differences in coping, making comparisons and generalizations across various populations problematic (Endler et al., 1993).

Despite methodological inconsistencies, some definitive conclusions can be drawn about the relation between coping and mental or general health status. Generally, research suggests that strategies deemed "passive" (e.g., avoidance and acceptance/resignation) lead to less favorable health outcomes than those deemed "active" (Brown & Nicassio, 1987). Of note, however, the relation between coping and an outcome is a bit more complex than this simplified explanation would suggest. For example, emotion-focused coping is sometimes considered a passive approach. Findings suggest, however, that emotion-focused coping is an active and effective coping strategy in situations that are appraised as unchangeable (Folkman & Lazarus, 1980), but passive and less effective in situations appraised as changeable. Thus, the relative effectiveness of a particular coping strategy depends not only on the severity of the stressor and the extent of the individual's personal resources, but also on cognitive appraisal of the situation. Other individual characteristics (e.g., perceived self-efficacy) may influence the appraisal of the situation as well. Overall, coping can be thought of as a regulatory process intended to maintain homeostasis in a complex, multidetermined system.

HEALTH AND COPING

The relation between health and coping has long been acknowledged (Auerbach, 1989; Endler & Parker, 1990b, 1993). The rationale for the coping construct's importance relative to health status was made explicit by Sachs (1991) "failure to cope well with stress can enhance illness ... adequate coping reflects psychological strength that promotes health" (p. 61). According to diathesis-stress models of illness (e.g., Levi, 1974), coping variables are conceptualized as crucial mediators in the interplay between physiological predispositions toward illness (diathesis) and the influence of psychological and environmental stimuli or demands (see Taylor, 1990, 1991).

The antecedent demands to coping have traditionally been studied in the form of environmental stressors such as daily hassles and crises. More recently, however, health problems themselves have been regarded as important stressors that place demands on physiological, behavioral, and psychological systems. In addition, a relatively recent development in coping research has been the construction of measures designed to assess coping specifically in the medical patient population. The relation between health and coping styles assessed by these measures has been a popular topic (Auerbach, 1989; Endler & Parker, 1990b; Parker & Endler, 1992; Taylor, 1990, 1991). See Endler et al. (1993) for a review of conceptual and methodological issues in coping assessment and health.

Endler et al. (1993) noted that one of the most important distinctions in the coping area has been between measures that attempt to assess basic coping styles and measures that attempt to assess coping responses specific to a particular situation or problem (Endler & Parker, 1990a; Folkman, Lazarus, Dunkel-Schetter, DeLongis, & Gruen, 1986; Parker & Endler, 1992). This is sometimes referred to as the distinction between *interindividual assessment* (the assumption of relatively stable coping styles) and *intraindividual assessment* (the assumption of dynamic, situation specific coping styles). The measurement of illness-related coping may be considered an intraindividual approach because it assesses coping in response to a specific stressor.

Of particular relevance to this article, Endler et al. (1993) noted a general failure to address coping issues specific to medically ill populations, or a failure to adequately address intraindividual assessment. This approach would assume that patients use different coping strategies to deal with a life threatening illness than those coping strategies used to deal with less threatening, everyday stressors. Based on this logic, the assessment of illness-related coping may provide information that is more relevant to health outcomes than the assessment of global coping strategies that may not be consistent across stressful situations. If one considers the inter- and intraindividual approaches on a continuum of global, stable coping styles to more situation-specific repertoires of coping strategies, respectively, critics may argue that a strict intraindividual approach is too restrictive. In fact, a measure designed to assess coping in a specific medically ill population (e.g., diabetics) may not be at all useful for the measurement of coping in a different medically ill population (e.g., cancer patients). Thus, it would seem advantageous to develop a measure that lies somewhere in the middle of the interindividual/intraindividual continuum, enabling the identification of a set of basic coping responses associated with a diverse set of illnesses.

COPING AND TRANSPLANTATION

Given the duration and intensity of stress associated with end-stage organ disease, coping strategies may play a key role in transplant outcome. Indeed, psychosocial

variables such as coping have been associated with outcome in organ transplantation, both pre- and postoperatively (e.g., Dew et al., 1994; Shapiro et al., 1995). For example, Dew et al. (1994) found that heart transplant recipients relying on avoidant styles of coping were more likely to have consistently elevated mean anxiety levels posttransplant, suggesting that this tactic of coping was not beneficial. Research has also shown that heart transplant patients who consistently use religious coping report better mental and general health (Sears, Rodrigue, Greene, Fauerbach, & Mills, 1997), and heart transplant patients reporting the use of optimistic coping, such as keeping a sense of humor, report better mental and general health (Cupples, Nolan, Augustine, & Kynoch, 1998). Given such evidence that coping is intimately related to mental and general health status, coping strategies are routinely evaluated in the context of psychosocial pretransplant assessments.

