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## RESEARCH ARTICLE

# Endorsement Patterns on the Coping with Health Injuries and Problems (CHIP) Scale in Patients with Multiple Sclerosis: Further Validation of the Instrument and Examination of its Relationships with Demographic and Disease-Related Variables and Measures of Emotional, Physical, and Cognitive Status

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## ABSTRACT

This study examined the coping strategies of patients with multiple sclerosis using the Coping with Health Injuries and Problems (CHIP) scale and compared patient scores on this measure to demographic and disease-related variables as well as formal indicators of emotional, physical, and cognitive status. Participants were 41 patients diagnosed with MS who were referred for outpatient psychological or neuropsychological assessment. Participants ranged in age from 21-60 years ( $M = 42.32$  years,  $SD = 9.50$ ). Mean educational level and duration of multiple sclerosis diagnosis for participants were 14.63 years ( $SD = 2.27$ , range = 12-20 years) and 8.71 years ( $SD = 7.51$ , range = 1-38 years), respectively. In contrast to prior research and expectations, findings revealed that participants reported the highest degree of engagement in CHIP Instrumental Coping strategies followed by Distraction Coping strategies as opposed to Emotional Preoccupation. Scores of patients with multiple sclerosis on the Instrumental Coping and Distraction Coping subscales of the CHIP were found to be significantly higher than those of the scale's standardization sample. Results also indicated that engagement in Emotional Preoccupation was associated with poorer outcomes, in particular psychological adjustment. CHIP coping strategies were not found to be a function of age, educational level, duration of MS diagnosis, disability status, or gross global cognitive status. Findings provide further validation of the CHIP and support its use in assessing the coping strategies of patients with multiple sclerosis.

**Keywords:** coping, CHIP, multiple sclerosis, psychology, testing

## Introduction

Multiple sclerosis (MS) is a chronic autoimmune disease in which the body's immune system attacks the myelin sheath of axons in the central nervous system, resulting in inflammation, sclerotic plaques, axonal damage, and loss of neurons.<sup>1-2</sup> Because this neuropathology may occur within the brain, spinal cord, or both, manifestation of the disease varies to some degree from individual to individual but primarily involves sensory and/or motor disturbances. Specific symptoms of MS commonly include visual deficits, physical numbness/tingling, muscle spasms and weakness, incontinence, sexual dysfunction, and fatigue.<sup>2-6</sup> Estimates of the prevalence of neurocognitive impairment among individuals with MS varies from approximately 40% to 70%, with deficits commonly involving anterograde memory, speed of information processing, and concept formation.<sup>3,5,7-9</sup>

Onset of MS generally occurs between the ages of 15 and 50 years, and therefore the disease is a major cause of disability in young adults.<sup>10</sup> In light of the relatively young age of MS onset in conjunction with the chronic and potentially debilitating nature of the disorder, diagnosed individuals often experience significant emotional disturbances. Indeed, research has reported among patients with MS an estimated lifetime prevalence for major depression of 25-50% and anxiety of approximately 36%.<sup>11</sup> Consequently, MS also has been shown to detrimentally impact patients' quality of life<sup>11-12</sup> secondary to its effects on physical, cognitive, behavioral and/or emotional functioning.

The manner in which individuals respond to or cope with stressors has been shown to be significantly related to various health-related outcomes, both physical and psychological.<sup>13</sup> Coping, in its broadest sense, may be defined as a response directed at diminishing the burden linked to stressful life events and daily hassles.<sup>14</sup> This burden, or demand, is subjective in nature. It may arise as a result of internal or external events that are perceived as taxing.<sup>15</sup> Debate exists as to whether coping is a conscious process. Although evidence exists to support automatic, or unconscious, forms of coping<sup>16-17</sup>, it generally is considered to be an action within individual conscious awareness.<sup>14</sup> In this light, coping may be conceptualized as occurring in a series of stages, during which a constant reappraisal of the situation takes place and the outcomes of the specified coping strategy are evaluated and, if necessary, modified.<sup>15,18</sup> This assessment drives the coping process and determines the most efficacious strategy for dealing with the particular stressor(s) at a given point in time.<sup>19</sup>

