Form C of the MHLC Scales: A Condition-Specific Measure of Locus of Control

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Form C of the Multidimensional Health Locus of Control (MHLC) scales is an 18 item, general purpose, condition-specific locus of control scale that could easily be adapted for use with any medical or health-related condition. Data from 588 patients with one of four conditions—rheumatoid arthritis, chronic pain, diabetes, or cancer—were utilized to establish the factor stucture of Form C and to establish the reliability and validity of the resultant four subscales: Internality; Chance; Doctors; and Other (powerful) People. The alpha reliabilities of the subscales are adequate for research purposes. Data from the arthritis and chronic pain subjects established that the Form C subscales were moderately stable over time and possessed considerable concurrent and construct validity. Some discriminant validity of Form C with Form B of the MHLC was also demonstrated.

One of the most frequently used measures of health-related beliefs over the past fifteen years has been the Multidimensional Health Locus of Control scales (MHLC; K. A. Wallston, B. S. Wallston, & R. F. DeVellis, 1978). Health locus of control refers to a person's beliefs regarding where control over his/her health lies. If the person believes that his/her own behavior influences his/her health status, the person is said to possess an *internal* locus of control orientation with regard to his/her health. If, on the other hand, the person believes that his/her health status is influenced by the actions of other people or is due to fate, luck, or chance, the person is said to have an *external* health locus of control orientation.

According to K. A. Wallston's (1984, 1992) modification of Rotter's (1954) social learning theory, a person's health locus of control orientation

is one of several factors that determine which health-related behaviors a person will perform. These health-related behaviors, in turn, partially determine a person's health status. Thus, mediated by behavior, health locus of control orientation is theoretically an indirect determinant of health status. Because health beliefs are learned over the course of a lifetime, they are themselves a function of prior health status and one's health-related experiences, both personal and vicarious.

In 1978, K. A. Wallston and colleagues published two parallel forms (A and B) of the MHLC scales. Modelled after Levenson's general locus of control measure (the I, P, and C scales; Levenson, 1973), the MHLC splits externality into two distinct dimensions—Powerful Others and Chance. Each form (A or B) consists of three 6-item Likert subscales: IHLC—the extent to which a person believes his/her health is a function of his/her own behavior; PHLC—the belief that one's own health status is due to the actions of "powerful" people (such as one's doctors, family members, or friends); and CHLC—the belief that chance, fate or luck influences one's health. The initial publication regarding these scales (K. A. Wallston et al., 1978) established the fact that they were internally consistent and concurrently valid. This latter determination came from showing that each MHLC subscale correlated approximately .6 with its counterpart from Levenson's scale. Early research with these scales was reviewed in two chapters (B. S. Wallston & K. A. Wallston, 1981; K. A. Wallston & B. S. Wallston, 1982). The three-factor structure of the MHLC has generally been supported in other studies (e.g., Marshall, Collins, & Crooks, 1990; Robinson-Whelen & Storant, 1992), although there have been a few exceptions.

As was the case with Levenson's more general measure, IHLC scores are typically orthogonal to (i.e., uncorrelated with) PHLC scores and are only slightly negatively correlated ($r = -.2$ to $-.3$) with CHLC scores. One exception to this pattern has been with samples of persons with chronic illnesses, where it is not uncommon to find IHLC and PHLC slightly positively correlated (K. A. Wallston, 1989). Different from Levenson's scales, however, is the typical finding that the two external subscales, PHLC and CHLC, are only slightly correlated with one another ($r = .2-.3$). Levenson's P and C scales typically intercorrelate much more strongly ($r > .6$). Because of the basic orthogonal nature of the MHLC subscales, it is not uncommon to find individuals who simultaneously endorse (or even disagree with) both internal and external health locus of control beliefs.

One argument behind developing health specific locus of control measures comes from Rotter's (1975) assertion that, in predicting behaviors/outcomes in specific psychological situations, expectancies specific to that situation would perform better than more generalized expectancies. Forms A and B of the MHLC scales, like their predecessor, the unidimensional Health Locus of Control scale (HLC; B. S. Wallston, K. A. Wallston, Kaplan, & Maides, 1976), were designed to be mid-level in terms of specificity. Because they only assessed health and/or illness beliefs, they were more situa-

tionally specific than measures of generalized expectancies such as Levenson's scales or Rotter's (1966) Internal–External scale. On the other hand, Forms A and B of the MHLC scales were deliberately constructed so as not to be specific to any one health behavior or any particular health condition. It is possible that people with a given health condition may hold different locus of control beliefs about that condition than about their general health status. It is also possible that locus of control beliefs about a specific condition might correlate differently with health behaviors and/or indices of health status than do more general locus of control beliefs. For example, although it is generally the case that internals have better health outcomes than externals, Burish and colleagues (1984) found evidence that outcomes were positively correlated with external beliefs in a sample of cancer patients.