These findings must be considered in light of evidence that the use of specific coping strategies by transplant patients appears to shift over time. Particular coping strategies may dominate and prove more effective at specific stages in the transplant process. For example, Sutton and Murphy (1989) found that 24 to 48 months after renal transplant, patients tend to use more affective-oriented coping methods, but 2 to 4 years posttransplant, patients tend to use more problem-oriented coping styles. In addition, Rodrigue, Boggs, Weiner, and Behen (1993) found that bone marrow transplant candidates tend to employ a more confrontive coping style than patients with a non life-threatening medical condition.

Folkman and Lazarus (1980) reported that the relative predominance of affective and problem-oriented coping styles depends on the appraisal of the stressful situation. Problem-oriented forms of coping increase in situations appraised as changeable, and affective-oriented coping is heightened in situations perceived as not amenable to change. This is consistent with findings that affective coping is more effective in situations deemed unchangeable and problem-oriented coping is more effective in situations deemed changeable. Thus, transplant candidates and recipients in the early months after transplant may feel they have less control over their health and rely on more affective oriented coping, than do recipients who live with a transplant for a longer period of time. It is also conceivable that, during the pretransplant stage, individuals may strive for greater mastery and control over their medical situation as they begin to anticipate the loss of control they may feel immediately posttransplant.

MEDICAL COPING MODES QUESTIONNAIRE (MCMQ)

As originally conceived by Feifel, Strack, and Nagy (1987b), the MCMQ is a 19-item questionnaire that purports to measure the extent to which patients use three cognitive-behavioral coping strategies (Confrontation, Avoidance, and Acceptance-Resignation) in dealing with their illness. The measure was constructed fol-

lowing a combination of rational and factor analytic procedures from a pool of coping strategies commonly reported by medical patients (Feifel et al., 1987b). It is a frequently used measure of coping in medical patients (e.g., Rodrigue et al., 1993).

The MCMQ may overcome some of the aforementioned conceptual problems in coping assessment, because items are concerned with coping in response to a medical condition, but the items are not illness specific. Thus, when assessing coping in medical patients, the MCMQ has the advantage of specificity as opposed to more global coping measures. Granted, most global coping measures instruct the respondent to think of one stressor or stressful situation when answering questions. However, there is no guarantee that respondents will consider their medical condition or the stressors specific to that condition when such instructions are given. In addition, relative to most coping measures (e.g., Ways of Coping, Folkman & Lazarus, 1988; COPE, carver, Scheier, & Weintraub, 1989; Jalowiec Coping Scale, Jalowiec, Murphy, & Powers, 1984; etc.), the MCMQ is brief and easily administered.

Initially, Feifel et al. (1987b) compared MCMQ scores of patients with life threatening illnesses (i.e., cancer, heart disease) to patients with non-life-threatening illnesses (i.e., rheumatoid arthritis, orthopedic disability, and dermatologic ailment). Consistent with findings by Rodrigue et al. (1993), results showed that life-threatened patients were significantly more confrontive than non-life-threatened patients. In a subsequent study, Feifel, Strack, and Nagy (1987a) showed that Acceptance–Resignation as a coping strategy was associated with longer illness, expression of negative affect, negative self-perception, and gloomy expectations about recovery.

Relations between MCMQ subscale scores and mental/general health outcomes have been borne out in other studies as well. For example, Ashby and Lenhart (1993) reported a positive correlation between diverting attention/praying/hoping as measured by the Coping Strategies Questionnaire and the Avoidance subscale of the MCMQ in chronic pain patients. In addition, higher scores on these scales were related to greater self-reported disability. Similarly, Rodrigue et al. (1993) found that scores on the acceptance–resignation subscale of the MCMQ were associated with higher levels of state anxiety, trait anxiety, and depression in bone marrow transplant candidates, and Lenhart and Ashby (1996) reported that MCMQ avoidance subscale scores significantly contributed to measures of disability in persons with chronic pain. Finally, Rodrigue and Hoffman (1994) found that caregivers of adults with cancer who reported high distress, clinically significant anxiety, and clinically significant depression also reported significantly greater use of avoidant coping strategies as measured by the MCMQ. These findings are consistent with previous research suggesting that, generally, passive approaches to coping (e.g., avoidance and acceptance/resignation) are less effective than active approaches to coping (Brown & Nicassio, 1987).

Regarding the psychometric properties of the MCMQ, Feifel et al. (1987a) and others (e.g., Ashby & Lenhart, 1994; Lenhart & Ashby, 1996) reported moderate

to high alpha coefficients (.56–.74) for the three subscales. In addition, Shapiro, Rodrigue, Boggs, and Robinson (1993) found four coping profiles of cancer patients (confrontive, avoidant, acceptant–resigned, and nondominant) using the MCMQ. Despite such evidence of internal consistency, construct validity, and utility, the original MCMQ was developed based on responses from a select sample of primarily White, male medical patients. This raises questions regarding the stability of the factors, as well as the generalizability of the scales. The comparison of factors across patient populations is important because the extent to which factors replicate provides further support for generalizability and construct validity (Bandalos & Benson, 1990).