Specific strategies for coping involve efforts through actions and/or thoughts to deal with those demands perceived as taxing or overwhelming<sup>20</sup> and may be broadly classified as problem focused or emotion focused.<sup>15</sup> Problem-focused strategies involve straightforward, purposeful, and direct attempts to reduce, modify, or eliminate the source(s) of stress. Situations in which stressors cannot be confronted directly may result in the adoption of emotion-focused strategies aimed at regulating emotions surrounding the stressor(s), possibly through

reappraisal.<sup>15,18,20</sup> Misguided emotion-focused coping strategies, such as alcohol/drug use or promiscuous sex<sup>21</sup>, however, may themselves result in outcomes that lead to additional sources of stress.<sup>20</sup> Folkman and Lazarus<sup>18</sup> found both strategies for coping to be used commonly in dealing with stressful situations, with problem-focused strategies prominent in situations appraised as changeable and emotion-focused strategies prominent in situations appraised as unchangeable. The literature similarly distinguishes between active strategies versus avoidant strategies for coping with stress. Strategies are considered to be active in nature when directed at changing the nature of the stressor itself or the manner in which it is conceptualized; whereas, strategies viewed as avoidant result in activities or mental states that do not allow for addressing stressful events directly. Active forms of coping, whether behavioral or emotional, generally are considered more effective in dealing with stressful events than are avoidant forms of coping, which appear to be a psychological risk factor or marker for adverse responses to stressful events.<sup>22</sup>

The effects of coping are complex and vary as a function of or are moderated/mediated by numerous factors, including but not limited to the particular nature of stressor involved, the duration of the stressor, the characteristics of the individual experiencing the stress, and the type of outcome being evaluated.<sup>13,23</sup> Historically, research has suggested that health contexts favor emotion-focused coping.<sup>18</sup> With the growing realization that individuals have the ability to influence their health outcomes through their behavior,

however, problem-focused approaches for coping with health issues are being seen more commonly over time, and it is probable that this trend will continue. Nevertheless, research has suggested relatively consistently that patients diagnosed with MS more commonly engage in emotion-focused and avoidant strategies relative to problem-focused strategies for coping with the sequelae of their disease, which generally leads to poorer outcomes.<sup>24-26</sup> Further, McCabe and colleagues reported that relative to control participants, patients with MS, but in particular men, were less likely to adopt coping styles related to problem-solving and support-seeking behaviors and consequently to exhibit poorer psychological adjustment.<sup>27</sup> Utilizing a longitudinal methodological design, Pakenham also found that better outcomes in depression, global distress, social adjustment, and subjective health status at Time 2 (i.e., Time 1 + 12 months) were predicted by greater reliance on problem-focused coping and less reliance on emotion-focused coping in patients with MS, even after controlling for the effects of Time 1 psychological adjustment.<sup>28</sup>

In light of the research demonstrating the influence of coping strategies on adjustment in patients with MS, several researchers have highlighted the need for development of educational programs to facilitate the adoption by diagnosed individuals of those approaches identified in the literature to be most efficacious for coping with the sequelae of the disease, the ultimate goal being to promote better outcomes.<sup>27,29</sup> Another consideration in this regard is

research suggesting that coping with the distress related to a neurological disease, such as MS, may differ from coping with the stressful situations of everyday life.<sup>22,30</sup> Consequently, coping approaches used successfully across situations by individuals prior to their diagnosis may not be equally as effective in trying to adjust to the various challenges associated with MS.

A prerequisite for the participation of patients in educational programs designed to teach effective approaches for coping with MS is a formal assessment of their present coping strategies using one or more reliable and valid measures. It has been suggested, however, that many scales utilized in research protocols for the evaluation of coping strategies are far too lengthy and time consuming to be practically useful within clinical settings.<sup>29</sup> Devy and colleagues therefore developed a brief 10-item scale through confirmatory factor analysis and Rasch modeling from 46 items and seven coping dimensions based on the Coping with Health Injuries and Problems (CHIP)<sup>31</sup> scale, in conjunction with interviews of patients with MS as well as the opinions of experts in the field. Their objective, however, was directed towards designing a scale specifically to measure coping and quality of life that could be administered repeatedly in routine medical practice for monitoring patient adjustment over time. The CHIP was chosen over several other coping measures for their project because of its relative brevity and the fact that prior research had provided preliminary validation for its use with patients having MS.<sup>29</sup> Their new scale was successfully

validated and accomplished their aforementioned objective. More comprehensive assessment of an individual's coping likely is necessary, however, to more fully understand their current approaches for managing stress prior to participation in an educational program for teaching effective coping strategies. For the aforementioned reasons that the CHIP was chosen by Devy and colleagues in their study, and especially if used in conjunction with their brief scale to monitor status over time, the CHIP would seem an obvious measure for the assessment of coping strategies in patients with a diagnosis with MS. Additional research is needed to understand the characteristics of the scale in the MS population as well as its relationship to other variables in patients with MS, including emotional, physical, and cognitive status as well as demographic factors.

