6

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HEALTH LOCUS OF CONTROL SCALES [1]

Introduction

Health is one of the many areas in which there has been a significant amount of interest in relating locus of control (LOC) beliefs to a variety of relevant behaviors. Much of the earlier work in this area has already been reviewed and is available elsewhere (see Strickland, 1978; Wallston, & Wallston, 1978). In this chapter we will not review this material again but will focus on work that has used the health-specific scales we developed, the Health Locus of Control (HLC) Scale and the Multidimensional Health Locus of Control (MHLC) Scales.[2] This chapter will review our own program of research and the programs of others across the country who have been using these scales.[3] We have tried to be as complete as possible in covering such work, but much of it is unpublished, and numerous studies are in progress. Thus, although this chapter reflects our current views on the utility and validity of

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[2] It is important to distinguish between the Multidimensional Health Locus of Control Scales and the Mental Health Locus of Control Scale described by David Hill and Ronald Bale in Chapter 8. Both scales are abbreviated as "MHLC Scale"—Ed.

[3] This chapter will deal only with measures of adults' health locus of control beliefs. A Multidimensional Children's Health Locus of Control Scale has been developed by Parcel and Meyer (1978).

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these scales, in some ways it will be out of date by publication time. Work in this area is mushrooming. We hope that some of our conclusions will point researchers in appropriate and productive directions.

A brief historical perspective on research involving nonspecific locus of control beliefs and health behavior should put our work in a relevant context. In one of the earliest studies examining the locus of control construct, Seeman and Evans (1962) found that hospitalized tuberculosis patients who held internal locus of control beliefs knew more about their own condition, questioned doctors and nurses more, and expressed less satisfaction with the amount of feedback or information they were getting about their condition from the hospital personnel than did external patients. This study appeared before Rotter's (1966) publication of the I–E Scale and, in fact, used an earlier version of that scale. In a similar vein, work by DuCette and colleagues (DuCette, 1974; Lowery & Ducette, 1976) showed that among newly diagnosed diabetics, "internals" knew more about their condition than did "externals." This finding did not hold for long-term diabetics, where no differences in information between internals and externals were found. Because DuCette's data were cross-sectional, conclusions about changes over time must be drawn with caution.

DuCette (1974) investigated other health behaviors as well. Contrary to his prediction, he found that long-term diabetics who were internal missed an increasing number of doctor appointments and began to ignore their diets. He hypothesized that the uncontrollable, unpredictable aspects of diabetes leads internals to find their normal response inadequate; that when knowledge does not lead to control, internals respond by relinquishing the degree of control they might maintain.

Investigating locus of control in relation to specific health behaviors is only one aspect of the value of this construct. In an early paper (Wallston & Wallston, 1973), we noted that individualizing patient treatment based on locus of control beliefs was a potentially important utilization of the construct. Important work in this area has been reported by Cromwell, Butterfield, Brayfield, and Curry (1977). Participation in self-treatment was one of three nursing care interventions in a well controlled experiment focusing on myocardial infarction (MI) patients. No MI patient in a congruent condition (i.e., an external in a low-participation condition or an internal in a high-participation condition) returned to the hospital or died within 12 weeks. Although these findings were only marginally significant ($p < .06$), these important dependent measures are worth noting. However, on 14 other recovery-related variables, no significant interactions of locus of control

'ticipation in self-treatment were found. There were main ef-
ch that externals spent more days in the coronary care unit
nd had higher temperatures and lactate dehydrogenase while in
e believe insufficient attention has been paid to interactions of
treatment and locus of control beliefs in health care settings. A
portant usage of locus of control is as a dependent variable to
: treatment programs. Research with this thrust will be re-
later in the chapter.

ɔr to our work, there was one other attempt to develop a health-
scale. Dabbs and Kirscht (1971), using their own scale, found
lege students they termed *internal* were more likely to be in-
ɔd against influenza than those they termed *external*. However,
ing was based on motivational items that do not fit the locus of
construct. If we look only at expectancy items (which is the
:ally consistent way of measuring locus of control), we see that
; were less likely to have taken shots. This finding produces
ıs as to the validity of the Dabbs and Kirscht expectancy
·. Although motivation to control one's health may be predic-
ealth behavior, it should not be confused with locus of control,
ctancy that one's behavior either is or is not directly related to
tcomes (i.e., reinforcements). Kirscht (1972) later clarified this
ɔn. In one study, he reported, expectancy for control of health
itively related to having in the past made medical and dental
ıred for teeth, controlled diet, and exercised, as well as to the
ı of doing these things in the future. Other results, however,
ıfficiently ambiguous to warrant a second study in which a mea-
control was developed that clearly distinguished expectancy
tivation, and health from non-health content [Kirscht, 1972, p.
he health expectancy scale included only three items, and little
velopment work was done. Kirscht concluded from the second
ıt motivation for control tended to account for relationships to
ɔns of vulnerability to specific diseases whereas expectancy
e related to a belief that health can be determined by personal
In addition, however, Kirscht concluded that it is "necessary to
rther measures of control [p. 235]." Our scale development ef-
l be described below. After reviewing the development of the
l MHLC Scales, we will examine alternative measures, nor-
ata, and scale properties. We will then discuss how to use the
nd research utilizing them will be reviewed considering locus
l as a dependent and an independent variable. Finally, we will
ıclusions and suggest directions for future research.

Development of the Health Locus of Control Scales

Our interest in relating locus of control to health care situations began with observations we made of a series of classes for newly diagnosed diabetic patients and their families. Throughout their presentations, the medical staff kept stressing the importance of the patient's active role in his or her own care. "We can't make you well—only you can," and "What happens to your diabetes depends on what you, yourself, do" were the constant themes of the week's classes. The obviousness of these "internality" messages was readily apparent to us. "You're trying to get these patients to adopt an internal locus of control orientation," we said excitedly to the doctor and nurse in charge of the program (who, like most health professionals at that time, were totally unaware of Rotter's construct). We tried to convince them to structure their entire patient education program by means of a social learning theoretical framework, but they would have none of it. They preferred to evaluate their effectiveness strictly in terms of patients' knowledge about diabetes and its treatment, rather than expose themselves and their patients to the world of psychological constructs.

Although our medical colleagues were not stimulated, we were. Our major research effort at that time involved information disclosure in nurse practice settings, and we saw locus of control orientation as an individual difference variable that might be related to information exchanges between patients and health care professionals. As a means of getting started in this area, at the American Public Health Association meetings in San Francisco we presented a paper (Wallston & Wallston, 1973) in which we conceptualized the intent of many health education efforts as internality training programs. In that paper also we advocated evaluating the effectiveness of these health education programs by means of the health-related measure of locus of control beliefs that we were just beginning to develop. We referred to Rotter's own writings (Rotter, 1960; 1966) in which he advocated taking the situation into account when devising measures of expectancy for our rationale in developing a health-specific measure.

The original health-related locus of control scale (the HLC Scale) (Wallston, Wallston, Kaplan, & Maides, 1976) consisted of 11 items in a 6-point Likert format. These 11 items were the product of an item analysis based on the responses of 98 college students to a pool of 34 items written as face-valid measures of generalized expectancies regarding locus of control related to health. Congruent with most other measures of locus of control, the HLC Scale was scored so that high

scores indicated agreement with externally worded beliefs. Individuals with scores above the median were labeled "health-externals"; they were presumed to have generalized expectancies that the factors that determine their health are ones over which they have little control (i.e., external factors such as luck, fate, chance, or powerful others). At the other end of the dimension, scoring below the median, were the "health-internals," who believe that the locus of control for health is internal and that one stays or becomes healthy or sick as a result of his or her own behavior. The mean score for the original developmental sample was 35.57, with a standard deviation of 6.22. The alpha reliability (i.e., internal consistency) of the scale (.72) appeared respectable, and the HLC scores did not reflect a social desirability bias, as evidenced by a −.01 correlation with the Marlowe–Crowne Social Desirability Scale.

Concurrent validity of the HLC Scale was initially evidenced by a .33 correlation ($p < .01$) with Rotter's I–E Scale for the original development sample. The shared variance (10%) with the more established measure of locus of control was kept purposely low to enhance its discriminant validity, thus meeting the requirement that a new test not correlate too highly with measures from which it is supposed to differ (Campbell & Fiske, 1959). It is important to note that the HLC Scale, while specific to a given goal area (i.e., health), was still a generalized expectancy measure, cutting across many health-related settings and behaviors. It was our hope that such a middle-ground tool would be sufficiently useful to obviate the need for development of highly specific locus of control measures dealing with given health conditions (e.g., hypertension, cancer, accidents, obesity) or health behaviors (e.g., medicine taking, smoking, overeating, seeking information).

Not only did we have the HLC Scale to utilize in our own research (which is reported in later sections); the availability of a seemingly well-developed health-related locus of control instrument appeared to fit the needs of many other health researchers. Somehow the word about the instrument spread, so that even before its 1976 publication in the *Journal of Consulting and Clinical Psychology* we had received and filled requests for copies from all over the world. (We still get inquiries from people who say, "I have this unpublished manuscript you sent me in 1974 about your scale. Has it ever been published and have you done anything else with it?") The HLC Scale has been reproduced in at least two collections of instruments for health researchers (Reeder, Ramacher & Gorelnik, 1976; Ward & Lindeman, 1978). We have tried to act as a clearinghouse for information about studies utilizing the HLC Scale (some of which will be presented here) and as consultants to other investigators contemplating its use. However, much of the re-

search was designed without our direct input, and we are by no means aware of all of the results of work done with the HLC Scale.

After utilizing the HLC Scale in a half dozen or so studies we began to question our original decision to treat health locus of control as a unidimensional concept. Even though we were aware of the evidence supporting the multidimensionality of the I–E Scale (e.g., Berzins, 1973; Collins, 1974; Gurin, Gurin, Lao, & Beattie, 1969; Mirels, 1970; Reid & Ware, 1973), we nevertheless designed the HLC Scale to be unidimensional. Subsequent calculation of the HLC Scale's internal consistency yielded alpha reliabilities in the .30–.59 range—considerably lower than the original determination of .72.

Based on an earlier finding cited by MacDonald (1973), that a factor analysis of a Likert-format locus of control scale produced a first factor consisting almost entirely of externally worded items, a number of HLC Scale protocols were rescored to form two subscales: HLC–I consisted of the five items worded in the internal direction and HLC–E consisted of the six items worded to the external direction. The correlation between these two subscales was essentially zero. Item analyses of the subscales revealed that the alpha reliability of HLC–E was approximately the same as for the total 11-item scale and the alpha for HLC–I was even higher, though based on only five items. Thus, it seemed that at least two health locus of control dimensions existed.