The primary purpose of this study was to test the three-factor structure of the MCMQ in a diverse patient population. More specifically, we tested the factor structure in a sample of liver, kidney, heart, lung, and bone marrow transplant candidates with gender and racial distributions that are representative of the general medical population. Although there were no a priori hypotheses regarding one- and two-factor models, the three-factor structure was tested against one-factor (general medical coping) and two-factor (active vs. passive) models for purposes of statistical comparison. In addition, internal consistency and construct validity were examined.

METHOD

Participants and Procedure

The participants were 372 transplant patients who received a psychological assessment in 1997 prior to placement on a transplant list. As part of comprehensive, multidisciplinary evaluations, transplant candidates at the University of Florida Health Science Center routinely undergo a psychological assessment. This assessment typically involves a clinical interview and the completion of several psychological assessment measures, including the MCMQ.

The sample consisted of 108 bone marrow, 104 liver, 75 heart, 57 lung, and 28 kidney transplant candidates. The mean age of the sample was 47.47 years (range: 5–76; $SD = 11.47$) and consisted of 56% men and 44% women. The sample was 82% White, 12% African American, 3% Hispanic, and 3% unclassified ethnicity. Sixty-four percent of the sample was married, and 28% of the participants were employed. The average years of formal education was 12.84 ($SD = 2.40$). Mean duration of illness was 44.10 months ($SD = 61.29$).

Measures

MCMQ. The MCMQ (Feifel et al., 1987b) is a 19-item questionnaire designed to assess three cognitive–behavioral, illness-related coping strategies: Confrontation, Avoidance, and Acceptance–Resignation. Sample questions include

“How much do you want to be involved in decisions regarding your treatment?” and “How often do you try to talk about your illness with friends or relatives?” Items are answered on a four-point continuum ranging from 1 (*never*) to 4 (*very much*). Feifel et al. (1987a) reported that internal consistency estimates using Cronbach’s alpha were moderate: confrontive (.70), avoidance (0.66), and acceptance–resignation (.67). They noted that coping modes are not considered to be as stable as personality traits, and generally lower internal consistency estimates may be expected on measures of coping. In addition, they reported excellent construct validity based on a personality measure (i.e., Test of Interpersonal Style; Nideffer, 1976), a set of questions asking patients about their attitudes toward and coping reactions to their illness, and responses to a questionnaire from patients’ physicians and significant others.

The following measures were used to assess the validity of the MCMQ. These measures were chosen because of their psychometric properties (i.e., reliability and validity), their frequent use in health psychology research, and their frequent use in the psychosocial assessment of transplant candidates.

Short Form–36 Health Survey (SF–36). The SF–36 (McHorney, Ware, & Raczek, 1993) is a 36-item survey of disease impact and illness-related quality of life. It yields standard scores (0–100) on eight domains: Physical Functioning, Role Functioning–Physical, Bodily Pain, General Health, Vitality, Social Functioning, Role Functioning–Emotional, and Mental Health. These scales were generated from various health status measures designed to assess mental and physical health. Internal consistency estimates range from .77 to .92 in a sample of over 3,000 adults.

Transplant Symptom Frequency Questionnaire (TSFQ). The TSFQ (McNaughton, Rodrigue, Cicale, & Staples, 1998; Sears, Rodrigue, Greene, & Mills, 1995) was designed to assess the frequency and distress associated with 33 physical and mental symptoms. These symptoms may be associated with medical illness and immunosuppression (e.g., headaches, fatigue, impotence, etc.). Patients report the frequency of each symptom on a scale ranging from 0 (*never*) to 4 (*always*) and whether it is a problem for them. Total scores for symptom frequency (0–132) and symptom problems (0–33) are calculated.

Psychosocial Adjustment to Illness Scale (PAIS–SR). The PAIS–SR (Derogatis & Derogatis, 1990) is a 46-item measure with a Likert-type response format. It was originally devised for use with cancer patients and their families and it is still widely used to assess psychosocial adjustment in persons with cancer (Gotay & Stern, 1995) and other medical conditions (e.g., Engle, Callahan, Pincus, & Hochberg, 1990; Fricchione et al., 1992). The PAIS–SR covers seven domains of functioning: Health Care Orientation, Vocational Environment, Domestic Environment, Sexual Relationships, Extended Family Relationships, Social Environ-

ment, and Psychological Distress. Sample items include: "In general, how do you feel about the quality of medical care available today and the doctors who provide it?", "Has your illness interfered with your ability to do your job?", and "Has your illness resulted in a decrease in communication between you and members of your family?" Generally, high scores are indicative of poor adjustment. Merluzzi and Sanchez (1997) reported that internal consistency estimates using Cronbach's alpha were moderate (.61-.92). Furthermore, they reported that PAIS-SR factor scores were correlated with measures of disease impact, adjustment, social support, coping, and medical demographic information.