The CHIP is a 32-item measure that includes four subscales, comprised of 8 items each, assessing different strategies for coping with a health or medical condition. The scale was not designed for use with a particular patient population or disorder but rather for more general application across conditions, allowing for the identification of the specific health issue for which the patient is providing ratings with respect to coping. The Distraction Coping subscale evaluates the extent to which actions and cognitions are used to avoid preoccupation with the health issue, such as thinking about a pleasant experience or engaging in unrelated activities. The Palliative Coping subscale assesses use of self-help behaviors, such as resting or modifying the surroundings, to alleviate the

unpleasantness of the health situation.<sup>31</sup> The Instrumental Coping subscale emphasizes task-oriented approaches to deal with the health issue. Examples would include active problem solving and acquiring information about the particular illness or injury. The Emotional Preoccupation subscale evaluates the extent to which coping involves focusing on the emotional consequences of the health concern, such as fantasizing.<sup>31,32</sup> Subscale items are distributed strategically to control for order effects and are rated according to a five-point scale ranging from 1 (Not at All) to 5 (Very Much) based on the extent to which engagement in the specific behavior has occurred since the onset of the illness or injury. Subscale raw scores are transformed to T scores ( $M = 50$ ,  $SD = 10$ ) based on patient age and gender for clinical interpretation. The CHIP also includes an Inconsistency Index, which considers problematic response patterns (e.g., random responding, carelessness, etc.).<sup>31</sup> The scale has been shown to have excellent reliability and validity and has been used effectively in identifying patterns of coping across a number of health conditions and injuries.<sup>31, 33-36</sup>

Studies employing the CHIP in the assessment of coping strategies in MS generally have found that patients with this disease endorse a relatively greater degree of Emotional Preoccupation in comparison to the other forms of coping assessed by the scale, although several disease-related variables seem to influence overall coping patterns. Montel and Bungener reported that patients with secondary progressive forms of MS tend to utilize emotional coping strategies

extensively; whereas, patients with primary progressive forms of the disease use more instrumental strategies.<sup>30</sup> In evaluating the CHIP coping strategies among patients with MS having mild frontal lobe cognitive impairments in comparison to those without such impairments, Montel and colleagues found no significant coping differences between the groups, although patients with mild cognitive impairments tended to use Emotional Preoccupation more so relative to the other forms of coping assessed by the CHIP.<sup>22</sup> Kehler and Hadjistavropoulos studied patients with MS who reported higher levels of health anxiety in comparison to an age-matched control sample using both the CHIP and Ways of Coping Questionnaire (WOCQ)<sup>37</sup> and found that patients diagnosed with MS having elevated levels of health anxiety were differentiated by greater utilization of CHIP Emotional Preoccupation and WOCQ Social Support in conjunction with less use of WOCQ Problem-Focused Coping. Further, their results revealed that health anxiety and generalized anxiety both were uniquely associated with CHIP Emotional Preoccupation but only health anxiety was uniquely related to WOCQ Problem-Focused Coping.<sup>38</sup>

The purpose of our study was to further explore CHIP coping strategies in patients with MS. More specifically, our aims were to examine some of the psychometric properties of the scale in this population and to explore the relationships among forms of coping as measured by the CHIP and various demographic and disease-related variables as well as measures of emotional, physical, and

gross cognitive status. Based on the findings of the aforementioned research in this area, we formulated three hypotheses. Firstly, we hypothesized that patients with MS would endorse greater engagement in Emotional Preoccupation as a means for coping relative to other CHIP coping strategies. Secondly, we expected that all forms of coping would be utilized to a significantly greater degree by our MS sample relative to the CHIP normative standardization sample. Finally, we hypothesized that Emotional Preoccupation would be associated with poorer outcomes, in particular psychological adjustment as indicated by levels of reported depression and anxiety.

## Method

### Participants

Participants for this study ( $n = 41$ ) were patients diagnosed with MS by a board-certified neurologist and were being followed for medical management of their disease at the multiple sclerosis specialty clinic within the department of neurology at a large urban medical center located within the Midwestern United States. Patients were referred for outpatient psychological or neuropsychological assessment secondary to symptoms and/or signs suggestive of possible emotional and/or cognitive concerns. The sample was 95% White/Caucasian and 5% Black/African American and consisted of 35 women and 6 men. Participants ranged in age from 21-60 years ( $M = 42.32$  years,  $SD = 9.50$ ). Mean educational level and duration of MS diagnosis for participants were 14.63 years ( $SD = 2.27$ , range = 12-20 years) and 8.71 years ( $SD = 7.51$ , range = 1-38 years),

respectively. Disease course of patients was largely relapsing-remitting ( $n = 38$ ), with less than 8% of patients demonstrating a progressive disease course (primary progressive = 1, secondary progressive = 2).  
Primary Measures

In addition to the CHIP, as described previously, study participants were administered the following measures, with the exception of the Expanded Disability Status Scale, according to standardized procedures by a licensed psychologist as part of a more extensive battery of tests. Scores from the Expanded Disability Status Scale were provided by the neurologist at the time of referral for psychological/neuropsychological assessment.