More pragmatically, for persons with specific health conditions, condition-specific locus of control scales may be less difficult to complete than more general ones. Although "healthy" subjects have little difficulty in responding to the items on Form A/B of the MHLC, some researchers, including the authors, have noted that when they administer these scales to persons with a chronic medical condition a sizable proportion of the patients, sometimes as many as 30%, have difficulty responding to certain items. For instance, the item "If I do the right things, I can stay healthy" can cause difficulty because respondents with a chronic condition are often unsure whether to respond to the item in reference to their current medical condition, to their health in general, or to some combination of the two. As a result, some subjects either omit the item entirely or respond in a random fashion, thus compromising the validity of the scale.

One approach that has been taken to deal with this issue is to develop variants of the MHLC scales targeted to specific health problems. Dickson, Dodd, Carrieri, and Levenson (1985) reworded items from Form A/B of the MHLC scales to be specific to cancer patients. Watson, Greer, Pruyn, and Vanden Borne (1990) developed an English version of a Dutch cancer locus of control scale (Pruyn et al., 1988). Karpinski (1992) even developed a multidimensional cancer prevention scale. Other investigators with interest in other medical conditions have developed their own instruments: diabetes (Farraro, Price, Desmond, & Roberts, 1987); heart disease (O'Connell & Price, 1985); pain (Toomey, Mann, Abashion, & Thompson-Pope, 1991); headache (Martin, Holroyd, & Penzien, 1990); weight/obesity (Saltzer, 1982; Stotland & Zuroft, 1990); needle injuries (Feldman & Feldman, 1989); fetal health (Labs & Wurtele, 1986); child health improvement (R. F. DeVellis et al., 1985, 1993; Tinsley & Holtgrave, 1989); orthodonture (Tedesco, Albino, & Curat, 1985); and adolescent depression (Whitman, Desmond, & Price, 1987). Although many of the previously mentioned efforts patterned their instruments directly after Forms A/B of the MHLC, no two of them selected the exact same set of items or worded their scales in such a manner that direct comparisons with other scales were possible.

Because scale development, especially if carefully done, is a difficult and time consuming process for each medical condition a researcher may want to investigate, and because researchers studying persons with one condition (e.g., cancer) may wish to compare their findings directly to those obtained with patients having a different condition (e.g., heart disease), there is a need for a general purpose, condition-specific locus of control scale that could be easily adapted for use by persons with any existent medical- or health-related condition. The purpose of this article is to describe the development and initial psychometric properties of such an instrument, one that we call Form C of the MHLC[1].

METHODS

Subjects

Data for this study came from five sources: one of persons with rheumatoid arthritis ($N = 273$); one of chronic pain patients ($N = 111$); one of Type I and II diabetics ($N = 111$); and two of cancer patients ($N = 42$, $N = 51$). The arthritis data set was part of a longitudinal study conducted by the authors and described in previous publications on this project (e.g., Brown, K. A. Wallston, & Nicassio, 1989; Smith & K. A. Wallston, 1992; Stein, K. A. Wallston, & Nicassio, 1988; K. A. Wallston, Brown, Stein, & Dobbins, 1989). Briefly, this data set consisted of 368 newly diagnosed (0 to 7 years) rheumatoid arthritis patients recruited in 1984 to be part of a longitudinal study. The majority of the patients resided in the Middle Tennessee area. Form C was introduced into their semiannual questionnaire at the seventh wave of data collection, 3 years after the initial data were obtained. By that time, 273 of the original 368 subjects remained. Seventy-five percent of these were female, 95% were White, 80% were married, and 78% had at least a high school education. Their mean age was 55 years.

The chronic pain patient data were obtained by a doctoral candidate for his dissertation research in psychology (Zylstra, 1993). The subjects consisted of 43 male and 68 female chronic (nonmalignant) pain patients entering a pain management program in Milwaukee, Wisconsin in 1991 or 1992. Sixty three percent had chronic lower back pain as the primary presenting problem, 14% neck/shoulder pain, 14% pain primarily in the extremities, with the remainder presenting with headache, gastrointestinal, or chest pain. Half of the patients had had no surgery for their pain problem; the others averaged one surgery per patient. Mean length of onset of pain was 45.5 months with a range of 4 to 300 months. The sample was predominantly

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[1] Form C was first described in the literature in K. A. Wallston, 1989.

married (49%), White (70%), high school educated (mean education was 12.2 years), with a mean age of 40.7 years.

The diabetes subjects were part of a study involving 189 diabetes patients in a private endocrinology practice in Nashville, Tennessee (cf., Woodridge, K. A. Wallston, Graber, Brown, & Davidson, 1992). Of the 189 patients, 66% had Type II, non–insulin-dependent diabetes mellitus. The mean length of time since diagnosis for the entire sample was 10.1 years (range = 0–40 years). Form C data were obtained on 111 patients who returned a mailed questionnaire within 12 months of completing a diabetes education program.