Beck Depression Inventory (BDI). The BDI (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961) is a 21-item measure comprised of severity ratings for 13 cognitive-affective and 8 somatic symptoms of depression, yielding a possible range of scores from 0 to 63. (Scores of 10 or higher are considered clinically significant.) Consistently high levels of validity and reliability have been reported (Beck, Steer, & Garbin, 1988; Kendall, Hollon, & Beck, 1987). Over the past two decades, the BDI has become one of the most widely accepted instruments in clinical psychology and psychiatry for assessing depressive symptomology (Piotrowski, Sherry, & Keller, 1985).

State-Trait Anxiety Inventory (STAI). The STAI (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983) evaluates feelings of tension, apprehension, nervousness, and worry via participants' responses to 40 statements that comprise two, 20-item scales (State Anxiety and Trait Anxiety). The response format is a four point scale ranging from 1 (*not at all*) to 4 (*almost always*). Sample items include: "I feel calm", "I feel pleasant", and "I feel nervous." The State portion requires respondents to indicate how they feel "right now" and the Trait portion requires respondents to indicate how they "generally feel." Test-retest reliability estimates range from .69 to .87 (Barker, Barker, & Wadsworth, 1977; Spielberger et al., 1983).

Confirmatory Factor Analysis (CFA)

A recent development in factor comparison procedures is CFA. CFA using linear structural equation modeling allows testing of a priori models, whereas traditional exploratory factor analysis does not allow for specification of an exact factor structure. Using the LISREL-8 (Jöreskog & Sörbom, 1993) statistical program, a model can be specified and then tested for the degree to which it fits the current data, which is not possible with principal components/factor analysis (Hair, Anderson, Tatham, & Black, 1992). The sample correlation matrix is compared to the correlation matrix implied by the original model using a chi-square statistic and other goodness of fit indexes.

Although Likert-type scales are often considered interval data, in actuality the data are ordinal. Jöreskog and Sörbom (1993) recommend the use of polychoric correlations (as opposed to Pearson product-moment correlations) and weighted least squares factoring procedures in this case. Raw data were analyzed by PRELIS 2.0 (Jöreskog & Sörbom, 1989) to produce an asymptotic covariance matrix, which was used as a weight matrix in obtaining weighted least squares estimates of the parameters of the models. The analysis of the measurement models was performed using LISREL-8 (Jöreskog & Sörbom, 1993).

Validation of Hypothesized Factors

There are several indexes available for evaluating the goodness of fit of a model to current data. However, no single statistic sufficiently estimates the adequacy of a model. We used five measures of fit. First, we computed the ratio of chi square to degrees of freedom (χ^2/df). As the ratio of chi-square value to degrees of freedom decreases and approaches zero, the fit of a model increases. Generally agreed upon value ranges are from 3-1 to as high as 5-1 (Hair et al., 1992). We also examined one measure of relative fit: the goodness-of-fit index (GFI). The GFI is a nonstatistical measure ranging in value from 0 (*poor fit*) to 1 (*perfect fit*), which reflects the relative amount of variance and covariance jointly explained by the model. GFI values of .90 or larger are acceptable (Hair et al., 1992). The adjusted-goodness-of-fit index (AGFI) is a modification of the GFI, taking into account the number of degrees of freedom used to achieve the level of fit. We also used the expected cross validation index (ECVI), which is useful for selecting one of several competing models hypothesized a priori, with the lowest value preferred (Hair et al., 1992; Stevens, 1996). The ECVI was used in statistically comparing one-, two-, and three-factor models. Finally, we evaluated the root mean square error of approximation (RMSEA), which corrects for the tendency of the chi-square to reject a sufficiently large sample, and represents the discrepancy between the observed and predicted matrices per degree of freedom (Hair et al., 1992). Hair et al. suggested that RMSEA values between .05 and .08 indicate good to moderate fit.

RESULTS

Demographic Data

Table 1 presents demographic characteristics of the study sample by transplant type. Chi-square analyses and one-way analyses of variance (ANOVAs) were performed to compare the demographic characteristics of the groups. Kidney patients were younger than all other groups ($p < .05$), and bone marrow patients were significantly younger than lung ($p < .05$) and heart ($p < .005$) patients. There were more men in the heart group than all other groups ($p < .001$). Education levels were not