### *Beck Depression Inventory-Second Edition*

The Beck Depression Inventory-Second Edition (BDI-II)<sup>39</sup> is a self-report instrument developed for assessing depression severity in adults and adolescents aged 13 years and older. The scale consists of 21 items, each item focusing on a specific symptom of depression and containing four statements ranked on a four-point scale from 0 to 3 as to how much the symptom was experienced during the prior two-week period. Responses are summed to calculate a total raw score ranging from 0 to 63 for clinical interpretation, with higher scores indicating a greater severity of depressive symptomatology.<sup>39</sup> The BDI-II has repeatedly been shown to have excellent psychometric characteristics and has been validated for use in numerous populations<sup>39,40</sup>, including individuals with MS.<sup>41</sup>

### *Beck Anxiety Inventory*

The Beck Anxiety Inventory (BAI)<sup>42</sup> is a 21-item self-report scale for measuring the severity of anxiety in adults and adolescents. Similar to the BDI-II, items are rated on a four-point scale from 0 (Not at All) to 3 (Severely) as to how much the individual was bothered by the symptom during the prior two-weeks and summed to compute a total raw score ranging from 0 to 63 for clinical interpretation. Higher total raw scores indicate a greater degree of anxiety severity. The scale has been demonstrated to have adequate reliability and validity<sup>42,43</sup>, and items have been reported to be distinguishable from those of the BDI, suggesting that the symptoms measured in the scales are not entirely overlapping.<sup>44</sup>

### *Satisfaction with Life Scale*

The Satisfaction with Life Scale (SWLS)<sup>45</sup> consists of five items, which together provide an estimate of global life satisfaction. Individual items are rated by the patient according to a seven-point scale ranging from 1 (Strongly Disagree) to 7 (Strongly Agree) and are summed to obtain a total score of 5 to 35, with higher scores suggesting a greater degree of life satisfaction. The scale has strong psychometric properties and has been reported to be useful in numerous populations, including those with MS and other neurological diagnoses.<sup>45-47</sup>

### *Brief Symptom Inventory 18*

As the name of the instrument implies, the Brief Symptom Inventory 18 (BSI-18)<sup>48</sup> is an 18-item self-report measure with three subscales of six items each assessing depression, anxiety, and somatization. It is an

abbreviated version of the 53-item Brief Symptom Inventory. BSI-18 items are rated according to five-point scale ranging from 0 (Not at All) to 4 (Extremely). Item responses are summed to compute a total raw score for each subscale. Raw scores are then converted to T scores according to gender and sample type for clinical interpretation. The scale also includes a Global Severity Index, which provides a global or total T score characterizing the respondent's overall level of psychological distress.<sup>48</sup> Evidence has been reported supporting the test's reliability and validity in various clinical groups, including patients with traumatic brain injury and individuals being seen for psychotherapy.<sup>48-51</sup>

### *Fatigue Severity Scale*

The Fatigue Severity Scale (FSS)<sup>52</sup> is a 9-item self-report measure assessing the impact of fatigue on an individual's daily functioning. Items are rated by the patient according to a seven-point scale ranging from 1 (Strongly Disagree) to 7 (Strongly Agree) and are summed to obtain a total score of 9 to 63, with higher scores suggesting a greater degree of fatigue.<sup>53</sup> Patients with MS served as one of the two initial test populations when the scale was developed<sup>52</sup>, and it has been referred to as the "Gold Standard" for measuring fatigue in the disease<sup>53</sup>, although more recent research using Rasch analysis has suggested that five of the scale's items as opposed to nine may provide a better estimate of the social impact of fatigue in MS.<sup>54</sup>

### *Mini-Mental State Examination*

The Mini-Mental State Examination (MMSE)<sup>55,56</sup> is a 30-item test that provides a

gross measurement of the global cognitive functioning of patients. The measure specifically assesses orientation to time and place, registration in terms of verbal learning, attention and calculation, recall, naming, repetition, verbal comprehension, reading, writing, and drawing (graphomotor construction). Correct items are worth one point, and items are summed to derive a total raw score ranging from 0 to 30.<sup>55,56</sup> Historically, a score of 23 or less was used to indicate the presence of cognitive impairment, although over time classification of severity evolved based on research to include three levels of impairment. Currently, it is recommended that interpretation be based on four levels of impairment, with 27-30 indicating normal cognitive functioning, 21-26 indicating a mild degree of cognitive impairment, 11-20 indicating a moderate degree of cognitive impairment, and 0-10 indicating a severe degree of cognitive impairment.<sup>56</sup> Although the test functions well as a brief screening measure, it has been shown to be affected by age, educational level, and IQ of patients<sup>57-59</sup> and to be less sensitive than other brief measures of cognitive status<sup>60,61</sup>, the recommendation therefore being that it should not be used in isolation for diagnosing specific disorders.