Form C data were also available on 93 cancer patients on chemotherapy, comprising various types of cancer. Fifty-one subjects were obtained from a pilot study conducted in central Illinois by Roberta Smith. Smith's patients ranged in age from 18 to 78 (M = 53.4 years). Their mean years of education was 12.6, and 61% were female. An additional 42 persons with cancer were obtained from a study conducted by Ann Fultz in Georgia. Fultz's subjects averaged 14 years of education, 61% were female, 67% were married, and their mean age was 54.7 years (range = 24–80 years). All had been diagnosed with cancer for 3 years or less (M = 1.85 years).

Measures

Condition-specific locus of control.   For all samples, the initial 24-item version of Form C was administered. These 24 items, depicted in Table 1, were developed in 1987 on the basis of face validity. All 24 items contain the word *condition,* with the intent that any specific medical problem/condition could be substituted for this word. Eight Internality, eight Chance, and eight Powerful Others items were included, with the eventual goal of reducing these eight item subscales to six items each to make them consistent with Forms A and B of the MHLC when sufficient data were available. For the eight Powerful Others items, different types of "powerful others" were included: for example, doctors, other health professionals, and other people. In the studies contributing to the data for this article, the word *condition* was replaced by *arthritis, pain, diabetes,* or *cancer* for the appropriate subjects.

Other measures of locus of control.   The arthritis subjects also completed the original MHLC Form B (K. A. Wallston et al., 1978) as well as a shortened 13-item version of Levenson's (1974) I, P, and C scales.

Pain.   The arthritis subjects responded to a single, 100 mm long, visual analogue scale that asked them to rate "how much pain have you had because of your arthritis in the PAST MONTH?" The two anchors were *no pain* (0) and *pain as bad as it could be* (100). This type of assessment of pain intensity is frequently used with persons experiencing chronic pain

TABLE 1
Factor Analysis of Form C Items for Both Samples

Items	Factor 1 (Internal)	Factor 2 (Chance)	Factor 3 (Doctors)	Factor 4 (Other People)
If my condition worsens, it is my own behavior which determines how soon I feel better again.	.76/.70	−.00/−.01	.19/.08	.09/.19
I am directly responsible for my condition getting better or worse.	.77/.81	−.14/−.11	.06/.02	.06/.03
Whatever goes wrong with my condition is my own fault.	.74/.81	.01/−.08	−.05/.01	−.10/.06
The main thing which affects my condition is what I myself do.	.78/.68	−.08/−.14	.04/.11	.13/−.04
If my condition takes a turn for the worse, it is because I have not been taking proper care of myself.	.71/.65	−.04/−.07	.00/.18	−.08/.02
I deserve the credit when my condition improves and the blame when it gets worse.	.75/.79	−.12/.01	−.01/.01	−.17/−.04
If I take the right actions, my condition should improve or at least not get any worse.	.60/—	−.11/—	.24/—	.17/—
I'm the one with the responsibility for what happens with my condition.	.73/—	−.02/—	−.05/—	.02/—
Most things that affect my condition happen to me by chance.	.02/.03	.55/.61	−.16/.12	.13/.05
Luck plays a big part in determining how my condition improves.	.08/−.04	.76/.66	−.00/−.14	.08/.23
Whatever improvement occurs with my condition is largely a matter of good fortune.	−.04/−.09	.74/.77	.06/−.08	.01/.16
If my condition worsens, it's a matter of fate.	−.10/−.08	.79/.78	.01/.08	.17/.12
If I am lucky, my condition will get better.	−.00/−.04	.76/.71	.01/.00	.04/−.01
As to my condition, what will be will be.	−.23/−.19	.68/.63	.08/−.06	.01/−.04
No matter what I or anyone else does, if my condition is going to get worse, it will get worse.	−.30/—	.48/—	−.08/—	.15/—
Even when I take care of myself, things outside of anyone's control can make my condition get worse.	−.04/—	.30/—	.05/—	.21/—
If I see my doctor regularly, I am less likely to have problems with my condition.	.14/.13	−.05/.00	.70/.77	.06/.10

(Continued)

TABLE 1 *(Continued)*

Items	Factor 1 (Internal)	Factor 2 (Chance)	Factor 3 (Doctors)	Factor 4 (Other People)
Following doctor's orders to the letter is the best way to keep my condition from getting worse.	.23/.17	.03/ – .12	.77/.77	.12/.08
Whenever my condition worsens, I should consult a medically trained professional.	– .04/.01	– .07/.09	.76/.80	– .03/.07
Other people play a big role in whether my condition improves, stays the same, or gets worse.	.03/.16	.09/.11	.11/.05	.81/.78
The type of help I receive from other people determines how soon my condition improves.	.18/.16	.13/.04	.22/.15	.74/.80
In order for my condition to improve, it is up to other people to see that the right things happen.	– .09/ – .18	.36/.23	.02/.06	.66/.72
Regarding my condition, I should only do what my doctor tells me to do.	.00/ –	.01/ –	.68/ –	.13/ –
Health professionals are responsible for seeing that my condition improves.	.12 / –	.14/ –	.47/ –	.38/ –

Note. Within each column are two sets of factor loadings separated by a slash (/). The loadings on the left of the slash came from the factor analysis of 24 items using data from Sample 1. The factor loadings on the right of the slash came from the factor analysis of 18 items using data from Sample 2. A dash (–) signifies that the item was not included in the factor analysis.