TABLE 1
Demographic Characteristics x Transplant Type

	<i>Transplant Type</i>														
	<i>Bone Marrow</i>			<i>Liver</i>			<i>Heart</i>			<i>Kidney</i>			<i>Lung</i>		
	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>
Age (years)	108	44.6	12.0	104	49.7	8.9	75	50.3	11.7	28	37.3	12.4	57	50.1	10.2
Education	105	13.4	2.8	101	12.6	2.2	73	12.5	2.2	28	12.4	1.8	54	12.8	2.4
Sex															
Male	49			56			59			16			28		
Female	59			48			16			12			29		
Ethnicity															
White	90			91			63			11			49		
African American	13			5			7			13			5		
Hispanic	1			7			1			1			0		
Native American	1			0			1			0			1		
Other	3			1			2			3					
Employment															
Employed	46			27			21			3			7		
Not employed	62			77			54			25			50		
Disability status															
Disabled	69			73			51			23			49		
Not disabled	39			31			24			5			8		

significantly different. Significantly more lung and kidney patients were unemployed ($p = .004$) and a greater proportion of kidney patients were African American ($p = .015$).

Transplant Type Comparability

Because the sample consisted of patients with multiple types of end-stage organ disease (kidney, heart, bone marrow, liver) that have different courses and physical effects and, therefore, may have implications for coping, one-way ANOVAs were performed to evaluate differences in original MCMQ factor scores across transplant type. Results revealed no significant differences on each of the three factor scores: Confrontation, $F(5, 328) = 1.69, p = .14$; Avoidance, $F(5, 362) = 1.32, p = .25$; Acceptance/Resignation, $F(5, 362) = .86, p = .51$. Therefore, transplant types were combined for subsequent analyses.

Tests of Single-, Two-, and Three- (Feifel) Factor Models

The results of the first series of analyses of the proposed factor structure of the MCMQ are presented in Table 2. The fit statistics for the single factor model ($\chi^2/df = 4.77$, GFI = .88, AGFI = .85, and RMSEA = .20) indicate that the sample data do not support the hypothesis that the MCMQ consists of a single underlying construct. Avoidance and Acceptance/Resignation factor items were combined to form a two-factor model consisting of Confrontive/Active and Passive/Resistant coping. Testing a two-factor model did not lead to a significant decrease in the chi-square value: $\chi^2(1, n = 373) = 61.69$. In addition, fit statistics ($\chi^2/df = 4.39$, GFI = .89, AGFI = .86, and RMSEA = .09) indicate that the sample data do not support the hypothesis that the MCMQ consists of two underlying constructs. The two-factor model accounted for 38% of the variance/covariance in the sample data. Testing the three-factor model did not lead to a significant decrease in the chi-square value as compared to the two-factor model, $\Delta\chi^2(1, n = 373) = 48.56$, or the one-factor model, $\chi^2(1, n = 373) = 110.25$. In addition, fit statistics ($\chi^2/df = 4.12$, GFI = .90, AGFI = .87, and RMSEA = .09) indicate that the sample data do not support the hy-

TABLE 2
Comparison of Single, Two, and Three Factor Models

<i>Models</i>	χ^2/df	χ^2/df	<i>GFI</i>	<i>AGFI</i>	<i>ECVI</i>	<i>RMSEA</i>
Single-factor	725.07/152	4.77	.88	.85	2.16	.20
Two-factor	663.38/151	4.39	.89	.86	2.00	.09
Three-factor	614.82/149	4.12	.90	.87	1.88	.09

Note. GFI = Goodness of Fit Index; AGFI = Adjusted Goodness of Fit Index; ECVI = expected cross validation index; RMSEA = root mean square error of approximation.

pothesis that the MCMQ consists of three underlying constructs. The three-factor model accounted for 42% of the variance/covariance in the sample data.

At this point, none of the proposed models appear to adequately fit the data. Sources of misfit can be assessed by permitting correlated error terms or allowing items to load on more than one factor. Typically, these restrictions are removed as guided by modification indexes produced by LISREL. However, we recognize that post hoc model fitting capitalizes on chance (Jöreskog & Sörbom, 1993) and introduces complexity in interpretation. In addition, one-, two-, and three-factor models appear to have relatively equally poor explanatory power. Therefore, we decided not to respecify the models proposed, but rather to pursue explanatory factor analyses.

Principal Components Analysis (PCA)

It is possible that transplant patients use a different constellation of coping responses than the sample of medical patients used by Feifel et al. (1987b). In addition, the primary purpose of pretransplant assessment is the potential prediction of posttransplant outcome. Therefore, PCA with a varimax rotation procedure was conducted to identify the underlying dimensions that explain responses to the MCMQ in this sample. This yielded five factors with an Eigenvalue greater than one, which accounted for 53.31% of the total variance (Table 3). In interpreting the factors, item inclusion criteria were as follows: the primary loading must be greater than .40 and any secondary loading must be a minimum of .20 less than the primary loading. Using these criteria, Factor 5 retained only a single item and, therefore, was dropped. The remaining four factors accounted for 47.07% of the variance.