#### *Expanded Disability Status Scale*

The Expanded Disability Status Scale (EDSS)<sup>62</sup> is a composite measure used to assess progression of disability in MS. The scale ranges from 0, indicating normal functioning with no neurologic signs or symptoms to 10, indicating death by MS. The scale progresses in 0.5-point increments,

although there is no 0.5 between 0 and 1, and includes subscales for deficiencies in pyramidal, cerebellar, brainstem, sensory, bowel and bladder, visual, cerebral, and other functions. It has been used widely in MS trials and has been shown to have reasonable reliability and validity.<sup>53</sup>

#### Data Processing and Ethics

Performances across the study's primary measures of patient functioning were analyzed using descriptive statistics. CHIP scores of patients with MS were compared to those of the standardization sample using one-sample *t* tests. In order to compare scores across the four CHIP subscales in the sample, we conducted a one-way repeated measures ANOVA. Pearson correlations were calculated to assess both intercorrelations among the CHIP subscales and the relationships of the CHIP subscales to other primary measures as well as to demographic and disease-related variables. Multiple regression analyses were calculated in order to predict scores across measures of emotional, physical, and cognitive status from CHIP subscale scores. Statistical analyses were executed using IBM SPSS Statistics.

This retrospective study using archival clinical data was compliant with institutional standards for human research and was conducted in accordance with the 1964 Declaration of Helsinki<sup>63</sup> and its subsequent amendments as well as with the ethical principles of the American Psychological Association.<sup>64</sup>



**Results**

Descriptive statistics were calculated for the CHIP subscales as well as the other primary measures of emotional, physical, and cognitive status and are presented in Tables 1 and 2, respectively. Mean CHIP scores for the sample uniformly were within the average range; however, one-sample *t* tests revealed that our patients with MS reported significantly higher use of both Distraction Coping and Instrumental Coping strategies relative to the CHIP standardization sample.

For the repeated measures ANOVA, Mauchly's test indicated a significant violation of sphericity; thus we report Geisser-Greenhouse corrected values for degrees of freedom and *p* values. There was a significant difference across the four subscales,  $F(2.27, 90.86) = 3.17, p = .041, \eta^2 = .07$ . We included a set of simple contrasts comparing Emotional Preoccupation to each of the other three subscales. The only significant difference yielded by these comparisons was a lower mean on Palliative Coping compared to Emotional Preoccupation ( $p = .025$ ).

Table 1 - Mean T Scores of Patients with Multiple Sclerosis (n = 41) Across the CHIP Subscales and Comparison to the Scale's Standardization Sample

	<i>M</i> ( <i>SD</i> )	Range	<i>t</i> ( <i>p</i> ) <sup>^</sup>	<i>d</i>
<b>CHIP Subscales</b>				
Distraction	54.54 (15.28)	24-84	1.90 (.032)*	.30
Palliative	47.46 (11.52)	23-72	1.41 (.083)	.22
Instrumental	55.68 (12.62)	30-74	2.88 (.003)*	.45
Emotional Preoccupation	53.32 (14.37)	29-81	1.48 (.074)	.23

CHIP = Coping with Health Injuries and Problems

<sup>^</sup>df = 40

\**p* < .05

Patients with MS as a group also endorsed a mild degree of depression, anxiety, dissatisfaction with life, and fatigue as measured by the BDI-II, BAI, SWLS, and FSS respectively. On the BSI-18, mean scores of the sample generally were within the average range and not suggestive of distress in terms of depression and anxiety, although the obtained score on the somatization subscale was slightly elevated and suggestive of mild

symptomatology in this domain. Mean scores of the sample on the EDSS indicated a moderate degree of disability in one or more aspects of functioning as assessed by this measure. On the MMSE, mean scores of the sample were consistent with normal cognitive functioning, although 18.2% of patients with MS scored in the range suggestive of mild cognitive impairment.