(Huskinsson, 1974; Scott & Huskinsson, 1976). Patients in the chronic pain study rated their immediate pain as well as their most severe and least severe pain in the past week on three 11-point rating scales ranging from *no pain* (0) to *pain as severe as can be imagined* (10). Responses to these three scales were then summed to derive a single pain score.

Helplessness. The subjects in the arthritis study completed the five-item helplessness subscale of the Arthritis Helplessness Index (Stein et al., 1988). The patients in the chronic pain sample completed a version of the same five-item scale modified to assess pain helplessness.

Depression. The 20-item Center for Epidemiological Studies–Depression Scale (Radloff, 1977) was administered to subjects in the arthritis study. Those in the chronic pain sample were administed the 21-item Beck Depression Inventory (Beck, Rush, Shaw, & Emery, 1979).

Procedure

In all cases, the 24-item MHLC Form C was administered to adult patients (18 years of age or older) via questionnaire format using a 6-point Likert response format ranging from *strongly disagree* (1) to *strongly agree* (6). In addition, two of the studies collected Form C data at multiple time periods. For the arthritis subjects, 246 of the subjects completed mailed questionnaires containing Form C at the eighth wave of data collection approximately 1 year after the seventh wave. One hundred and six of the 111 chronic pain patients who completed Form C prior to entering a behaviorally oriented chronic pain program filled out Form C again upon completion of the program (*M* program length = 6.2 weeks) and 100 of the patients completed Form C again at a one month posttreatment follow-up.

Form C data from all of the previously mentioned sources were combined into one integrated data set for the purposes of item and factor analyses. (In those instances where subjects completed Form C more than once, only data from the first administration were included in the integrated data set.) For cross-validation purposes, the subjects were randomly divided into two samples of approximately equal size. (Slightly unequal *N* resulted from some subjects having some missing data. Sample 1 consisted of a total of 298 cases: 134 with arthritis, 58 with chronic pain, 57 with diabetes, and 49 with cancer. Sample 2 consisted of a total of 290 persons: 139 with arthritis, 53 with chronic pain, 54 with diabetes, and 44 with cancer.)

RESULTS

Factor Structure

Exploratory factor analysis was performed on data from Sample 1 utilizing a principal components analysis with orthogonal rotation. Five factors with eigenvalues greater than one were obtained, accounting for 58% of the total variance among the twenty-four items. A scree test suggested retaining four factors, which accounted for 53.5% of the total variance (or 92% of the variance accounted for by the five-factor solution).[2] Therefore, a new factor analysis was run, forcing a four-factor solution. Table 1 presents the factor loadings for the four-factor solution (after orthogonal rotation) for the full 24 items for Sample 1.

Factor analysis yielded a clean factor structure for Factor 1 consisting of all eight Internality items. Seven of the eight items had factor loadings of .7

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[2]Only two items loaded on the fifth factor; both were Chance locus of control items, and both were eliminated from the final 18-item version of the scale.

or greater. Factor 2 had six of the eight Chance items loading .55 or better. The eight Powerful Others items loaded on two separate factors. The four items that explicitly mentioned doctors or medically trained professionals all had loadings of .70 or higher on Factor 3, whereas the items that explicitly mentioned "other people" all loaded .66 or higher on Factor 4. The one item that mentioned "health care professionals" loaded almost equally on Factors 3 and 4. Thus, Powerful Others for these chronic disease patients appears to be multidimensional with two separate factors: people trained in medicine and other people.

Scale Reduction

As stated earlier, to be comparable with Forms A and B, our intent all along was to reduce Form C to 18 items. The factor analysis results with Sample 1 suggested that instead of three 6-item scales, the final version should consist of two 6-item scales for Internality and Chance and two separate 3-item subscales for Powerful Others. Among the eight Internality items loading on Factor 1, an item analysis showed that Cronbach's alpha would not be lowered if the item with the weakest loading (i.e., .60) was eliminated. A new item analysis of the remaining seven items indicated that either of two items could be dropped without adversely affecting alpha. Therefore, to choose between these two items, using the data from the arthritis and chronic pain samples (where repeated measures were available), we eliminated the item with the lower test–retest reliability. This resulted in a six-item subscale. Because Factor 2 had six of the eight Chance items loading strongly on it, the two Chance items with the weakest loadings (.30 and .48) were eliminated to reduce the Chance subscale to six items. (The items eliminated were the one that had loaded on Factor 5 in the initial factor analysis.) For the two Powerful Others subscales, three of the four items loading cleanly on Factor 3 were selected for the Doctors subscale on the basis of maximizing alpha, and the Other People subscale was comprised of the three items that had loaded cleanly on Factor 4.