Table 4 contains the results of the varimax rotated component analysis, with loadings ranging from .559 to .803, and a comparison of these factors with the factor structure derived by Feifel et al. (1987b). In the current data, two factors closely resembled those proposed by Feifel et al.: Avoidance and Acceptance/Resignation. Interestingly, the original Confrontation scale was divided into two distinct subscales in this analysis.

TABLE 3
Results of Extraction of Components

<i>Factor</i>	<i>Eigenvalue</i>	<i>Percentage of Variance</i>	<i>Cumulative Variance</i>
1	3.78	19.87	19.87
2	2.48	13.07	32.95
3	1.46	7.68	40.62
4	1.23	6.45	47.07
5	1.19	6.24	53.31

TABLE 4
Factor Loadings for Medical Coping Modes Questionnaire Items
and Comparisons to Previous Three Factor Solution

<i>Scale</i>	<i>Item Loading</i>	<i>Previous Factor Solution</i>
<i>Avoidance</i>		
3. In conversation about your illness, how often do you find yourself thinking about other things?	.614	AV
7. To what extent do you like talking to your friends and family because you won't have to think about your illness?	.746	AV
9. When you think about your illness, how often do you try to distract yourself by doing something else?	.758	AV
17. How often do you go to the movies or watch TV in order not to think about your illness?	.755	AV
<i>Social Support</i>		
2. How often do you try to talk about your illness with friends or relatives?	.803	CF
16. When you meet someone with your kind of illness, how much do you talk about the CF details of the illness?	.605	CF
19. When close relatives or friends ask you about your illness, how often do you talk to AV them about it?	.775	AV
<i>Information Seeking</i>		
5. In the past few months, how much have you learned about your illness from talking with others who know something about it, such as doctors, nurses, and so forth?	.741	CF
12. In the past few months, how much have you learned about your illness from reading books, magazines, or newspapers?	.821	CF
15. How many questions have you asked your doctor about your illness?	.599	CF
<i>Acceptance / Resignation</i>		
4. How often do you feel there is really no hope for your recovery?	.746	A/R
13. How often do you just feel like giving in to your illness?	.673	A/R
18. To what extent do you feel there is nothing you can do about your illness?	.694	A/R
<i>Items Dropped</i>		
1. How much do you want to be involved in decisions regarding your treatment?		CF
6. How often do you feel that you don't care what happens to you?		A/R
8. How much has your illness caused you to think about certain things in your life in a more positive way?		CF
10. How often do you ask your doctor for advice about what to do concerning your illness?		CF
11. When friends or relatives try to talk to you about your illness how frequently do you try to change the subject?		AV
14. To what extent do you try to forget about your illness?		AV

Note. AV = Avoidance; CF = Conformation; A/R = Acceptance/Resignation; IS = Information Seeking; SS = Social Support.

Factor 1 contained items reflecting avoidance and consisted of four items from the original Avoidance subscale. Factor 2 consisted of items reflecting social support seeking. Two of the items were from the Confrontation subscale and one item was from the Avoidance subscale. Factor 3 consisted of three items reflecting information seeking that were originally part of the Confrontation subscale. Factor 4 consisted of three items that were part of the Acceptance/Resignation subscale. Six items were dropped because of insufficient or shared loadings. After unacceptable items were deleted, the four factors accounted for 45.81% of the variance. Pearson product-moment correlations between revised factors are presented in Table 5. Intercorrelations ranged from .06 to .30. Means and standard deviations for revised scale scores are presented in Table 6.

Coefficient alpha was calculated for each factor to assess internal consistency. In addition, the relative merit of the revised versus the original subscales was examined by comparing their internal consistency coefficients and scale intercorrelations on the sample used in this study (see Table 5). The Avoidance (Factor 1) and Information Seeking (Factor 3) subscales had the highest internal consistency ($\alpha > .70$), and the Social Support (Factor 2) and Acceptance/Resignation (Factor 4) subscales had lower levels of internal consistency ($\alpha = .58$ and $.52$, respectively), which could possibly be increased with the addition of a few more items. The revised subscales have slightly less overlap than the original subscales. The percentage of variance shared by any two scales is obtained by squaring the correlation for that pair. When the mean of these squared correlations was calcu-

TABLE 5
Comparison of Reliabilities and Scale Intercorrelations for
Original Verses Revised Subscales

<i>Scale</i>	<i>Original</i>	<i>Revised</i>
Reliabilities		
CF	.73	—
AV	.70	.70
A/R	.57	.52
IS	—	.63
SS	—	.59
Intercorrelations		
AV, AR	.33	—
AV, CF	-.20	—
CF, AR	-.19	—
AV, AR	—	.30
AV, IS	—	-.06
AV, SS	—	.06
SS, IS	—	.26

Note. AV = Avoidance; CF = Confrontation; A/R = Acceptance/Resignation; IS = Information Seeking; SS = Social Support.