Questioning the conceptualization of locus of control as a unidimensional construct, Hanna Levenson (1973; 1974; 1975) argued not only that internal beliefs are orthogonal to external beliefs but that understanding and prediction could be further improved by studying fate and chance expectations separately from external control by powerful others. She developed three 8-item Likert scales (Internal, Powerful Others, and Chance—the I, P, & C Scales) to measure generalized locus of control beliefs and demonstrated initial evidence of their discriminant validity. Levenson's P and C scales were moderately intercorrelated ($r = .59$)—a finding that Rotter (1975) interpreted as support for his contention that externality is a single factor—but were essentially independent of scores on the I Scale. Like Rotter's I–E Scale, Levenson's new scales did not include items specific to expectations about health. Nevertheless, since Levenson demonstrated the utility of measuring three distinct dimensions of locus of control, there was reason to model the new health-specific locus of control scales after her work. (See Levenson, Chapter 2 in this volume, for further information about Levenson's scales.)

We were sufficiently impressed with Levenson's work to use it as a model for new health locus of control scale development. Of the six externally worded items on the original HLC Scale, only one, "I can only

do what my doctor tells me to do," was conceptually related to the dimension of powerful others externality. Form II of the HLC Scale was developed by Kenneth Wallston and Gordon Kaplan as a means of salvaging the HLC Scale as a multidimensional tool. The original 11 items were joined by 4 new items purporting to measure beliefs that one's health is controlled by powerful other people. Thus Form II could be scored unidimensionally or multidimensionally, the latter method consisting of three 5-item scales. No formal scale development was done for Form II, since Wallston and Kaplan needed the new scales right away for inclusion in their weight management research.

Form II was clearly only a stopgap measure. Adding additional "powerful others" items was a step in the right direction, but more rigorous development procedures were called for. Also, the original HLC Scale included a mixture of items tapping personal control and general control ideology, but a strong case was made by Levenson arguing for all personally worded items. Thus, we decided to word all items to reflect beliefs about "self." Aided by a grant from the National Center for Health Services Research, we have now developed the Multidimensional Health Locus of Control (MHLC) Scales, which measure three distinct dimensions: Internality (IHLC); Chance Externality (CHLC); and Powerful Others Externality (PHLC). Two equivalent forms (A & B) of the MHLC Scales have been developed, each consisting of three 6-item scales. We have retained the 6-point Likert format (Wallston, Wallston, & DeVellis, 1978).

The development sample for the MHLC Scales was much more heterogeneous than the sample of Vanderbilt University undergraduates on whom the HLC was developed. The 115 subjects who responded to our new pool of 81 personally worded health-related locus of control items were recruited at Nashville's Municipal Airport. Although these subjects are also predominantly middle class, they represent more of a cross-section of the population for whom the scales are designed than did the students.

The alpha reliabilities for the MHLC Scales (6-item forms) ranged from .67 to .77. When Forms A and B were combined into 12-item scales, the alpha reliabilities ranged from .83 to .86. The three MHLC dimensions are more or less statistically independent, especially the IHLC and PHLC Scales. The IHLC and CHLC Scales are negatively correlated (but share less than 10% common variance), and the CHLC and PHLC Scales are only modestly correlated (the 12-item versions correlate + .20). Only the CHLC Scale correlated significantly with a shortened version of the Marlowe-Crowne Social Desirability Scale ($r = -.24$).

The concurrent and discriminant validity of the MHLC Scales were

established by correlating them with Levenson's I, P, & C Scales. The intercorrelations of the MHLC Scales and the I, P, & C Scales were such that each MHLC Scale correlated most highly with its theoretical counterpart among Levenson's scales. This was most clearly the case with the IHLC, which correlated significantly only with the I Scale. The PHLC correlated highest with the P Scale but also correlated significantly with the C Scale. Likewise, the CHLC correlated highest with the C Scale but, again, correlated significantly with the P Scale and negatively with the I Scale. The significant PHLC–C and CHLC–P correlations are probably due to the .60 correlation between C and P for this sample.

The a priori designation of items into the IHLC, CHLC, and PHLC Scales was borne up by a factor analysis that reproduced the three dimensions without error.

With the development of the MHLC Scales, health researchers had at their disposal a set of instruments with greater potential usefulness than the original unidimensional HLC Scale. Not only could scores be obtained on three theoretically and empirically differentiated dimensions, but equivalent forms of the scales were available for research designs that required repeated administrations over short time intervals. In using multidimensional scales, however, there was one problem for which a solution was not apparent: Individuals could no longer be classified as "internals" or "externals" by referring to whether they were above or below the median on a single dimension. In fact, the designation "external" became doubly ambiguous if not totally meaningless. Later in this chapter we discuss this issue more extensively.

Alternative Measures

In addition to developing the Likert format HLC and MHLC Scales, we have attempted to measure health locus of control beliefs using two alternative self-report measures: a simple, self-rating form and a behavioral situational inventory. One stimulus for developing these alternative tools was our intention to conduct multimethod–multitrait (Campbell & Fiske, 1959) validation studies of the MHLC Scales. In order to do this, we needed alternative means of assessing internal, chance external, and powerful others external health locus of control beliefs.

The self-rating form consists simply of two- or three-sentence descriptions of each of the three MHLC dimensions and requires the subject to rate where she or he falls on each of the dimensions, using a 7-point rating scale.

TABLE 6.1
Correlation Matrix between Multidimensional Health Locus of Control (MHLC) Scales and Self-Rating (SR) Scales[a]

	MHLC Scales		
SR Scales	Internal (IHLC)	Chance (CHLC)	Powerful Others (PHLC)
Internal	.52**	−.08	.06
Chance	−.27*	.48**	.08
Powerful Others	−.06	.23*	.47**

[a] The MHLC data are based on the 12-item versions (Forms A and B combined) of the Scales. $N = 109$ undergraduates; fall, 1978.
* $p < .01$.
** $p < .001$.

Table 6.1 presents an intercorrelation matrix from one study in which the MHLC Scales and the Self-Rating (SR) Scales were administered to the same sample of undergraduates. As can be observed, the one-item SR Scales do a fairly good job of correlating with the MHLC Scales. Two notes of caution, however, must be sounded before we advocate widespread usage of these simple devices. No test–retest results are yet available on the SR instrument, but one-item scales are typically very unstable and thus of questionable reliability. Also, the highest intercorrelation ($r = .52$ between the Self-Rating–Internality Scale, or SR–I and IHLC) accounts for only 26% of the shared variance, thus calling into question the comparability of both of the tools.

The Situational Inventory (SI) consists of brief descriptions of hypothetical situations followed by a set of possible behavioral responses to that situation. Persons are asked to indicate which response they would actually make if they were in that situation. (Appendix A contains an example from this inventory.) The responses have been assigned weights for each of the MHLC dimensions, and a person's score on each dimension is the sum of weights across situations. The present version of the Situational Inventory consists of three situations. Table 2 presents an intercorrelation matrix from a study in which the SI and MHLC Scales were administered to the same sample of dental patients. As can be seen from inspecting Table 6.2, only the Situational Inventory–Powerful Others (SI-P) score is correlated with its corresponding MHLC Scale. Obviously, either something is drastically wrong with the scoring used for the Situational Inventory–Internality (SI-I) and Situational Inventory–Chance (SI-C) Scales, or they and the IHLC and CHLC Scales are not measuring the same constructs. Since

TABLE 6.2
Correlation Matrix between Multidimensional Health Locus of Control (MHLC) Scales and Situational Inventory (SI)[a]

	MHLC Scales		
Situational Inventory	Internal (IHLC)	Chance (CHLC)	Powerful Others (PHLC)
Internal	.13	.00	.03
Chance	−.13	−.03	−.18
Powerful Others	−.11	.04	.42*

[a] Form A of the MHLC Scale was used. $N = 99$ dental patients.
* $p < .001$.

the MHLC Scales were developed with much greater rigor than was the Situational Inventory, we believe that the fault lies with the latter rather than the former. Inferring individuals' locus of control beliefs from their reports of what they would do in hypothetical situations is a tricky business at best, and it is even quite surprising that the powerful others dimension appears to be tapped by this methodology.

To date, these alternative ways of assessing health locus of control beliefs have been used only in an exploratory fashion and only in our own research. We have not felt that they were sufficiently well developed to advocate their use by other investigators. For the remainder of this chapter we will concentrate only on results obtained with the HLC and MHLC Scales.

Normative Data

Table 6.3 presents normative data on the HLC Scale. Data are presented with the most internal group first and the most external group last. This provides some idea of the consistency of norms across samples and the kinds of samples among whom beliefs are at variance with healthy college or adult samples. We will discuss these normative data later in the chapter because they provide known-groups evidence of scale validity. In general, the most internal groups are samples selected because they were evidencing preventive health behaviors (e.g., birth control users, smoking reduction program participants, undergraduates, and healthy middle-to-upper middle class adults). The most external groups tend to be patients with chronic diseases and/or persons of lower SES. The consistency of means across groups is fairly evident from the table.

TABLE 6.3
Norms for the Health Locus of Control (HLC) Scale

Sample description[a]	Average age	N[b]	M	SD
Adherers to exercise programs (Dishman *et al.*, 1980)	Adults	43 M	29.87	7.20
Undergraduates (Wallston & Wallston, unpublished data, 1976)		147	31.33	7.26
Birth control users (Harkey & King, personal communication, 1975)	early 20s	25 F	31.46	6.38
Abortion patients (Harkey & King, personal communication, 1975)	early 20s	17 F	31.68	8.03
Schoolteachers, administrators, staff, and their relatives; school white, 72% female (McCusker & Morrow, 1979)		543	31.79	6.28
Participants in smoking reduction program (Wildman *et al.*, 1979)		16	31.80	
Undergraduates (DeVito *et al.*, 1979)		84	31.90[c]	
OB–GYN Health Maintenance Organization clients (Lauver, 1978)		32 F	32.25	
Undergraduates (Wallston & Wallston, unpublished data, 1979)		171	32.71	5.50
Undergraduates (Krantz *et al.*, 1980)		200	32.80	7.16
Undergraduates (B. S. Wallston *et al.*, 1976)	18.0	94	33.08	5.35
White adults (Wallston & Wallston, unpublished data, 1976)	34.2	42 M	33.19	7.23
Black gonorrhea patients (Olbrisch, 1975)	22.8	27 M	33.37	5.85
White adults (Wallston & Wallston, unpublished data, 1976)	28.0	40 F	33.40	6.90
White gonorrhea patients (Olbrisch, 1975)	22.5	18	34.34	6.01
College students (B. S. Wallston *et al.*, 1976)	20.0	185	34.49	6.31
White adults (Wallston & Wallston, unpublished data, 1976)	38.5	44 F	34.66	9.66
Michigan State undergraduates (Stratoudakis, personal communication, 1976)		206 M	34.98	
Eighth- and ninth-graders (Albino, personal communication, 1980)	14.5	154	35.25	5.92
Fathers (Albino, personal communication, 1980)	47.6	111 M	35.37	7.50
Mothers (Albino, 1981)	41.0	151 F	35.45	7.29
Preoperative patients (Wallston & Wallston, unpublished data, 1975)		25	35.56	9.03
Michigan State undergraduates (Stratoudakis, personal communication, 1976)		205 F	35.70	
U. S. population sample (Grahn, 1979)		200	35.77	7.86
Introductory Psychology students (deHass & van Renken, 1979)	18.8	188 F	35.80	
Campers (B. S. Wallston *et al.*, 1976)	51.0	101	35.93	7.11
Patients originally classified psychotic, about to be discharged (Battle & Halliburton, 1979)	40.9	60 M	36.88	

[a] Sources given in parentheses.
[b] Sex indicated (M = male, F = female) where known.
[c] Median.