Once the 18 items were tentatively selected, the next step was to attempt to cross-validate the factor structure with data from Sample 2. Forcing the 18 items into a four-factor solution yielded a clean factor structure (see Table 1) where all items loaded on the appropriate scale with loadings greater than .60. In all cases, loadings on any other factor were less than .25. The four factors accounted for 57.6% of the total variance among the 18 items. For the remainder of this article, only results for the 18-item version of Form C will be presented.

Table 2 presents the intercorrelations of the resulting subscales for both samples. Given that, like Forms A/B, the subscale structure was derived using orthogonal rotation, the Form C subscales should not be highly inter-correlated, and Table 2 indicates that they are not. Although several of the

TABLE 2
Intercorrelations Among Form C Subscales and Alpha Reliabilities
for Both Samples

Sample	Internal	Chance	Doctors	Other People
Sample 1				
Internal	(.87)	−.16*	.17*	.04
Chance		(.82)	−.04	.31**
Doctors			(.71)	.22*
Other People				(.71)
Sample 2				
' Internal	(.85)	−.19*	.22*	.12
Chance		(.79)	−.03	.26**
Doctors			(.71)	.22*
Other People				(.70)

Note. Alpha reliabilities are in parentheses along the diagonal.

*p < .05 for two-tailed test. **p < .01 for two-tailed test.

correlations are statistically significant, the highest intercorrelation among the subscales (r = .31) accounts for less than 10% shared variance. As was the case with Forms A/B, there is a small negative correlation between Internality and Chance on Form C. Internality correlates positively with the Doctors subscale to about the same degree as it does negatively with the Chance scale. The highest amount of common variance is between Chance and Other People, with a smaller overlap between the two Powerful Others scales. The Doctors and Chance subscales as well as the Internality and Other People subscale appear to share no significant common variance in either sample.

Reliability

Internal consistency.   Table 2 also presents the alpha reliabilities of the Form C subscales for the two samples. In both samples, the six-item Internality and Chance subscales demonstrated ample internal consistency. Because the Doctors and Other People subscales were only half as long as the Internality and Chance subscales, their alphas are understandably lower, but even these lowered alphas are ≥ .70, which are acceptable for three-item subscales.

Test–retest reliability.   Although health locus of control scores should show some trait-like stability over time, health beliefs can change with experience. Thus, one would not necessarily expect a very high test–retest reliability for the Form C subscales, especially over extended time periods or during time periods in which individuals are systematically exposed to experiences designed to alter their beliefs. Table 3 depicts the test–retest

TABLE 3
Stability Coefficients and Mean Scores Over Time for Form C Subscales in
Two Separate Studies

Study	Internal	Chance	Doctors	Other People
Arthritis Study				
M (seventh wave)	17.45	16.34	13.62	7.38
M (eighth wave)	17.85	15.66	13.24	6.81
r (7, 8)	.66	.61	.66	.54
Chronic Pain Study				
M (pretreatment)	19.20	15.84	11.01	9.19
M (posttreatment)	22.30	14.64	10.26	7.67
M (follow-up)	22.64	14.42	9.24	7.36
r (pre, post)	.64	.39	.45	.35
r (post, follow-up)	.80	.72	.58	.40

reliabilities (stabilities) for the two data sets offering multiple time periods (arthritis and chronic pain). In the arthritis sample, subjects were not systematically exposed to psychoeducational interventions, although some patients may have sought out such interventions on their own, and a full year passed between assessments. The chronic pain patients were assessed three times at much shorter intervals (approximately 6 weeks between Time 1 and Time 2 assessments and 1 month between Time 2 and Time 3), but, as detailed in the next section, all patients received an intervention between the first two assessments that was designed, in part, to alter beliefs closely related to health locus of control. Thus, test–retest reliabilities should be somewhat attenuated for the first two assessments in the chronic pain sample.

Examination of the table indicates that the observed test–retest reliabilities were in accord with these considerations. With the exception of the Other People subscale, for which stability was generally low, the stability coefficients were moderate to high for the arthritis sample and for the chronic pain sample between Time 2 and Time 3 (i.e., after the intervention had been completed). However, for the pain sample, the stabilities for the Internality, Chance, and Doctors subscales between Times 1 and 2 (i.e., when the intervention occurred) were attenuated relative to the stabilities observed between Times 2 and 3. Note also that the somewhat lower stability coefficients for the two Powerful Other subscales might, in part, reflect reduced reliability for these brief, three-item subscales as well as, or instead of, true instability of the control beliefs they are meant to assess.