Table 2 - Mean Scores of Patients with Multiple Sclerosis (n = 41) Across Primary Measures of Emotional, Physical, and Cognitive Status

	<i>M (SD)</i>	Range
BDI-II	17.90 (10.87)	1-45
BAI	14.95 (9.23)	1-38
SWLS	19.17 (7.78)	5-33
BSI-18		
Somatization	63.22 (6.65)	48-74
Depression	57.02 (10.00)	40-77
Anxiety	57.71 (10.62)	38-80
Total (GSI)	61.00 (8.39)	42-75
Fatigue Severity Scale	46.71 (12.80)	17-63
EDSS	3.78 (1.60)	1-6.5
MMSE	27.97 (2.02)	23-30

BDI-II = Beck Depression Inventory-Second Edition, BAI = Beck Anxiety Inventory, SWLS = Satisfaction with Life Scale, BSI-18 = Brief Symptom Inventory 18, GSI = Global Severity Index, EDSS = Expanded Disability Status Scale, MMSE = Mini-Mental State Examination

Intercorrelation coefficients among the CHIP subscales are presented in Table 3. Only the Distraction Coping and Instrumental Coping subscales were found to be significantly associated with one another, providing further support for multidimensionality of the scale and suggesting that overall the subscales measure relatively distinct aspects of coping in patients with MS. These findings essentially mirror those of the standardization sample in that the highest correlation coefficient was seen between the Distraction Coping subscale and Instrumental Coping subscale both in men and women as well as in the various age groups (i.e., 18 to 29 years, 30 to 49 years, and 50+ years) in which these relationships were examined. Although other significant associations among coping subscales were

found in the CHIP standardization sample, the coefficients generally were small and should be interpreted relative to our findings in light of the fact that more than 2,300 participants comprised the normative standardization sample.

Table 3 - Intercorrelation Coefficients Among CHIP Subscales in Patients with MS (n = 41)

	CHIP Subscales			
	Distraction	Palliative	Instrumental	Emotional Preoccupation
Distraction	----	.222	.416**	-.264
Palliative		----	-.003	.245
Instrumental			----	-.226
Emotional Preoccupation				----

CHIP = Coping with Health Injuries and Problems

\*\*p < .01

Based on the calculation of Pearson correlation coefficients, CHIP subscales demonstrated no significant relationships with patient age, educational level, or duration of MS diagnosis. Pearson correlation coefficients among CHIP subscales and measures of emotional, physical, and cognitive status are presented in Table 4. CHIP Distraction Coping was significantly and negatively correlated with patient scores on the BDI-II, BAI, and BSI-18 Anxiety subscale and significantly and positively correlated with patient scores on the SWLS. Palliative Coping was significantly and positively associated only with patient scores on the FSS. CHIP Instrumental Coping was found to be significantly and negatively related to patient scores on the BAI and EDSS and significantly and positively related to patient scores on the SWLS. Significant positive correlations were seen between CHIP Emotional Preoccupation and patient scores

on the BDI-II, BAI, SWLS, and all measures of the BSI-18, including the Global Severity Index.

Table 4 Pearson Correlation Coefficients Among CHIP Subscales and Measures of Emotional, Physical, and Cognitive Status

	CHIP Subscales			
	Distraction	Palliative	Instrumental	Emotional Preoccupation
BDI-II	-.417**	.215	-.268	.637**
BAI	-.344*	.212	-.369*	.511**
SWLS	.657**	.244	.430**	-.332*
BSI 18				
Somatization	-.100	.095	-.219	.361*
Depression	-.286	.099	-.258	.649**
Anxiety	-.384*	.094	-.281	.538**
Total (GSI)	-.286	.100	-.263	.614**
Fatigue Severity Scale	-.011	.401**	.004	.302
EDSS	.027	.180	-.340*	.097
MMSE	.080	-.181	.021	-.112

CHIP = Coping with Health Injuries and Problems, BDI-II = Beck Depression Inventory-Second Edition, BAI = Beck Anxiety Inventory, SWLS = Satisfaction with Life Scale, BSI-18 = Brief Symptom Inventory 18, GSI = Global Severity Index, EDSS = Expanded Disability Status Scale, MMSE = Mini-Mental State Examination

\* $p < .05$

\*\* $p < .01$

Finally, we conducted simultaneous multiple regression analyses predicting scores on the BDI-II, BAI, SWLS, BSI-18 Global Severity Index, FSS, EDSS, and MMSE from scores on the four CHIP subscales. As shown in Table 5, the regression model explained a significant amount of variance in scores on the BDI-II, BAI, SWLS, and BSI-18, but not for scores on the FSS, EDSS, or MMSE. CHIP Distraction Coping and Emotional Preoccupation scores were significant predictors of scores on the BDI-II. For scores on the BAI and BSI-18 Global Severity Index, the only significant predictor was

Emotional Preoccupation. For the scores on the SWLS, only Distraction Coping was a significant predictor.