(cont.)

TABLE 6.3 (*cont.*)

Sample description [a]	Average age	N [b]	*M*	*SD*
Patients with permanent pacemakers (Brown, 1980)	69.4	100	36.90	7.70
Patients with chronic obstructive pulmonary disease (Brown, personal communication, 1979)	58.8	32 M	37.70	8.20
Hypertensive outpatients (Wallston & McLeod, 1979)	46.0	80 M	38.25	8.75
Unmarried pregnant women (Harkey & King, personal communication, 1975)	Teens	17	38.50	4.40
Cancer patients (Diller *et al.*, 1979)	Mid-50s	210	39.26	8.33
Noninstitutionalized, predominantly male patients with coronary artery disease (Brown, personal communication, 1979)	54.1	51	39.40	6.10
Hypertensive outpatients, predominantly black females (Key, 1975)	51.0	38	40.05	6.22
Black gonorrhea patients (Olbrisch, 1975)	20.8	19 F	40.74	8.20
Chronic hemodialysis patients (Sproules, 1977)		31	43.00	

Table 6.4 presents normative data for the MHLC Scales. Since there are three different scales, these data are grouped by type of sample. This should allow easier comparison. Once again, consistencies are fairly clear. Further discussion of these data as they relate to scale validity will be presented later in the chapter.

The normative MHLC data in Table 6.5 have been put together by combining various samples from Table 6.4. Table 6.5 allows researchers to compare their findings with large-sample norms and to set up cutting points for dividing samples into high and low groups. The latter procedure is particularly relevant where sample size is small and median splits based on such data would provide less appropriate cut-off points than means or medians from large samples.

Scale Properties

Several investigators have performed factor analyses of the health-specific measures showing that the I, P, and C Scale structure is

TABLE 6.4
Norms for the Multidimensional Health Locus of Control (MHLC) Scales

Sample [a]	Average	N [b]	Form	Internal *M*	Internal *SD*	Chance *M*	Chance *SD*	Powerful Others *M*	Powerful Others *SD*
College Student Samples									
Undergraduates (Wallston & Wallston, unpublished data, 1978)	19.20	35 M	A	26.43	3.47	16.20	3.68	17.29	3.83
	18.81	75 F	A	26.19	4.03	16.44	4.68	17.71	4.53
	19.20	35 M	B	25.06	4.02	15.91	4.53	18.77	4.19
	18.81	15 F	B	27.09	4.26	16.80	5.05	18.68	5.48
Undergraduates (Wallston & Wallston, unpublished data, 1979)		85	A	25.58	4.71	16.41	4.85	17.66	4.21
		85	B	25.79	4.71	17.42	4.67	18.60	4.63
		86	A	26.50	3.87	15.90	5.11	17.34	4.69
		86	B	27.13	3.57	17.23	5.63	19.05	4.71
First-year undergraduates (Nagelberg, 1979)		252	A	27.10	3.67	16.63	4.33	17.06	4.53
Healthy Adults									
Persons at airport (Wallston, Wallston, & DeVellis, 1978)	41.33	57 M	A	25.37	5.32	16.23	6.28	20.23	5.94
	43.48	58 F	A	24.84	4.50	14.93	5.21	19.76	4.49
	41.33	57 M	B	25.75	5.22	16.14	5.55	20.81	6.03
	43.48	58 F	B	24.86	4.05	14.79	4.81	21.14	4.99
Graduate and professional women (Wallston & Wallston, unpublished data, 1978)	33.74	41 F	A	23.51	5.27	15.78	4.38	16.27	5.63
	32.41	51 F	B	26.54	4.33	15.84	5.24	18.32	4.79

[a] Source given in parentheses.
[b] Sex indicated (M = male; F = female) where known.
[c] A 5-point scale converted by multiplying by $\frac{6}{5}$.
[d] Age range.

(cont.)

TABLE 6.4 (cont.)

Sample [a]	Average	N[b]	Form	Internal M	Internal SD	Chance M	Chance SD	Powerful Others M	Powerful Others SD
Clerical and secretarial women (Baughman, 1978)	20–67	242 F	A & B	25.39	4.87	16.68	5.52	16.79	5.99
Wives of enlisted navy men (Nice, personal communication, 1979)	30.28	93 F	A	25.51	6.00	16.66	5.51	17.59	6.71
Florida panhandle households (Wilson, personal communication, 1978)	44.00	319	B	24.90	4.70	16.44	5.96	23.70	5.59
Physicians (Davis, 1979)		72	A	25.20		16.50			
Nurses (Davis, 1979)		72	A	27.80		14.10			
Consumers (Davis, 1979)		72	A	28.10		14.50			
Total sample (Davis, 1979)		216	A	27.00	5.50	15.00	5.60	14.60	5.10
Spanish-American mothers of Head-start children on SES (Rosenblum, 1979)	28.00	95 F	A	26.00	6.00	18.56	6.18	20.33	6.50
Chronically Ill Persons									
Nationwide sample of persons with epilepsy (DeVellis, DeVellis, Wallston, & Wallston, 1980b)	35.50	286	A	25.46	5.39	17.57	6.14	20.93	6.68
Diabetics (Nagy, personal communication, 1979)	58.52	29	A[c]	27.20	5.35	17.14	6.62	26.86	4.42
	58.52	29	B[c]	26.53	5.00	16.34	5.90	26.52	4.06
Hypertensives, (Nagy, personal communication, 1979)	59.96	49	A[c]	25.99	5.28	22.38	7.02	22.38	6.28
	59.96	49	B[c]	27.80	4.62	19.70	6.40	26.60	5.90
Hypertensive college students (Sherwin, 1979)	18–35[d]	19	B	26.79	4.52	15.26	3.41	18.00	4.70
Hemodialysis patients (Hatz, 1978)	23–67[d]	19	A	24.00	7.03	14.78	5.58	23.10	7.21
Chemotherapy outpatients (Wallston & Wallston, unpublished data, 1979)		29	A	21.83	6.49	19.31	4.56	23.93	4.95

Tennessee and Kentucky Appalachian residents with respiratory disease attending student health coalition fair (Olson, personal communication, 1979)		100	A	26.27	5.88	18.36	7.40	23.15	6.44
Persons Engaged in Preventive Health Behaviors									
Dental check-up participants (Wallston & Wallston, unpublished data, 1978)	42.76	38 M	A	26.50	5.67	14.55	5.68	18.05	5.16
	40.53	61 F	A	26.61	4.59	15.61	6.41	18.49	6.04
Students attending preventive dental clinic (Carnahan, 1979)	23.45	140	A	26.58	4.11	16.96	4.83	18.35	3.10
Staff members of Diet Workshop (Carnahan, 1979)	37.70	94	A	26.56	3.38	16.29	4.43	18.28	4.01
Women beginning voluntary medical weight reduction program (Saltzer, 1979)	35.01	113 F	B	29.21	4.66	14.08	4.84	18.63	5.72
Primigravidae from a prenatal clinic (Lowenstein, 1979)	15–26[d]	47 F	A	28.45	3.87	19.26	5.60	20.47	5.46
Primiparous parents in prepared childbirth, middle to upper middle class (Nicholson, 1980)	27.00	30 F	A	27.84	4.33	14.27	4.87	13.61	4.43
	29.00	30 M	A	26.97	4.75	15.50	4.17	14.29	4.91
Persons attending a YMCA health fair (Wallston & Wallston, unpublished data, 1978)	39.81	58 M	A	26.55	5.04	14.19	4.96	19.26	5.11
	44.04	23 F	A	28.22	3.69	14.91	6.47	20.13	6.05
	37.51	57 M	B	28.26	4.44	13.37	4.40	19.12	5.80
	44.58	29 F	B	26.93	3.79	15.45	6.02	20.83	5.73

TABLE 6.5
Mean Scores for MHLC Scales Summarized across Types of Subjects

		Mean scores		
Sample	N	Internal (IHLC)	Chance (CHLC)	Powerful Others (PHLC)
Chronic patients	609	25.78	17.64	22.54
College students	749	26.68	16.72	17.87
Healthy adults	1287	25.55	16.21	19.16
Persons engaged in preventive health behaviors	720	27.38	15.52	18.44

replicable. Stuart (1979) did a factor analysis of the HLC Scale with a large national sample and found I, P, and C factors. Bloom (1979) factor analyzed the HLC Scale responses of 115 women who had undergone a mastectomy within the past 2 years. She found two factors: Fate (six items involving good fortune and dependency) and Self-Blame (four items involving carefulness and self-blame). One item, "I am directly responsible for my health," did not load on either factor. Clearly, factor analyses of essentially healthy persons' responses to health locus of control items produce somewhat different structures than factor analyses based on the responses from patient populations.

Nagelberg (1979) using a college student sample, performed a factor analysis on the MHLC Scales. The items loaded on the appropriate factors with the exception of one item on pretest (Form A) and one item on posttest (Form B). In each case, the item had a reasonable factor loading on the appropriate scale but a slightly higher one on another scale. That is, one chance item on Form A loaded slightly higher and negative on Internality and one internal item on Form B loaded slightly higher and negative on Chance Externality.

De Haas and van Reken (1979) report an alpha reliability of .72 for the HLC Scale. Lewis, Morisky and Flynn (1978) reported an alpha reliability of only .36. However, this was administered as an interview, and only a 4-point scale was used. These methodological differences may account for lower alpha. Albino (personal communication, 1980) also reported low internal consistency coefficients for the HLC Scale (.23–.50); the lowest figure was for eighth- and ninth-grade school children.