TABLE 6
Revised Scale Scores by Transplant Type

	<i>Avoidance</i>		<i>Social Support Seeking</i>		<i>Information Seeking</i>		<i>Resignation</i>	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Kidney	7.67	2.62	7.32	1.49	8.53	2.24	4.29	1.41
Heart	7.45	2.59	6.94	1.30	8.85	1.85	4.56	1.44
Liver	7.34	2.32	7.29	1.13	9.19	2.06	4.40	1.47
Lung	7.68	2.97	7.01	1.28	8.47	2.26	4.95	1.74
Bone marrow	8.21	2.48	7.06	1.32	9.10	1.90	4.50	1.53
Combined groups	7.68	2.56	7.11	1.28	8.94	2.02	4.54	1.52

Note. Scales have different numbers of items and are not directly comparable unless converted to standardized scores.

lated across correlations, the measure of average shared variance was 16% for the revised scales, as compared to the original scale shared variance of 19%.

Construct Validity

Cronbach and Meehl (1955) argued that one form of evidence for the construct validity of a measure is the successful prediction of associations between theoretically related variables. Generally, models of stress (e.g., transactional model of stress; Folkman & Lazarus, 1980) predict that coping strategies should be related to one's response to stressors (e.g., anxiety, depression, quality of life). Thus, correlations between revised MCMQ subscales and subscales of the BDI, STAI, SF-36, TSFQ, and PAIS were calculated (see Table 7).

In this sample, BDI, SF-36, TSFQ, and PAIS scores were within normal limits when compared to general medical and surgical patient norms (see, Beck et al., 1988; Fricchione et al., 1992; McHorney et al., 1993; Spielberger, 1983). As expected, higher scores on Social Support and Information Seeking subscales, which are generally thought to be adaptive strategies, were correlated with better mental health and physical role functioning (SF-36) and lower scores in Health Care Orientation (PAIS). With these three exceptions, these subscales had little to no correlation with measures of affective distress or functioning. Conversely, correlations with Avoidance and Acceptance/Resignation subscales were moderate to high and in the directions expected. These strategies are generally thought to be maladaptive. As expected, scores high in Avoidance or Acceptance/Resignation were associated with higher depression (BDI); higher anxiety (STAI); poorer general psychological functioning (PAIS Psychological Distress subscale); and poorer general health, physical, and social functioning (SF-36).

Because associations between psychometric scale and demographic variables can confound a scale’s interpretation, we examined the degree to which the revised scales were associated with gender, age, education, and marital status. Multivariate analyses of variance were performed to assess differences in scale scores for gender and marital status. A significant effect was found for gender, $F(4, 329) = 3.68, p = .006$, such that women scored significantly higher on the Avoidance subscale than did men. A significant effect was also found for mari-

TABLE 7
Correlations of Revised MCMQ Scales and BDI, STAI,
TSFQ, SF-36, and PAIS Subscale Scores

	<i>Revised MCMQ Factors</i>			
	<i>AV</i>	<i>A/R</i>	<i>IS</i>	<i>SS</i>
BDI				
Cognitive	.34**	.36**	-.02	.09
Somatic	.27**	.26**	-.03	-.02
STAI				
State	.35**	.28**	-.10	.08
Trait	.43**	.35**	-.15**	.10
TSFQ				
Frequency	.29**	.22**	-.03	.05
Problem	.27**	.23**	-.01	-.02
SF-36				
General health	-.15**	-.28**	.04	.04
Mental health	-.35**	-.41**	.10*	-.02
Bodily pain	-.13*	-.15**	-.03	.03
Physical functioning	-.04	-.15**	-.04	-.03
Role functioning (emotional)	-.27**	-.18**	.06	-.06
Role functioning (physical)	-.11*	-.01	-.04	.29**
Social functioning	-.11*	-.17**	-.02	-.04
Vitality	-.09	-.09	-.02	.03
PAIS				
DOM	.17	.09	-.07	-.15
EFAM	.27	.24	.04	-.03
HCO	.23	.39**	-.36**	-.03
PSY	.33**	.48**	.11	-.07
SEX	.05	.04	.05	.05
SOC	.14	.11	.18	.13

Note. BDI = Beck Domestic Inventory; STAI = State-Trait Anxiety Inventory; TSFQ = Transplant Symptom Frequency Questionnaire; SF-36 Health Survey; PAIS = Psychological Adjustment to Illness Scale; AV = Avoidance; R = Resignation; IS = Information Seeking; SS = Social Support; DOM = Domestic Environment; EFAM = Extended Family Relationships; HCO = Health Care Orientation (satisfaction with health care/staff); PSY = Psychological Distress; SEX = Sexual Relationships; SOC = Social Environment.