Validity

Intervention-related changes in locus of control.   The presence of the intervention in the chronic pain sample affords an opportunity to test the

construct validity of Form C. This intervention was a behaviorally oriented pain management program, modeled after the work of Turk, Meichenbaum, and Genest (1983), that was designed, in part, to weaken participants' beliefs of pain helplessness. Because helplessness beliefs are strongly associated with locus of control beliefs (e.g., R. F. DeVellis, B. M. DeVellis, B. S. Wallston, & K. A. Wallston, 1980), such an intervention should be expected to strengthen beliefs of internal locus and to weaken external locus of control beliefs. In contrast, because they did not specifically receive such an intervention, the persons in the arthritis sample would not be expected to demonstrate such changes. Examination of the mean changes in subscale scores in both samples offered partial support for these hypotheses. In particular, no significant changes in mean Form C Internality subscale scores were observed in the arthritis sample between the seventh and eighth waves (1 year), but all three external subscales decreased over time: for Chance, $t(233) = 1.94$, $p = .053$; Doctors, $t(234) = 2.17$, $p < .04$; Other People, $t(233) = 2.96$, $p < .01$. In contrast, all four Form C subscales scores changed significantly in the pain sample during the approximately 6 weeks between Time 1 and Time 2: for Internality, $t(104) = -5.10$, $p < .001$; Chance, $t(104) = 2.11$, $p < .04$; Doctors, $t(104) = 2.63$, $p < .01$; Other People, $t(104) = 4.10$, $p < .001$. As predicted, for the pain patients, the mean Internality scores increased and the mean externality scores each decreased.

Concurrent validity.   For Form C to be considered to have concurrent validity, its subscales should demonstrate modest correlations with the appropriate scale from Form A/B. Table 4 presents the correlations between Forms B and C (when the latter was administered as an arthritis locus of control scale). In each case, the Internality, Chance, and two Powerful Others subscales from Form C demonstrate the highest correlation with their appropriate counterparts on Form B. The only other significant correlation was between the Form C Other People subscale and Form B Chance subscale.

TABLE 4

Interrelationship of Form C Subscales With Form B Subscales and Levenson's I, P, and C Scales

Subscale	Form B			Levenson's Scales		
	Internal	Chance	Powerful Others	I	C	P
Internal	.59*	−.07	.03	.35*	−.02	.11
Chance	−.12	.65*	.07	−.11	.50*	.38*
Doctors	−.01	−.04	.55*	.08	.09	.04
Other People	.05	.30*	.38*	−.11	.30*	.41*

*$p < .001$, two-tailed.

Because Levenson's I, P, and C Scales measure general locus of control beliefs instead of health-related beliefs, Form C would not be expected to correlate as highly with her measures as they do with Form B. Nevertheless, for concurrent validity, some modest correlation could be expected within the same locus of control belief dimension. This would especially be true for Form C's Internality, Chance, and Other People scales, because Levenson's scales have Internality, Chance and Other People items. However this may not apply to Form C's Doctors subscale, as there are no items on Levenson's P scale referring to doctors or medically trained professionals as a source of control.

Table 4 also shows significant relationships between Form C Internality, Chance, and Other People scales and their appropriate counterparts on Levenson's I, P, and C scales. As with Form B, there is also a smaller significant relationship between Other People beliefs and Levenson's C scale. There is also a smaller but significant relationship between Form C Chance and Levenson's P scale. It should be noted, however, that unlike Form A/B, Levenson did not develop her C and P scales to be orthogonal to one another. As anticipated, there was no significant relationship between the Form C Doctors subscale and any of the I, P, or C scales.

Differences among known groups. One form of construct validity involves differences in mean scores among "known groups." The known groups in this case are the four diagnostic groups that constituted the total sample. Previous research with Forms A/B of the MHLC have shown significant differences among diagnostic groups (cf. B. S. Wallston & K. A. Wallston, 1981). Persons with diabetes, for example, often score higher on measures of internal health locus of control than do persons with certain other diagnoses (e.g., arthritis), perhaps because diabetics recognize that their clinical status is dependent upon a variety of actions that they need to carry out on a daily basis. As shown in Table 6, this is also the case with Form C Internality. Also, persons with cancer often score higher on measures of chance health locus of control beliefs perhaps due to their belief that their condition is fatal (Meyerowitz, Burish, & K. A. Wallston, 1986). This, too, is the case with Form C (see Table 5).