TABLE 6.6
Alpha Reliabilities of Multidimensional Health Locus of Control (MHLC) Scales

			Reliabilities		
	N	Form of scales	Internal (IHLC)	Chance (CHLC)	Powerful Others (PHLC)
College samples	86	A	.66	.74	.64
		B	.66	.83	.75
		A & B	.82	.87	.83
	85	A	.72	.70	.56
		B	.80	.70	.73
		A & B	.86	.84	.79
	112	A	.61	.55	.56
		B	.75	.68	.73
		A & B	.83	.77	.77
Persons attending health fair	82	A	.66	.65	.56
	89	B	.61	.67	.69

In our recent studies, the alpha reliabilities for the MHLC have held up quite well. See Table 6.6 for these data.

Several studies have provided test–retest data. McCusker and Morrow (1979) found a test–retest correlation of .69 for the HLC after 4 weeks. On ilial-jejunal-bypass patients in Nashville, test–retest reliability for the HLC after a year was only .43. However, the fact that these patients had undergone treatment could account for a change in beliefs.

Nagelberg (1979) compared data from Form A to Form B on her control group pre–post tests. The results were rather disappointing ($r_{IHLC} = .48$, $r_{CHLC} = .38$, $r_{PHLC} = .46$). It is not possible to determine whether this represents changes (i.e., lack of scale reliability) or differences between Form A and B. On a sample of dental patients, using Form A and correlations from Time 1 to Time 2 (4–6 months later), the test–retest correlations were fairly robust ($r_{IHLC} = .66$, $r_{CHLC} = .73$, $r_{PHLC} = .71$). Correlations between Form A and B administered at the same session for college students showed the best correlation for IHLC ($r = .77$), while the correlations for CHLC ($r = .65$) and PHLC ($r = .53$) were slightly lower but not as low as reported by Nagelberg. Nonetheless, this causes some concern over the equivalence of Forms A and B. We have provided some evidence of test–retest reliability, but fur-

ther data are needed on the comparability of the two forms before definitive statements can be made about their true equivalency.

How to Use the MHLC Scales

Three major potential uses of a health-related locus of control scale have been identified: (*a*) as an independent variable to predict health behavior, either alone or in combination with other relevant belief and attitude variables; (*b*) as an independent variable, in combination with different treatment conditions, such that treatment outcome may vary with locus of control belief; and (*c*) as a dependent variable to measure treatment outcome. Our coverage of research utilizing the scales will discuss studies under each of these headings. First, however, we will discuss issues and problems relating to such utilization, especially in light of the development of multidimensional scales.

As an independent variable, it is important to note that there is no theoretical reason to expect locus of control to predict to health behavior, unless it is used in combination with a measure of health value (Wallston, Maides, & Wallston, 1976). Social learning theory (Rotter, 1954) posits that behavior will occur only when action is expected to lead to a reinforcement and the reinforcement is valued. Too often, studies have excluded the value construct and expected locus of control main effects. In general, health locus of control beliefs should predict to health behavior only under high-health-value conditions. The fact that some research does find main effects is at times puzzling and suggests that this theory may require some revision. Moreover, locus of control and value are only two of many variables that may influence health behavior. The Health Belief Model (e.g., Becker & Maiman, 1975; Rosenstock, 1966) provides suggestions of additional variables that could be considered. A full discussion of this model is beyond the scope of the current chapter; however, perceived cost and instrumentality of specific actions are important variables derived from the health belief model deserving of more study and inclusion in research. (See Wallston & Wallston, forthcoming, for a fuller discussion of these issues.)

This discussion has focused, thus far, on main effects and interactions obtained with an analysis of variance model. A unidimensional scale, by means of which people could be classified as internals or externals, allowed for simple 2×2 designs. However, with a multidimensional scale, analysis of variance models must be more complex. We have tried a variety of types of analysis using the MHLC Scales and

cannot say, at this point, what the single best analysis strategy is. We will discuss several strategies here.

If a sample is large enough, subjects can be divided on IHLC, PHLC, CHLC and health value in a 2 × 2 × 2 × 2 design. However, this is cumbersome and often impossible. Moreover, four-way interactions may be difficult to explain. An alternative method is to decide which is the most theoretically relevant HLC dimension of the three and use only that scale. For example, it may be that PHLC would be expected to predict best to adherence to doctor's orders. We have not had very much success with such an approach, since it is not always clear which is the best dimension to utilize. However, with more research in this area, dimensional relationships to be expected may become clearer. When sample size is too small for one analysis, it is possible to do three 2 × 2 analyses crossing health value by each of the MHLC dimensions. This is statistically problematic, however, since multiple analyses may capitalize on chance findings; thus, more conservative alpha levels would be appropriate when such an analysis strategy is used.

It is inappropriate to use IHLC, CHLC, and PHLC scores to produce a single overall score. Since there is a small, but significant negative correlation between IHLC and CHLC, it is possible to combine CHLC and IHLC into a unitary scale to yield a single score on which to divide the subjects.[4] This would produce a scale very similar to the original HLC Scale which included only one powerful others item. The advantage of a combined CHLC–IHLC Scale is that response bias is eliminated as a consideration. The MHLC Scales include only positively worded items, and "yea saying" or "nay saying" (Couch & Keniston, 1960) could produce bias in the data.[5] Since the correlation between IHLC and CHLC is low and negative, CHLC–IHLC will not have the added reliability that usually is found with a longer scale. This was one of the reasons for developing the multidimensional scales in the first place. It is an empirical question whether such a combined scale would prove more fruitful than the individual scales; thus far we have not found that to be the case.

In theory, CHLC could be added to PHLC to form an external subscale. Once again, the very low positive correlation between these two

[4] This combined scale would be scored CHLC minus IHLC plus 42.

[5] Some persons score above the mean on all three dimensions; they may actually hold such beliefs, or they may simply be agreeable individuals who will agree with any item regardless of its content. If the latter is the case, of course, the validity of such subjects' responses is suspect.

scales suggests that combining them is not the most fruitful approach for the utilization of these scales. We believe that Powerful Others Externality is an important dimension in health research, and the PHLC Scale should be used as a separate measure.

We have made some attempts at developing typologies using IHLC, CHLC, and PHLC, but with little success to date. For example, in theory, one could say that an internal is someone high on IHLC and low on the other two scales. However, it may be that other combinations of beliefs (e.g., high on IHLC and PHLC and low on CHLC) are also important, and most persons do not fall into pure types anyway. The $2 \times 2 \times 2 \times 2$ analysis of variance model suggested earlier allows one to test all combinations of the three scales. Further work is needed to see if useful typologies can be developed to limit the number of cells needed in an analysis of variance design.

In recent work, we have been using multiple regression models. We can restrict the interactions these models include to two-way interactions. We see this as an important and viable strategy, too often ignored by psychologists trained in the use of the analysis of variance model. In addition to allowing theoretically relevant effects to be tested—and thus providing additional power for smaller sample sizes over a four-way analysis of variance—this method provides information on the amount of variance accounted for. Frequently, significant analysis of variance effects account for only small proportions of variance. In an area such as health, where we may be recommending actions based on our findings, it is particularly important to know the size of effects. For theoretical purposes, a very small effect may still be quite meaningful; for applied purposes, size of effect is quite important. Hierarchical regression models, in which variables are ordered according to theoretical relevance, are to be preferred over stepwise regressions where the computer decides the order of variables entered into the equation.[6]

When entering interaction effects in regression analyses, it is important to use variables that are scored in congruent directions. Thus, IHLC should be multiplied by health value (HV) scored positively, and CHLC should be multiplied by the inverse of health value, or health value reverse-scored. With PHLC the appropriate direction is unclear, since in some cases persons with high Powerful Others Externality scores may be expected to practice health behaviors, and thus HV should be used, and in others where health behavior may not be expected, the reverse of HV is more appropriate. When this is not theoretically clear, both terms (i.e., PHLC $\times$ HV and PHLC $\times$ the reverse of HV) might be entered in the regression equation. Before such

[6] For a readable discussion of regression analysis, see Cohen and Cohen (1975).

a multiplicative term is utilized, each score should be standardized and a constant added, so that all resultant standardized scores are positive. This is because the scales may have different variances and would therefore be differentially weighted in the multiplicative terms if standardization were not used (Finn, personal communication, 1979). We have gone into this matter at some length because it is complex, and we see regressions utilizing interaction terms as a productive approach to data analysis in this area. They also allow theoretical models to be tested against one another.

When the MHLC is used as a dependent variable, a repeated measures design or multivariate analyses can be used. Since intervention programs normally have some theoretical basis, it may often be clear which HLC belief dimension should be affected. In such cases, the single most appropriate MHLC Scale may be used as a dependent variable. The advantage of a multivariate approach is that it allows the investigator to differentiate which beliefs are affected and which are not and thus to illustrate the real nature and effects of an intervention program.

A problem with all of the analysis strategies discussed thus far is that they assume linear relationships. To the extent that effects are more complex (e.g., curvilinear), a finer division of subjects becomes important. Dividing persons into three or more groups may prove fruitful, since median splits often lead many persons in the middle to be arbitrarily labeled as low or high on the dimension even though they differ by as little as 1 scale point. However, larger sample sizes are needed for such analysis strategies.

Clearly, further work is needed on data analysis approaches using the MHLC Scales. This section represents our best thinking at the current stage of our work.

Research Done with HLC and MHLC Scales

The following section is organized according to whether or not, in our judgment, health locus of control beliefs are best conceptualized as an independent variable predicting to some other variable or set of variables, or as a dependent variable predicted from another variable or set of variables. Since most individual difference research is truly correlational in nature, any distinction into independent or dependent variable categories is recognizably arbitrary. Nevertheless, we find this distinction helpful in sorting through the numerous studies that either we or others have done. Where appropriate, some investigations will be

mentioned under both headings. We will begin with the use of health locus of control as a dependent variable.

Locus of Control as a Dependent Variable

Health locus of control can be used as a dependent variable in several ways. In the past (Wallston & Wallston, 1973), we have advocated use of these scales as tests of the efficacy of interventions in changing beliefs. Only a few such studies have been completed; they help us understand the development of locus of control beliefs as well as the efficacy of intervention. Such studies will be reviewed together with studies that investigate locus of control beliefs as they are influenced by naturally occurring events. Another use of locus of control as a dependent variable involves comparisons of groups that differ in some way likely to be relevant to locus of control. Such known-groups comparisons and data relating locus of control to demographic variables provide evidence of construct validity of the scales. These studies will be reviewed together. Finally, correlations of locus of control with other scales will be presented as evidence of concurrent validity.