Table 5 - Results of Multiple Regression Analyses Predicting Scores on Measures of Emotional, Physical, and Cognitive Status from CHIP Subscale Scores

	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>
<b>BDI-II</b>				
CHIP Distraction	-.22	.10	2.19	.035
CHIP Palliative	.15	.12	1.22	.229
CHIP Instrumental	-.02	.11	0.20	.845
CHIP Emotional Preoccupation	.39	.10	3.92	<.001

$F(4,36) = 8.81, p < .001, R^2_{Adj} = .44$

<b>BAI</b>				
CHIP Distraction	-.12	.09	1.26	.214
CHIP Palliative	.13	.12	1.14	.260
CHIP Instrumental	-.15	.11	1.38	.175
CHIP Emotional Preoccupation	.24	.09	2.55	.015

$F(4,36) = 5.24, p = .002, R^2_{Adj} = .30$

<b>SWLS</b>				
CHIP Distraction	.25	.07	3.54	.001
CHIP Palliative	.13	.08	1.48	.148
CHIP Instrumental	.11	.08	1.39	.172
CHIP Emotional Preoccupation	-.11	.07	1.63	.113

$F(4,36) = 9.42, p < .001, R^2_{Adj} = .46$

<b>BSI-18 TOTAL</b>				
CHIP Distraction	-.05	.08	0.59	.557
CHIP Palliative	-.02	.10	0.14	.888
CHIP Instrumental	-.06	.10	0.67	.508
CHIP Emotional Preoccupation	.34	.08	4.04	<.001

$F(4,36) = 6.03, p < .001, R^2_{Adj} = .34$

	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>
<b>Fatigue Severity Scale</b>				
CHIP Distraction	-.06	.15	0.39	.697
CHIP Palliative	.40	.18	2.26	.030
CHIP Instrumental	.08	.17	0.48	.635
CHIP Emotional Preoccupation	.19	.14	1.30	.202

$F(4,36) = 2.41, p = .067, R^2_{Adj} = .12$

#### EDSS

CHIP Distraction	.02	.02	0.95	.350
CHIP Palliative	.02	.02	0.85	.401
CHIP Instrumental	-.05	.02	2.41	.021
CHIP Emotional Preoccupation	.00	.02	0.09	.929

$F(4,36) = 1.84, p = .143, R^2_{Adj} = .17$

#### MMSE

CHIP Distraction	.02	.03	0.57	.571
CHIP Palliative	-.03	.03	0.98	.334
CHIP Instrumental	-.01	.04	0.24	.811
CHIP Emotional Preoccupation	-.01	.03	0.21	.835

$F(4,28) = 0.35, p = .836, R^2_{Adj} = -.09$

CHIP = Coping with Health Injuries and Problems, BDI-II = Beck Depression Inventory-Second Edition, BAI = Beck Anxiety Inventory, SWLS = Satisfaction with Life Scale, BSI-18 = Brief Symptom Inventory 18, GSI = Global Severity Index, EDSS = Expanded Disability Status Scale, MMSE = Mini-Mental State Examination

#### Discussion

This study was conducted to build upon the research base examining coping strategies in patients with MS and, more specifically, to explore use of the CHIP in this population in light of the existing, but limited, literature using this particular instrument in patients with this disease. Research of this kind is important and necessary prior to routine use of a measure in a specific

population. In other words, before applying a scale to a clinical population for which it was not developed, a research base must be established to demonstrate that the scale possess adequate psychometric properties when used in assessing individuals with the particular diagnosis or condition.<sup>65</sup> For example, a scale designed to assess quality of life in patients diagnosed with psychiatric conditions and shown to have adequate

psychometric properties to do so within this diagnostic classification may not function in a similar manner in patients with diagnosed neurological conditions, and thus should not be used in this latter population until research demonstrates that it is both reliable and valid in such patients.

Based on the existing research demonstrating that patients with MS generally tend to engage in a greater degree of emotion-focused coping relative to problem-focused coping<sup>24-28</sup> and specifically endorse more engagement in Emotional Preoccupation in comparison to the other forms of coping as assessed by the CHIP<sup>22,30</sup>, we hypothesized that our sample of patients with MS would endorse higher utilization of Emotional Preoccupation relative to other CHIP coping strategies as a means for coping with the sequelae of the disease. This hypothesis was not supported by our findings. In contrast to our expectations, our sample reported the highest degree of engagement in Instrumental Coping strategies followed by Distraction Coping and then Emotional Preoccupation. Our hypothesis that all forms of coping would be utilized to a significantly greater degree by our MS sample relative to the CHIP normative standardization sample was partially supported by the study results. Only the scores of patients with MS on the Distraction Coping and Instrumental Coping subscales of the CHIP were found to be significantly higher than those of the standardization sample. Although scores on the Emotional Preoccupation were higher relative to those of the standardization sample, the difference was not statistically

significant. Scores on the Palliative Coping subscale actually were lower than those of the normative standardization sample, although not significantly so. Lastly, our hypothesis that Emotional Preoccupation would be associated with poorer outcomes, in particular emotional adjustment as indicated by levels of reported depression and anxiety, was fully supported by our findings. Scores on the CHIP Emotional Preoccupation subscale were significantly correlated with scores on the BDI-II, BAI, SWLS, and all BSI-18 subscales as well as this measure's Global Severity Index and also were found to be significant predictors of scores on the BDI-II, BAI, and BSI-18 Global Severity Index based on multiple regression analyses.