Correlations with related constructs. Construct validity can also be determined by examining correlations among measures of distinct but theoretically related constructs. Two of the studies (arthritis and chronic pain) administered measures of pain, helplessness, and depression along with Form C. These latter constructs would theoretically be correlated positively with indicators of externality and negatively with Internality (Abramson, Seligman, & Teasdale, 1978; Crisson & Keefe, 1988). Table 6 presents the simple zero-order correlations of these measures with the Form C subscales in each of the two studies. Five of the six correlations for the Internality

TABLE 5
Means and Standard Deviations on Subscales of Form C
by Diagnostic Groups

Subscale	Possible Range	Rheumatoid Arthritis	Chronic Pain	Diabetes	Cancer
Internal	6–36	17.50_d	$19.24_{b,c}$	28.67_a	$18.49_{c,d}$
		(5.89)	(7.58)	(4.95)	(5.72)
Chance	6–36	16.60_b	15.95_b	12.46_c	19.81_a
		(6.10)	(6.29)	(5.73)	(7.13)
Doctors	3–18	13.43_b	11.19_c	15.99_a	15.91_a
		(3.28)	(3.48)	(2.57)	(2.39)
Other People	3–18	7.48_c	9.18_b	8.48_b	10.96_a
		(3.27)	(3.60)	(3.46)	(3.96)

Note. Means with a subscript in common across rows are not significantly different from one another according to the Student-Newman-Keuls posttest at $p < .05$.

TABLE 6
Correlations Between Form C Subscales and Pain, Helplessness, and
Depression Scores for Two Groups of Subjects

Subscale	Arthritis Sample			Chronic Pain Sample		
	Pain	Depression	Helplessness	Pain	Depression	Helplessness
Internal	−.13*	−.12*	−.17**	−.19*	−.04	−.22**
Chance	.19**	.32**	.45**	.08	.31**	.27**
Doctors	−.16**	−.01	.07	.17*	−.03	.17*
Other People	.10	.24**	.43**	.26**	.07	.40**

*$p < .05$, one-tailed. **$p < .01$, one-tailed.

subscale were significant and in the expected direction, as were five of the six correlations for the Chance subscale. The results for the two Powerful Others subscales were less consistent, with the exception of the correlations between other people and helplessness in both studies.

Differential utility of Forms B and C. As indicated in the introduction, a theoretical reason for developing a condition-specific locus of control scale is that such a scale would be a better predictor of condition-specific outcomes than would a more general scale, whereas the more general scale would be expected to better predict more general outcomes (cf., Rotter, 1975). A final set of analyses was conducted on the seventh wave of data from the arthritis sample to eamine this proposition. In these analyses we first regressed three criterion measures (pain, helplessness, and depression) separately on the three Form B subscales, and then hierarchically added the four Form C subscales. Next we reversed the order by regressing the criterion measures on the four Form C subscales, and then hierarchically added

the three Form B subscales. Of the three criterion measures, pain represents a condition-specific symptom of arthritis, whereas depression is a much more general outcome that can result from many forms of stress. Arthritis helplessness is of somewhat intermediate specificity; it is assessed in a condition-specific manner, but the helplessness construct has broad utility for understanding depression (e.g., Abramson, Seligman, & Teasdale, 1978). Thus, Form C should demonstrate an advantage in explaining pain, Form B should demonstrate an advantage in explaining depression, and it is unclear whether the two forms should differ in explaining arthritis helplessness.

The result of the regression analyses were in accord with these expectations. First, Form C demonstrated a marked advantage in explaining pain. The adjusted R^2 for Form B was .015 compared to .076 for Form C. Moreover, adding Form C to Form B resulted in a significant increase in the adjusted R^2 of .051 ($p < .005$), whereas adding Form B to Form C resulted in a nonsignificant *decrease* in adjusted R^2 of −.010. In contrast, Form B demonstrated a clear advantage in explaining depression. The adjusted R^2 for Form B was .207 vs. .140 for Form C. In addition, adding Form C to Form B increased the adjusted R^2 by a nonsignificant .007, but adding Form B to Form C resulted in a statistically reliable increase in adjusted R^2 of .074 ($p < .001$). Finally, the two forms did not differ appreciably in explaining arthritis helplessness. The adjusted R^2 for Form B was .313, whereas it was .355 for Form C. Interestingly, there was a significant increase in adjusted R^2 both when Form C was added to Form B (+.093, $p < .001$) and when Form B was added to Form C (+.051, $p < .001$). Thus, as predicted by theory, both forms of the locus of control scales appear to be best at explaining variation in outcomes at their intended level of specificity.

DISCUSSION

This investigation examined the reliability and validity of Form C of the MHLC, a measure that was designed to serve as a general purpose, condition-specific locus of control scale that could easily be adapted for use with any medical or health-related condition. The results of this investigation indicate that Form C holds considerable promise for serving as such a measure. Utilizing data covering four diverse medical conditions, the items on this measure yielded an easily interpretable and highly replicable factor structure representing four more-or-less orthogonal subscales: Internality, Chance, Doctors, and Other (powerful) People. These subscales were found to be sufficiently internally consistent to be used in research as reliable indicators of unidimensional factors, and, in a sample of persons rheumatoid arthritis who had not received systematic interventions designed to alter their beliefs, the subscales were observed to be relatively stable across 1 year.