Development of Locus of Control Beliefs

Using a national sample of persons with epilepsy, we conducted a survey including the MHLC Scales as one indicator of learned helplessness (DeVellis, DeVellis, Wallston, & Wallston, 1980b). Since seizure disorders parallel laboratory procedures for inducing learned helplessness (a seizure is a negative experience involving loss of control, and for some persons medical treatment of seizures is not totally successful), we expected that persons with seizures that were more frequent, more severe, and less predictable or controllable should express higher beliefs in chance and lower beliefs in internality. Because epilepsy is health-related but may affect a person's entire life, our health-specific measure (Form A of the MHLC) was included as well as Levenson's general measure of locus of control. Since her P and C Scales are highly intercorrelated, we used only the I and C Scales in the interest of maintaining a questionnaire of reasonable length. Using hierarchical regression analyses, control and predictability variables were used as predictors with each locus of control scale as the criterion variable. Variables were entered in five steps. In step 1, predictors directly related to control and prediction of seizures (having an aura; whether a seizure could be avoided; and whether seizures occurred more in certain situations) were entered. Step 2 added a weighted index

of seizure severity (seizure frequency times severity), since learned helplessness is related to repeated negative experiences over which there is no control. Other indicators of extent of exposure were added at Step 3 (age of first seizure; number of years with seizures; whether the pattern had changed; and whether seizures were remembered). The fourth and fifth steps concerned the influence of other helplessness-inducing factors (the severity of other medical problems and the degree of dependence of the respondent's lifestyle). By step three, the model explained significant proportions of the variance of all of the criterion measures. Steps 4 and 5 only produced a substantial increase in the prediction of I scores. At step three, similar proportions of general and health-specific locus of control were accounted for (IHLC, 7%; I, 7.1%, CHLC, 7.5%, C, 9.2%, PHLC, 12.1%).

Since we predicted best to powerful-others health beliefs, after the fact, we regret that Levenson's P Scale was not included to test discriminant validity. In general, predictors were associated with the criteria as expected. The overwhelming preponderance of predictions in the right direction strongly supports the idea that negative experiences over which there is little control are conducive to the development of high beliefs in external control (both chance and powerful others) and low belief in internal control (health-specific and general). Although the proportion of variance explained is modest, in light of the numerous and diverse factors that influence belief patterns these findings are not to be taken lightly. It must be noted that these are correlational data collected at one point in time. However, we would argue that the history variables have influenced the development of beliefs. One could claim that respondents' belief systems influenced their reports of history; this notion cannot be totally dismissed. However, some of the history data (e.g., age of first seizure) are less open to interpretation and, therefore, supportive of the case for causal-directionality we are trying to build.

We are aware of one other study that investigated changes in health locus of control beliefs following a naturally occurring event (Nicholson, 1980). Investigating primiparous parents involved in prepared childbirth pre- and post-partum, Nicholson found that mothers decreased significantly in IHLC and increased in CHLC, and that changes in the same direction, though not significant, occurred for fathers. Since these women held more internal and lower chance beliefs than normative samples, these data could merely reflect regressions to the mean. On the other hand, it is plausible that their experiences during hospitalization led to these changes. Nicholson has observational and interview data relating to the hospital experience which are not yet analyzed. It will be interesting to see whether sub-

jects with different experiences relevant to control in the hospital setting will show differential changes in MHLC Scale scores. Nonetheless, the hospital environment has been characterized as one of low control (Taylor, 1979), and it is to be expected that beliefs in control with respect to health would change after a hospitalization experience. Thus, changes in the theoretically predicted direction among this sample of women are at least congruent with our understanding of how locus of control beliefs develop and provide further suggestive evidence that our scales can tap such changes in belief.

Tolor (1978) also investigated antecedents and correlates of HLC. He expected that those with a history of severe and frequent childhood illnesses and accidents would be more external. This hypothesis was supported only for the female subjects. It is not clear why the relationship did not hold for men. Women with greater than average reported childhood illnesses were more external than those with fewer such illnesses. Results for accidents, severity of illnesses, and severity of accidents for women were in the same direction, but not significant. Tolor (1978) suggests that this sex difference may be related to women's "more intense emotional responding to childhood experiences than men's [p. 1163]." Since the accident and illness reports were specifically developed for this study, the sex difference in findings may also reflect reporting differences.

We have located four studies where health locus of control scores served as a dependent variable to reflect changes in beliefs following treatment intervention. Nagelberg (1979), in an excellently designed dissertation study, evaluated a health-risk-reduction program. A large sample of first year college students who completed pretests including Form A of the MHLC were randomly assigned to one of two treatment groups (peer health education or mail feedback) or a control group. The posttest questionnaires used Form B of the MHLC. The only significant difference from pretest to posttest was an increase of 1.5 points in PHLC, which did not differ by intervention group. As Nagelberg notes, Form B had a mean that was one point higher than Form A for our development sample. Thus, what appears to be a change may merely reflect differences between forms. Because our "equivalent" forms are not perfectly equivalent, randomly distributing Form A and Form B on pretest and using the other form on posttest may be a better approach with these scales. Findings that were consistent in direction of change irrespective of form would be more easily interpretable. Alternately, if sufficient time exists between pretest and posttest, it may be best to use one of the two forms for both tests. Nagelberg further notes that her sample showed relatively high internal beliefs, which may have pro-

duced a ceiling effect for that variable. Since the sample was also low on powerful-others beliefs, any change might also reflect regression to the mean. Thus, these data do not allow good conclusions regarding the effectiveness or ineffectiveness of the intervention; rather, they provide an important model for an experiment and important information regarding our scales.

Bloom (1979) compared the HLC scores of two groups of mastectomy patients within one week postsurgery and two months postsurgery. One group ($N = 18$) received a special counseling intervention, while the comparison group ($N = 18$) received only standard care. There were no between group differences on the first administration (4–7 days postsurgery), but the intervention group was significantly less external than the comparison group 2 months postsurgery. However, this was evident only on the 6-item Fate subscale that Bloom derived from an earlier factor analysis of a larger group of mastectomy patients. Bloom (1979) concluded that "the effect of the intervention was to cancel out what would have been a more fatalistic attitude on the part of the treatment group subjects" [p. 638].

Diller *et al.* (1979) gave the HLC Scale to cancer patients on admission (T1), 3 months postdischarge (T3) and 6 months postdischarge (T4). The experimental group received a psychosocial rehabilitation intervention while in the hospital, but the control group received psychosocial evaluation only. From tabled data presented, it appears that HLC was stable from T1 to T3 for intervention groups across types of cancer (breast, lung, and melanoma) while control groups became more external. However, by T4 (3 months later) consistent HLC differences between groups are not apparent (Gordon *et al.*, 1980). Thus, as with Bloom's (1979) study, the intervention may have inhibited, for a time, an increase in external beliefs which might be expected for persons diagnosed with cancer. However, over an extended time period, the effect does not hold. Since these findings were not reported in the text, we cannot judge their statistical reliability. The control group increased over 2 points by T3 but decreased almost a point at T4, so the T4 score was only a point higher than the T1 score. This is true even though dropouts from the control group reported more external locus of control scores, whereas there were no differences in locus of control scores between drop-outs from the intervention group and those remaining. Thus, these change data provide a conservative test of changes in health locus of control among cancer patients without intervention. By contrast, the intervention group showed no change in HLC over time. However, at T1 their scores were one and a half points higher than those of the control group. We were able to calculate a

t-test from tabled data, and these means were not significantly different. Both samples were highly external at the outset (see the norms in Table 7.3), so increased externality for the control group could be real; but it may be an artifact. An interesting analysis of type of treatment by locus of control classification using other dependent measures (e.g., negative affect) was not conducted, so their report fails to utilize fully the available data.

Schiller, Steckler, Dawson and Heyman (1979) used the MHLC as one of several dependent variables to evaluate a health education program for Appalachian residents of rural West Virginia. Since a principal objective of the health activation classes was to change participants' attitudes about their ability to care for themselves, the investigators expected significant increases in IHLC and decreases in CHLC and PHLC. However, no significant changes were found. Interesting data were provided (but not analyzed) which may explain this. The overall mean IHLC on pretest of persons who attended sufficient classes to obtain a certificate was 27.83. This is similar to the mean for persons engaged in preventive health behavior (see Table 7.5); therefore, one might not expect increases on this scale. For those who completed classes but did not attend regularly enough to obtain certificates, the mean IHLC on pretest was 24.83. This is slightly lower than normative data and, had these persons participated regularly, increases in IHLC might have been expected. However, data were also presented for a small comparison sample ($N = 15$) who had a mean of 23.1. Thus, all program participants appear to have higher health internality beliefs than is typical of this locale, although tests of these statements are not possible from the information provided (standard deviations are not given). Although the intervention did not produce changes as expected, this may be due to a ceiling effect. Moreover, IHLC scores appear to predict who will complete classes. Knowing this might allow special interventions with low IHLC scorers to produce better class attendance. Analysis of the interaction of treatment by locus of control beliefs, using other dependent variables, would also be possible in this study. This information is from an interim report, and the work is still in progress. Future data should prove of interest.

In summary, there is some evidence from these studies that development of health locus of control beliefs are in line with what is theoretically expected. Also, evidence that findings differ across dimensions suggests the importance of a multidimensional approach. The fact that changes in health locus of control beliefs were not in line with treatments in two studies may reflect scale problems, problems with the intervention, and/or ceiling effects. The available data do not allow

us to distinguish between these. There is some promise for use of MHLC as a dependent variable, and we believe this is one important direction for increased research.

Known Groups

Table 7.3 provides some indication of the consistency of means across similar groups on the HLC Scale. As would be expected, the more external subjects on the table tend to be samples of patients. It is reasonable to expect that patient status would increase external health expectancies. The most internal samples tend to be those exhibiting preventive health behaviors (e.g., birth control use, abortion, smoking reduction) and college samples; both tend to be middle to upper middle class. Sproles (1977) found that blacks in her sample expressed more external beliefs than whites. Older adults tend to be somewhat more external than younger samples. One study that provides some evidence of known-groups validity was done by Harkey and King (personal communication, 1976). They found that birth control users and abortion patients were more internal than their sample of unmarried pregnant women. These groups also differed in education and social class level, with the less educated, lower SES sample expressing more external beliefs, as would be expected.

One other study where known-groups validity was tested provides less encouraging results. Binik & Devins (1979) found no difference in health locus of control beliefs between renal dialysis patients on home dialysis, those on patient-managed hospital dialysis, and those on staff-assisted hospital dialysis. It is quite possible that the end-stage renal disease of these patients overrides beliefs about control even among those who appear to have more control through participation in their own dialysis. Relying on a machine is clearly conducive to external health beliefs, even if one participates.