Although not one of our formal hypotheses, it is interesting to note the significant relationship between scores of patients with MS on the CHIP Palliative Coping subscale and the FSS in that the two were significantly and positively correlated and that scores on Palliative Coping predicted scores on the FSS. As noted previously, the Palliative Coping subscale assesses use of various self-help behaviors, such as resting. It may be that patients diagnosed with MS and experiencing greater levels of fatigue do not have the ability to engage in more active forms of coping behaviors, such as those included in the Distraction Coping and Instrumental Coping subscales of the CHIP, and therefore are left to engage in coping strategies that are more passive in nature from a physical standpoint and therefore not prohibited by fatigue.

Results suggest that the coping strategies of patients with MS, as assessed by the CHIP, are not a function of age, educational level, duration of MS diagnosis, disability status as measured by the EDSS, or gross global cognitive functioning as assessed by the MMSE. This findings has positive implications from the perspective of participation of patients in educational programs designed to teach effective approaches for coping with MS, in so far as these variables are not easily modified and largely uncontrollable. The lack of a significant association between scores on the MMSE and CHIP coping strategies in our sample is not unexpected and is consistent with the findings of prior research showing no significant differences in CHIP coping between patients with MS having mild frontal lobe cognitive impairments and those without such impairments.<sup>22</sup> Similarly Jean and colleagues also reported that neuropsychological variables do not predict coping styles.<sup>66</sup>

Our findings are in contrast to the prior research in this area, which has suggested relatively consistently that patients diagnosed with MS more commonly engage in emotion-focused and avoidant strategies relative to problem-focused strategies for coping with the sequelae of their disease.<sup>24-28</sup> Our findings do provide additional support, however, to indicate that engagement by patients diagnosed with MS in emotion-focused coping strategies, specifically CHIP Emotional Preoccupation, are associated with poorer outcomes. Our results also offer further validation of the CHIP's multidimensionality in that its subscales appear to be measuring

relatively distinct aspects of coping in patients with MS.

The generalizability of the results of this investigation are limited secondary to several methodological issues. First and foremost is the relatively small size of the sample, which especially should be considered when interpreting the results of the multiple regression analyses. The large majority of the participants in our study were women and were white, which precluded our including sex/gender and race as variables in the analyses examining scores across the CHIP and other primary measures. Our sample generally was representative of the MS population in terms of these demographic variables, however, as the epidemiological research in MS consistently has shown the disease to be more prevalent among women and individuals of European/Caucasian descent.<sup>3, 67</sup> Most patients in our study also had a relapsing-remitting disease course, which prevented our examination of coping styles according to this variable. As noted previously, prior research reported that patients with secondary progressive forms of MS tend to utilize emotional coping strategies extensively; whereas, patients with primary progressive forms of the disease use more instrumental strategies.<sup>30</sup> Finally, our methodology also was characterized by a cross-sectional design and nonprobability sampling. Additional research taking into account these limitations of our study will be necessary before more firm conclusions can be made about use of the CHIP in patients with MS.



In addition to considering the aforementioned limitations of our investigation, future research including one or more measures of coping in addition to the CHIP would allow for further exploration of CHIP subscale validity through direct comparison of coping strategies across instruments. Research also has demonstrated that emotion-focused coping strategies are more likely to be utilized by patients with MS during periods of elevated psychological distress.<sup>66</sup> It might be assumed then that the relative degree of engagement in different types of coping by patients with MS is fluid to some extent based on the onset of new stressors and the severity of these stressors. For example, a patient with MS who usually engages in a greater degree of CHIP Instrumental Coping may shift to more engagement in Emotional Preoccupation following termination of employment or the passing of a primary caregiver. Future research may consider investigation of this possibility.

### Conclusion

In summary, the CHIP appears to be an excellent instrument for assessing the coping strategies of patients diagnosed with MS. It is one of only a small number of coping measures designed specifically to measure coping with a chronic health condition, and has been shown to have efficacy in guiding cognitive-behavioral interventions for depression and anxiety.<sup>68</sup> It is relatively brief, yet fairly comprehensive and therefore seems appropriate for efficient utilization in clinical settings, especially if used to obtain a baseline understanding of coping to determine the

need for participation in education programs for teaching effective approaches for coping with MS. We also believe it would be ideal for the initial evaluation of coping strategies in patients with MS prior to serial assessment of coping and quality of life over time using the brief scale developed by Devy and colleagues.<sup>29</sup>

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