Recently independent support for the factor structure of Form C has come from Dr. Colette Ray from Brunel, the University of West London, in the U.K. (personal communication, C. Ray, June 3, 1993). Using data she and her colleagues collected on a sample of 146 patients with chronic fatigue syndrome (and substituting the word *illness* for *condition* in all items), Ray also found, and rejected, a five-factor solution for the 24 item version of Form C. With only a few exceptions, her five-factor solution was identical to ours.[3]

The fact that Form C reliably yields a four-factor solution represents a substantive departure from the structure of more general health locus of control beliefs, as represented by Form A/B of the MHLC. It appears that when considering their specific health-related conditions, individuals differentiate between the potential influences of medically trained personnel, such as doctors, and of other people in a manner that they do not when considering their more general health. This greater differentiation at the more specific level is intriguing, although its significance and relevance for health behaviors and health-related outcomes must await further research.[4]

Importantly, our analysis provides considerable evidence for the validity of the Form C subscales. Although scale developers can never conclusively prove that their instruments are valid, the validity evidence presented in this investigation strongly indicates that Form C is at least as valid as its more established predecessors. First, the subscales of Form C correlated significantly with their counterparts from Form B (as well as from the even more general Levenson, 1973, scales), but tended not to correlate significantly with their non-counterparts from Form B, thereby demonstrating considerable convergent and discriminant validity.

Notably, none of the correlations between the Form B and Form C subscales exceeded 43% shared variance, thereby allowing the possibility that the two scales might show differential relations to other health-related variables in ways consistent with their intended differences in specificity. The results of the regression analyses using the arthritis data presented some preliminary indications of such differential relations: Whereas Form B was superior to Form C in predicting the very general outcome of depression, Form C was superior to Form B in predicting the degree of pain associated with the respondents' arthritis. Because the two MHLC forms appear to assess somewhat distinct locus of control beliefs, researchers who can afford

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[3]Similar results were found by Privette (1990) in a factor analysis of Form C responses by 243 chronically ill persons.

[4]It must be pointed out, however, that the wording of the items on the Form A/B PHLC scale do not readily distinguish between control by doctors and control by other people. In a factor-analytic study of Form A of the Multidimensional Health Locus of Control, Marshall, Collins, and Crooks (1990) suggest that beliefs regarding professional and nonprofessional control over health outcomes might be empirically distinct and call for further refinement of the PHLC dimension. The factor structure of Form C is in line with their recommendations.

to do so might consider administering Form C in combination with Form A or B so as to further explore the differential utilities of the two measures. Additional evidence for the validity of Form C comes from the following observations:

1. In the sample of chronic pain patients, an intervention designed to change helplessness beliefs also altered the patients' locus of control beliefs as assessed by all four subscales of Form C in ways consistent with the intervention—that is, internality beliefs became stronger, whereas external-ity beliefs became weaker.

2. The mean scores along the Form C Internality and Chance subscales varied systematically across the four examined health conditions in ways that are consistent with previous observations for those conditions —inter-nality beliefs were strongest among persons with diabetes, whereas chance beliefs were strongest among persons with cancer.

3. The subscales of Form C, particularly the Internality and Chance subscales, consistently demonstrated significant, theoretically consistent, correlations with the examined health-related criteria (pain, arthritis-related helplessness, and depression): That is, internality beliefs tended to be asso-ciated with more positive outcomes, whereas externality beliefs (especially chance, but also other people) tended to be associated with more negative outcomes.

In addition to the theoretical utility of providing a condition-specific measure of locus of control beliefs, Form C has proven to be a relatively easy instrument to administer. Our own experience and that of other investigators has been that subjects can respond to the items with a minimum of missing data. For instance, the first time we administered the Form C items to our rheumatoid arthritis subjects, less than 1% of the items were left blank. Similarly, a team of researchers from Southern University in Baton Rouge, Louisiana successfully included Form C in a structured interview format to assess diabetes locus of control beliefs in a large sample of predominantly elderly, female, African-American, low socioeconomic status persons with Type II non–insulin-dependent diabetes mellitus (personal communication, Lacey Tillotson, February 1990). Thus, Form C can be used successfully with a variety of subject populations.

Finally, because the 24-item version of Form C was made freely available to other health researchers in the hopes that they might test it out using a variety of different conditions and populations, there is now evidence that Form C is easily adaptable to a host of existing medical conditions ranging from ankolosing spondylytis to HIV disease. In sum, the evidence presented in this article indicates that Form C of the MHLC is a valid measure of condition-specific locus of control beliefs that has been successfully de-signed to be readily adapted in a standardized manner for the study of virtually any pre-existing medical or health-related condition.

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