With the MHLC Scale, several studies have been done that provide known-groups validity data. We collected data at a health fair run by the YMCA. As we predicted, persons who voluntarily sought out this type of personally relevant health information scored significantly higher on the health-internality dimension and lower on the health-chance dimension, as compared to nonselected adult samples. Rosenblum's (1979) sample of low SES Spanish-American women expressed greater beliefs in chance externality than the normative sample but did not differ on health internality or powerful others externality beliefs. The fact that these two studies showed differences in the expected direction on particular subscales is further evidence of discriminant

validity between the scales. It is logical that a lower class sample, particularly from a Spanish subculture, would have higher chance beliefs, while maintaining beliefs in their own control. One might also expect them to be higher in powerful-others beliefs, and it is surprising that this was not the case. However, in contrast to several other samples of healthy adult females (see Table 7.4, e.g., Davis, 1979; Nice, personal communication, 1979), this group does show relatively high beliefs in control of health by powerful others.

Table 7.4, which presents MHLC normative data, is less clearcut than the HLC table. Had groups been ordered based on the IHLC Scale (as we did in Table 7.3 since there was only one scale), the least internal group would be chemotherapy outpatients and the most internal group would be women beginning voluntary medical weight reduction programs (Saltzer, 1979). Differences between these groups are significant. However, it must be pointed out that even the least internal groups' mean score is slightly above the theoretical neutral point.[7] Thus, a bias toward internality is clearly evident among American samples. Moreover, the means of these groups do not line up neatly. A healthy sample of graduate and professional women are the next lowest in health internality. One might hypothesize that these women are aware of negative experiences in health settings and thus express some lack of control. However, we would then expect them to express high beliefs in control by powerful others, but they did not. All samples selected because they engage in preventive behavior express generally high beliefs in health internality (see Table 7.5); as would be expected, somewhat lower internality is expressed by the chronically ill samples. Undergraduates fall between these groups. However, the healthy adult samples are as low on internality as the chronic populations.

Overall, there is a bias toward lower health-chance beliefs. Only the most chance external sample, a group of hypertensives, are above the theoretical neutral point of 21. The lowest health-chance beliefs were expressed by the sample of women beginning voluntary medical weight reduction (Saltzer, 1979). Thus, once again, the extreme groups are consistent. The chemotherapy outpatients also show high chance beliefs, as would be expected. But similarly high beliefs in CHLC are expressed by primigravida women from a prenatal clinic (Lowenstein, 1979). In general, groups do show overall mean CHLC beliefs that would be expected. The patients with chronic diseases are most Chance External, and the persons taking preventive actions are least External;

[7] A score of 21 on any of the MHLC Scales represents a neutral belief on that dimension. For the HLC Scale, the neutral point is 38.5.

the healthy adults and college samples fall between these two groups (see Table 7.5).

Scores on the Powerful Others Externality Scale have the widest range, with primiparous women in prepared childbirth having the lowest scores ($M = 13.61$) and diabetics showing the highest scores ($M = 26.86$). Highest powerful others external health beliefs are held by chronic patients (see Table 7.5), and college subjects show the lowest such beliefs. In between are healthy adults and persons who engage in preventive behaviors.

Thus, overall, chronically ill patients look as expected with relatively low beliefs in health internality and relatively high beliefs in health externality, both chance and powerful others. Healthy adults differ from college subjects in their greater beliefs in powerful others and lower beliefs in health internality. Increased belief in powerful others may come with age, but this needs further investigation. Persons engaging in preventive health behavior show the greatest health internality and the lowest health chance beliefs. They are moderate in belief in control by powerful others, and do not appear to differ from other adults on this dimension. Although an external dimension, health powerful-others beliefs can lead to engaging in health behaviors to the extent that one is following the directions of a powerful other (particularly a health professional). Thus, this dimension is particularly interesting in the study of health behavior. The greater variability on this dimension also makes it of interest.

Correlational data from other studies also provides known-group validity evidence. Brown (personal communication, 1979) found no relationship between age and HLC scores. She did find that more educated persons expressed more health internal beliefs on the HLC scale. This may relate to social class differences, since these were not measured. Wallston and McLeod (1979) also found a negative correlation between education and HLC scores. Similarly, with our sample of persons with epilepsy, correlations with age were not significant for any of the three MHLC Scales. With this same sample, there was a low negative correlation ($r = -.13, p < .05, N = 272$) between education and CHLC and a higher negative correlation ($r = -.31, p < .001$) with PHLC, and the correlation with IHLC was in the right direction ($r = .10, p < .10$), though not significant. These data are somewhat congruent with Brown's data. For persons attending the YMCA health fair, age was not correlated with Form A of the MHLC Scales. However, for persons who completed Form B, there was a low positive correlation ($r = .21, N = 86, p < .05$) between PHLC and age. Thus, there is

little indication of a relationship between age and health locus of control. There is some indication that those with more education have decreased beliefs in externality. Large data sets where these variables might be investigated further have not, at this point, been made available to us.

In general, sex differences have not been found on the health locus of control scales. Thus, it is not necessary to divide samples by sex when investigating this variable.

Correlations with Other Scales

The most important correlations are those investigating the relationship between health locus of control beliefs and other general or specific locus of control beliefs to provide information on scale concurrent validity. The original HLC Scale was developed to have a low positive correlation (.33) with Rotter's I–E Scale on the scale development sample. In the early validation studies (Wallston, Wallston, Kaplan & Maides, 1976), this low positive correlation was replicated (.25 in study 1; .46 in study 2). In their sample, deHaas and van Reken (1979) replicated the .33 correlation with Rotter's scale.

The MHLC was developed so that each scale correlated most highly with its theoretical counterpart among Levenson's I, P and C Scales (see Wallston, Wallston, & DeVellis, 1978, Table 4, p. 167). These positive correlations ranged from .28 to .80 for Forms A and B combined. In our sample of persons with epilepsy, IHLC correlated .43 with Levenson's I Scale, and CHLC correlated .59 with Levenson's C Scale. There was also a positive correlation between PHLC ($r = .37$) and Levenson's C Scale, probably because Levenson's P and C Scales are highly intercorrelated (see our discussion of this in Wallston, Wallston & DeVellis, 1978). We did not use Levenson's P Scale in the epilepsy study, as we have already explained.

Carnahan (1979) developed a multidimensional dental locus of control scale (MDLC). The three subscales of this new scale correlated most highly with the appropriate MHLC subscale. Carnahan's Powerful Others subscale also correlated positively with CHLC (.23). In Saltzer's (1979) study of women beginning a weight reduction program, the IHLC and CHLC Scales correlated significantly with her Weight Locus of Control Scale, or WLOC (Saltzer, 1978), in the appropriate direction ($r = -.31$, $r = .35$ respectively, $p < .001$). Lack of correlation with the

PHLC Scale reflects the WLOC's lack of items tapping the powerful others external dimension.

Several studies have correlated health locus of control scales with other measures. Krantz, Baum and Wideman (1980) reported the development of scales to measure behavioral involvement and information, together termed the Krantz Health Opinion Survey (KHOS). These scales measure attitudes or preferences for self-care and health-related information, rather than expectancies. However, these preferences are related to the locus of control construct and, as might be expected, the KHOS correlated .31 with the HLC Scale for a sample of 200 undergraduates. The subscale correlations were somewhat lower, but significant (.26 for behavioral involvement and .23 for information). On a second sample of 83 subjects, however, correlations were even lower.

Dishman *et al.* (1980) developed a self-motivation inventory (SMI) and reported a significant negative correlation ($r = -.23$; $p < .05$) between the SMI and HLC scores. Those individuals scoring in the internal direction expressed a greater degree of self-motivation.

Tolor (1978) found no significant relationship between HLC scores and death anxiety (Tolor & Rynikoff, 1967) or adjustment (Bell, 1934). It is not clear why such relationships should be expected. Brown (personal communication, 1980) found significant correlations among a sample of pacemakers patients between HLC and life satisfaction, perceived health, and will-to-live such that more internal patients were more satisfied, perceived their health to be better, and had greater will to live. However, all of these correlations were relatively low. The positive relation between health status reflects similar findings we have obtained with the IHLC and CHLC Scales (see Wallston, Wallston, & DeVellis, 1978, p. 167). Similarly, Hatz (1978) found high positive correlations (.6) between IHLC and past and future life satisfaction among chronic hemodialysis patients. Baughman (1978) found CHLC to be the best predictor of self-evaluation of health condition such that better health status was perceived by persons with less belief that chance controls their health. PHLC and IHLC were also significant predictors of this variable, so that better health status was perceived by persons who scored higher on these scales. Overall, Baughman accounted for nearly 10% of the variance in health status perception with five predictors. CHLC alone accounted for nearly 6% of the variance. Similarly, those expressing higher CHLC beliefs and lower IHLC beliefs reported more illnesses in the past 6 months.

Using the HLC Scale, de Haas and van Reken (1979) found that

female college students with external scores reported more menstrual symptoms than did those students with scores in the internal direction. Nice (personal communication, 1979) used the MHLC Scales to study a sample of wives of men enlisted in the navy. In a preliminary look at the data, the IHLC scores correlated negatively with the number of wives' physical symptoms during the time the husbands were away at sea; the CHLC Scale did not correlate significantly with any measured variable; but the PHLC Scale correlated positively with the number of wives' visits to the physician and the number of wives' medications. After the husbands had been away at sea for 7 months, the best predictor of wives' physical symptoms was CHLC (Nice, 1980).

Overall, the data presented in this section provide evidence that expectancies regarding locus of control for health are being tapped by our scales. Moreover differences in patterning of correlations are suggestive of discriminant validity between the IHLC, CHLC and PHLC Scales. Given this evidence that the scales do measure these expectancies, as we claim, the question now is, How do such beliefs relate to health behavior? In the next section covering health locus of control as an independent variable, this issue will be explored.

Health Locus of Control as an Independent Variable

Literature will be reviewed according to the kind of health behavior investigated. Research is reviewed on information seeking, preventive health behavior, smoking reduction, weight reduction, dental behavior, and adherence with medical regimens.

Information-Seeking

Stimulated by the seminal study by Seeman and Evans (1963), more studies have been done looking at health-related information seeking as a function of health locus of control beliefs than any other dependent variable. We, ourselves, conducted our first HLC studies on information seeking, and our most recent MHLC studies have been done using a similar paradigm. Unfortunately, the promise that this was a most fruitful research field, as suggested by our early findings, has led to mostly barren harvests.