* $p < .05$. ** $p < .01$.

tal status, $F(16, 996) = 2.22, p = .004$. Univariate F tests revealed that significant differences were found on the Information Seeking subscale, $F(4, 329) = 2.82, p = .025$. Pairwise comparisons showed that single participants scored lower than married ($p = .003$) or widowed ($p = .018$) participants on Information Seeking. Pearson product-moment correlations between age, number of years of formal education, and revised scales showed an inverse relation between age and Avoidance ($r = -.15, p < .01$) and education and Avoidance ($r = -.16, p < .01$). In addition, higher education was associated with higher Information Seeking ($r = .14, p < .01$).

DISCUSSION

This study used CFA to compare the goodness of fit of two rationally derived and one empirically derived factor solution of the MCMQ. Results indicated that these models were inadequate. Therefore, an item-level exploratory factor analysis was conducted to identify the underlying dimensions that explain responses to the MCMQ in this sample. Results of this analysis revealed a four-factor solution. Two of these factors closely resemble those proposed by Feifel et al. (1987b). The two remaining subscales resulted from the division of one of the original subscales.

The obtained factor structure supported the integrity of the Avoidance and Acceptance/Resignation subscales that were clearly the most robust. This replication provides some underlying support for the validity of these scales, although not all items from the original scales were retained. The Confrontation scale, however, was split into two separate scales: Information Seeking and Social Support. These revised scales more clearly delineate specific methods used in “confronting” one’s illness, and may provide more clinically relevant information than a general “confrontation” scale. In addition, Social Support and Information Seeking scales share less common variance with Avoidance and Acceptance Resignation subscales than did the original Confrontation scale.

As expected, scores high in Avoidance or Acceptance/Resignation were associated with more affective distress, poorer general health, and poorer quality of life. Information Seeking and Social Support subscales correlated with better mental health and functioning, although fewer correlations were found. In a study of coping strategies in pain patients, Robinson et al. (1997) noted that the association between adaptive coping strategies and measures of affective distress may be limited for at least two reasons. First, self-report measurement may merely reflect patients’ perceptions of the use of these strategies without consideration of context or effectiveness. In addition, improved affect may result from the decreased use of maladaptive coping strategies, rather than increased use of positive strategies. Nevertheless, it appears that the Avoidance and Acceptance/Resignation subscales, which are generally considered maladaptive coping strategies, may in-

deed be predictive of poorer adjustment to transplantation. In addition, data provide preliminary evidence that Social Support and Information Seeking are predictive of better adjustment to transplantation.

Revision and replication of measures across diverse samples lends support to construct validity and generalizability. Although the original factor structure of the MCMQ was not replicated with a larger and more diverse sample than that used to develop the measure, the revised subscales do appear to have adequate psychometric properties and we are encouraged about the continued use of this measure in the assessment of transplant candidates. Nevertheless, further refinement and confirmation of the MCMQ factor structure is warranted.

The Social Support and Acceptance/Resignation subscales had rather low internal consistency estimates. There are several potential explanations for such low alphas. First, as noted, the MCMQ was designed to measure coping modes that are assumed to be more consistent than states, but less consistent than personality traits. Feifel et al. (1987b) commented that "generally lower internal consistency estimates may be expected for coping scales, since one or two coping responses may alleviate stress and reduce the use of alternative responses within the same category" (p. 94). Second, other researchers have argued that coping behavior is situation-specific (Zuckerman, 1979) and that within-subject consistency and inter-item correlations should not be high (Cone, 1977). Third, our sample was composed of a heterogeneous group of patients with different types of diseases. Although we verified comparability in scale scores among different transplant groups, the possibility remains that groups may differ due to various demand characteristics of specific diseases. Despite these potential explanations for low internal consistency, the most likely culprit was too few items per subscale. Thus, we recommend the addition of items and subsequent exploratory factor analyses.

An additional limitation of this study should be noted. As this was a retrospective study, we were confined to the data available, which, unfortunately, did not include appraisal of the stressor (illness). Thus, we were unable to assess the influence of situation appraisal on coping styles. As mentioned, appraisal is intimately linked to the effectiveness of the coping strategy employed. In addition, our data were collected concurrently on a sample of transplant candidates. Thus, we were unable to evaluate the impact of various coping styles on health outcomes. Of particular interest would be the relations between coping, quality of life, graft loss/failure, and survival after transplantation.

Current data suggest that there may be important demographic differences in illness-related coping. Of particular interest, women reported more Avoidant coping than did men, single participants reported less Information Seeking than did married or widowed participants, and younger participants reported more Avoidant coping than did older participants. After refinement of the measure, these associations and potential mediating factors should be explored.

The potential for the MCMQ to be used in the assessment of coping among diverse samples of medical patients, representing a convergence of intra- and interindividual approaches, warrants efforts to improve the psychometric properties of the measure. Further, exploratory factor analyses are necessary with subsequent CFAs on large and diverse samples of medical patients. Future research should also explore concurrent validity, predictive validity, and associations with transplant outcome variables and outcomes of other medical procedures and treatments.

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