Our first two studies investigating information-seeking (Wallston, Wallston, Kaplan, & Maides, 1976; Wallston, Maides, & Wallston, 1976)

tion to seek information, and we have reason to believe we were effective in doing so.) Along with Gordon Kaplan, we were interested in seeing if our results were specific to hypertension or could generalize to other medical conditions. Since Kaplan was interested in weight management, we designed a replication study substituting information about obesity for information about hypertension. Also, instead of conducting this research solely on college students we wanted to branch out and study "real people." Therefore, the subjects for one attempt at studying obesity-related information seeking were recruited at a campground in nearby Lebanon, Tennessee. Neither the college student nor the camper sample produced the results we were looking for. As we mentioned in the discussion of our 1976 paper on the development and validation of the HLC Scale, it is possible that information seeking about health-related topics much in the public domain (as is weight control and the effects of being overweight) is less tied into locus of control beliefs than is a topic such as control of blood pressure which, in 1974, was only beginning to be well publicized. Social learning theory (Rotter, 1954; Rotter, Chance, & Phares, 1972) states that generalized expectancies (such as locus of control orientation) are particularly predictive in novel situations but that, as the person gains experience in specific situations, the predictive power of generalized expectancies decreases and is supplanted by situation-specific expectancies.

The previously mentioned investigations were all conducted using the original HLC Scale. With the development of the MHLC Scales came a renewed interest on our part in dusting off the old paradigm and investigating anew the relationship between health value, health locus of control, and information seeking. For our initial effort, launched in the fall of 1978, we went back to the topic of hypertension and the population of Nashville undergraduates, since that combination had proven so successful four years earlier. Now with three scales rather than one we felt we could not miss; if we did not get results by splitting subjects on their IHLC scores, we could always split them on PHLC or CHLC and achieve significance. We wish we could report the unqualified success of this strategy, but for our 1978 sample we could find no combination of health-value and MHLC beliefs that explained the variance in number of hypertension-related pamphlets chosen. Levenson's I, P, and C Scales, included in the study for discriminant validity purposes, fared no better. One scale that was not included, however, was the original HLC Scale since, at that time, we were optimistic that the multidimensional scales would do a better job.

used college students as subjects. In two separate samples we predicted, and found, that individuals classified as high health-value internals (using median splits on the HLC scale and a value ranking procedure) indicated a willingness to read more pamphlets about hypertension than high health-value externals or low health-value subjects, regardless of their HLC category. It is important to note that actual information seeking was not investigated; subjects merely role-played potential clinic utilizers, and the dependent variable was how many pamphlets they would be interested in reading if they came to the clinic to have their blood pressure checked. Also, neither HLC nor health value alone was related to the number of pamphlets selected; it was the joint action of these two constructs which produced the finding. When Rotter's I–E Scale was used to classify these subjects as internals or externals, there were no significant results, thus helping to establish the discriminant validity of the health-specific LOC measure.

DeVito, Reznikoff, and Bogdanowitz (1979) attempted to replicate and extend our findings. Also having undergraduates role play potential hypertension clinic utilizers, they inserted a simple "yes–no" question about interest in obtaining more information about hypertension before the pamphlet selection task and an actual opportunity to request information following the pamphlet assessment. They did not find any significant differences among their four groupings of subjects (HLC × HV) on expressed interest in obtaining more information or in actual information seeking. They did, however, report a HLC × HV interaction on pamphlet selection. Among those subjects classified as having high health value, those classified as HLC internals chose a significantly greater number of pamphlets than those classified as HLC externals. That finding did, indeed, replicate our finding; what they failed to replicate was their finding that low health-value internals chose almost as many pamphlets as the high health-value internals. Their interaction effect was due to the low number of pamphlets selected by high value externals, rather than the greater number of pamphlets chosen by high value internals. Their study did, however, further caution on overgeneralizing from measures derived from role-playing to actual behavioral measures.

We had originally chosen to study information seeking about hypertension because when we began our investigations in early 1974 we had reason to suspect that our subject population was relatively uninformed about the condition and, therefore, might have a need to know something about it. (Our procedures—although not those adopted by DeVito *et al.*[1979]—were designed to heighten this motiva-

tion to seek information, and we have reason to believe we were effective in doing so.) Along with Gordon Kaplan, we were interested in seeing if our results were specific to hypertension or could generalize to other medical conditions. Since Kaplan was interested in weight management, we designed a replication study substituting information about obesity for information about hypertension. Also, instead of conducting this research solely on college students we wanted to branch out and study "real people." Therefore, the subjects for one attempt at studying obesity-related information seeking were recruited at a campground in nearby Lebanon, Tennessee. Neither the college student nor the camper sample produced the results we were looking for. As we mentioned in the discussion of our 1976 paper on the development and validation of the HLC Scale, it is possible that information seeking about health-related topics much in the public domain (as is weight control and the effects of being overweight) is less tied into locus of control beliefs than is a topic such as control of blood pressure which, in 1974, was only beginning to be well publicized. Social learning theory (Rotter, 1954; Rotter, Chance, & Phares, 1972) states that generalized expectancies (such as locus of control orientation) are particularly predictive in novel situations but that, as the person gains experience in specific situations, the predictive power of generalized expectancies decreases and is supplanted by situation-specific expectancies.

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There was one possible explanation as to why our 1978 information-seeking study did not work out. Perhaps the topic, hypertension, no longer had the same qualities it had 4 years earlier. In the intervening years there had been an extensive media campaign about hypertension and, as we concluded after the obesity-information-seeking failures, we reasoned that hypertension might be too much in the public domain and might no longer have the same stimulus properties it once had. Perhaps it was no longer necessary to have an inquisitive mind to be informed about the issue. On the other hand, countering this argument was the fact that the 1978 subjects chose slightly more hypertension-related pamphlets on the average than did the 1974 subjects. Nevertheless, we launched a search for a new disease entity which would be personally relevant to college students but would be relatively unknown to them. We settled on herpes simplex virus.

In the fall of 1979 we completed our latest health-related information-seeking study which included the HLC Scale along with the MHLC Scales. Half the subjects responded to statements about the old topic, hypertension, and half responded to statements about the new topic, herpes. If our speculations about novelty of topic were correct, we expected to find results with herpes but not with hypertension. Also, if a classification of subjects into internals and externals is necessary in order to produce the results, this should be the case when using the unidimensional HLC scale, but not with the separate MHLC Scales. Like the study by DeVito *et al.* (1979), this new study also included a measure of actual information seeking. Subjects were asked to write out all the questions they had about the disease (herpes or hypertension) and were told they would receive answers by mail.

The results with the 1979 sample were mixed and do not provide the clear-cut evidence we were hoping for. First of all, the selection of herpes as the wonder disease of the 1980s laid an egg. The only apparent finding for the subjects in the herpes condition was a tendency for low health-value subjects to choose more herpes-related pamphlets or to ask more questions about herpes. Health locus of control beliefs did not appear to be at all related to information seeking about herpes. There is no readily available explanation for the health value reversal.

To our surprise, the results for hypertension information seeking were more in line with what we expected. Splitting subjects on the basis of their HLC scores, internal, high health-value undergraduates chose significantly more hypertension-related pamphlets and asked more hypertension-related questions than the other three groupings of

subjects (i.e., than internal, low health-value subjects; external, high health-value subjects; or external low health-value subjects). Turning to the MHLC Scales, a two-way split on IHLC scores did not produce significant differences on pamphlet selection, but splits on the PHLC and CHLC scales did. High powerful-others, high health-value subjects chose more pamphlets than all other subjects as did low chance–external, high health-value subjects. For actual information seeking, all of the planned comparisons were significant. As suggested in an earlier section of this chapter, we combined the IHLC and CHLC scales into a single score as an approximation of the unidimensional HLC Scale. A median split on this combined scale also led to significant results for both hypertension pamphlet selection and question asking.

Why we obtained results for hypertension information seeking in 1979 when we failed with our 1978 study remains a puzzle. Over a 5-year period our batting average relating the health locus of control and health value constructs to hypertension information seeking (as operationalized by the number of pamphlets a person indicated he or she would be interested in reading) has been .750, but we have consistently struck out using the same paradigm with other health conditions. The latest study also contrasts with the findings of DeVito *et al.* (1979) by producing significant predicted results for both pamphlet selection (characterized by De Vito *et al.* as a measure of "behavioral intent") and question asking (a measure of actual behavior).

The studies reviewed in the preceding paragraphs all looked at the relationship of health locus of control and health-related information seeking for college students in a somewhat artificial situation. However, some studies have been more ecologically sound. Toner and Manuck (1979) studied 121 individuals participating in a public hypertension screening. Following measurement of blood pressure, subjects filled out the HLC Scale and were then "directed to a table containing stacks of 12 informational pamphlets regarding diet, smoking and other topics related to heart disease and encouraged to take whatever pamphlets would be of interest to them [Toner & Manuck, 1979, p. 824]." Toner and Manuck classified their subjects as HLC-Internals or HLC-Externals by a median split and further partitioned them into two age groupings (mean ages 57.3 and 25.2 years, respectively). Within the older group of subjects, HLC-Internals selected significantly more pamphlets than HLC-Externals, although no such differences were observed for the younger sample. Health value was not ascertained in this study.

In one of the earliest and most encouraging uses of the HLC Scale, Sproles (1977) classified renal dialysis patients as "internals" or "exter-

nals" and found that not only did internals know more about their condition, they also desired more information and were more willing to attend classes. Although based on a relatively small sample ($N = 31$), Sproles' statistics were almost too good to believe. Not only did she report a .93 correlation between HLC scores and number of questions answered incorrectly, she also found that 100% of the 14 internals wanted more information and were willing to attend classes, whereas only 3 out of 17 Externals wanted more information and no external wanted to attend classes. If awards were given for clean-cut data sets, this study by Sproles would win the prize.

Krantz, Baum, and Wideman (1980) related HLC scores to the number of questions college students asked a clinic nurse during a visit for minor complaints. Splitting their small sample into three groups, they found, apparently, a nonsignificant curvilinear relationship between HLC and question asking. Persons with moderate HLC scores asked fewer questions than persons with more extreme scores.[8]

We have looked at the relationship between MHLC scores and information-seeking in a longitudinal study of dental patients and in a nationwide survey of persons with epilepsy. The dental study was conducted using a sample of private dental patients on two successive visits for routine check-ups. Multidimensional health locus of control and health value were assessed via mailed questionnaires prior to the office visits. Two measures of information seeking were employed. The dental hygienist rated the patient's question-asking behavior during the procedure as "above average," "average," or "below average," compared to the typical patient in the same situation. Also, after the second visit, patients were given a list of health-relevant and dental-hygiene-relevant pamphlets that would be sent to them gratis as thanks for their participation in the study. The dependent variable was the number of free pamphlets they expressed interest in receiving. The most interesting finding was that for high-value subjects there was a significant negative correlation ($r = -.38, p < .05$) between the two measures of information seeking. Those judged by the hygienist to ask more questions chose a fewer number of pamphlets. Neither measure of information seeking, however, correlated one iota (a new statistic!) with health locus of control beliefs for those dental patients expressing high health value.

The measure of information seeking used in the survey of persons

[8] The information subscale of the KHOS (Krantz Health Opinion Survey) developed by Krantz *et al.* (1980) did a much better job of predicting a linear relationship with question asking than did the HLC Scale.

with epilepsy (DeVellis, DeVellis, Wallston, & Wallston, 1980a) consisted of a series of seven hypothetical situations in which the respondents could indicate their degree of willingness to expose themselves to epilepsy-relevant information using 6-point Likert scales. The MHLC Scales and health-value measures were also filled out as part of the same questionnaire booklet. In a multiple regression analysis where the total information-seeking score was the criterion variable and the MHLC and health-value scores, singly and multiplicatively, were the predictor variables, the best single predictor of information seeking was PHLC, which alone accounted for over 9% of the variance.

Preventive Health Behaviors

A number of investigations have looked at the relationship of health locus of control beliefs to the carrying out of health-relevant behaviors in relatively healthy populations. These preventive health behaviors have included such things as going to the doctor and/or the dentist for periodic examinations, eating and drinking sensibly, getting sufficient rest and exercise, using seat belts, practicing contraception, and obtaining immunizations for oneself and one's children. It is just these behaviors that most people think of when they hear about individuals "taking responsibility for their own health," and the temptation to correlate these behaviors with health locus of control beliefs—especially the internality dimension—has been exceedingly seductive for many health researchers. Unfortunately, taken as a whole, this has been a singularly unproductive research approach.

In one of the earliest uses of the HLC scale, Olbrisch (1975) found that among gonorrhea patients, internals did not differ from externals in plans to take future precautions. McCusker and Morrow (1979) administered the HLC Scale to a sample of schoolteachers and administrators and failed to find any relationship between HLC (either alone or in correlation with health value) and cancer-preventive behaviors such as frequency of having annual check-ups, stopping or reducing smoking, and practicing breast self-examination. Fischberg (1979) also looked at the practice of breast self-examination in a study comparing women in consciousness-raising groups to women not in such groups. Regardless of group membership, there was a nonsignificant tendency for her high health-value women who were also above the median on the IHLC scale to have practiced breast self-examination to a greater extent than other women (62% to 50%).

At a recent American Psychological Association convention, Stu-

art (1979) described two large-sample nationwide surveys of health status and health behaviors that he had conducted under the auspices of Weight Watchers International. The items from the HLC Scale were included as part of the interview schedule. No measure of health value was included. According to Stuart's report, the HLC score was insufficiently correlated with a wide variety of health behavior and health status measures. (Some correlations in the .10–.19 range may have reached statistical significance, but with a sample size over 1000 such significance is meaningless). When Stuart rescored the HLC Scale into its multidimensional components (i.e., HLC-I, HLC-C, and HLC-P), the number of correlations increased somewhat but not dramatically enough to be very meaningful.

Baughman (1978) assessed the MHLC beliefs and health-value rankings of a sample of female clerical and secretarial employees at the University of Cincinnati as part of her dissertation research. The MHLC and HV scores were used as predictor variables and were regressed on a number of preventive health behaviors and health status variables. The results were mixed but generally unimpressive. For amount of exercise, number of somatic complaints, medication usage, subjective health condition, and depression the correlations with IHLC and CHLC were in the right direction although not very large. There were no correlations with PHLC. Although Baughman included multiplicative terms (e.g., HV × IHLC) in her regression analyses, she did not standardize them before multiplying.[9]

We asked persons attending a health fair at a local YMCA to fill out the MHLC Scales along with a questionnaire assessing 13 different health behaviors and the subjective importance of engaging in these behaviors. Health value was not measured in this study, on the assumption that most persons going out of their way to attend a health fair would value health highly. A weighted composite score was computed by (*a*) multiplying whether or not a subject indicated he or she carried out a particular behavior by the subjectively rated importance of doing so, and (*b*) summing across behaviors. This composite score was essentially uncorrelated with the MHLC scores.

Krantz *et al.* (1980) found that college students' scores on the HLC scale correlated with the number of reported clinic visits during the academic year. Those students scoring toward the internal end of the scale reported fewer visits, perhaps suggesting a greater degree of self-

[9] Since we consulted with Baughman on her analyses, this omission was not her fault. It was only later that we discovered the necessity of standardizing terms before multiplying.

reliance in regard to their health. On a separate sample of college students, these authors also found that individuals scoring on the internal end of the HLC Scale were much more likely to self-diagnose and to assert themselves by requesting specific medications from the staff when they did visit the clinic than moderate scorers or those with more external beliefs.

Dishman *et al.* (1980) administered the HLC Scale as part of a battery of instruments to 66 adult males enrolled in physical activity programs. At the end of the 20-week study period the subjects were classified as either Adherers ($N = 43$)—individuals who were involved continuously for the entire 20-week period—or Dropouts ($N = 23$)—individuals who discontinued participation prior to conclusion of the 20-week period. The results of a stepwise multiple discriminant analysis revealed that the Self-Motivation Inventory (developed by Dishman *et al.*, 1980) was the only psychological inventory to contribute significantly to the group separation. Nevertheless the "adherers" had significantly ($t = 2.23$, $p < .05$) lower (i.e., more internal) HLC scores than the "dropouts" ($Ms = 29.81$ and 34.04, respectively). Dishman *et al.* (1980) did not look at the interaction of self-motivation and health locus of control in their analyses, but it is reasonable to conjecture that a highly self-motivated internal would be most likely to stay with a physical activity program.

Lowenstein (1979) attempted to relate pregnant women's MHLC beliefs to a number of self-reported health maintenance behaviors but failed to find any significant correlations. Lowenstein used her own measure of health value in her study, and it correlated positively ($r = .28$, $p < .08$) with health maintenance behaviors. If Lowenstein had looked at the health locus of control and health value constructs conjointly rather than singly, she might have obtained more interesting results. However, given the results from other studies that did carry out conjoint analyses, it is most parsimonious to believe that it would not have made any difference.

Lauver (1978) also failed to find expected relationships between health locus of control beliefs and self-reported health maintenance behaviors. Studying female clients in a health maintenance organization, she found a positive correlation between HLC scores and a client-health-responsibility index of her own devising. Those women with more external beliefs reported carrying out a higher proportion of "perceived beneficial" health behaviors, but the more internal scores were associated with not carrying out such behaviors. Like Lowenstein (1979), Lauver included a measure of health value but did not cross it with HLC in her analyses.

Smoking Reduction

Some studies have used the HLC Scale to predict long-term success of persons engaged in behaviorally oriented smoking cessation programs. Controlling for baseline smoking levels, Kaplan and Cowles (1978) found that individuals who both valued health highly and expressed internally oriented health locus of control beliefs were more successful in reducing smoking by the end of a 15-week treatment and demonstrated much better maintenance of behavior change over a 3–5½-month follow-up period than all other subjects. In particular, the high health-value internals differed significantly from the low health-value internals at the end of the follow-up period. Wildman, Rosenbaum, Framer, Keane, and Johnson (1979) did not use a measure of health value, but did collect HLC data at the beginning of a 7-week smoking reduction program stressing exercise and self-control procedures. By the end of treatment their HLC internals were smoking significantly less than the HLC externals, and these group differences remained roughly the same throughout a 21-month follow-up period. By the end of follow-up, the externals were almost back to baseline levels while the internals, although backsliding, were still lower than baseline. It is too bad that Wildman *et al.* did not assess health value, because it is very likely—given Kaplan and Cowles' findings—that only the low health-value internals began smoking again after treatment.

In the only known smoking study to date using the MHLC Scales, Shipley (personal communication, 1980) found high scores on the IHLC and low scores on the CHLC to be related to smoking abstinence 6 months after the treatment. Scores on the PHLC Scale were unrelated to the ability to stop smoking. Shipley's results parallel those of Wildman *et al.* Again, however, no measure of health value was employed.

Weight Reduction

Gordon Kaplan's master's thesis (reported in Wallston, Wallston, Kaplan, & Maides, 1976) looked at the interaction of locus of control beliefs and weight management treatment program characteristics and found that HLC internals expressed greater satisfaction with a self-managed program whereas HLC externals were more satisfied with a therapist-directed program. HLC category was not related to actual weight loss in either program. In an attempt to follow up on these results, we designed a study to test the hypothesis that given a choice, persons with an internal health locus of control orientation would select weight management programs that were congruent with internal beliefs and that persons with an external orientation would choose ex-

ternally oriented programs. We wrote up descriptions of 13 hypothetical weight management programs and, using a Thurstone procedure, had knowledgeable judges rate the programs' internal–external orientation along a 9-point scale. After eliminating programs where interjudge agreement was low, we ended up with five programs spaced at equal-appearing intervals along the locus of control dimension. Using 147 college students as subjects, we failed to find any relationship between HLC score and rank-ordered choice of weight management program. Almost none of these students was actually overweight (although female students were more likely than males to say that they should lose some weight); also, very few students indicated much interest in the two externally oriented programs (e.g., being hospitalized and having the staff totally control the diet; eating all one's meals in a special cafeteria where a fixed menu would offer no choices). This study should really be redone using a sample of individuals for whom these choices are personally relevant.

Kaplan's (1978) doctoral dissertation research was an attempt to predict weight-loss maintenance among a cohort of women who had participated in an 8-week, behaviorally based weight management program. Although it was not a formal part of Kaplan's dissertation, Form II of the HLC Scale (along with a multidimensional weight locus of control scale) was administered to these subjects at the program's conclusion. The dependent variable was the change in weight from program's end to follow-up, 6 months later. There was no relationship between any of the health or weight locus of control measures and the criterion variable, even when a crude measure of health value was also studied.

Examining intentions to lose weight, Saltzer (1978), in a very cleverly designed synthesis of social learning theory (Rotter, 1954) and Fishbein's behavior intentions theory (Fishbein & Ajzen, 1975), attempted to predict the regression weights associated with two theoretical components: attitudes toward the behavior and normative beliefs. Splitting her sample on the HLC scores did not produce the findings she anticipated for undergraduates who valued health and/or physical appearance highly. Using her own 4-item weight locus of control scale, however, Saltzer found that high weight-value internals' behavioral intentions were largely a function of their specific attitudes toward the behavior, whereas high weight-value externals' intentions were a function of normative beliefs. Not surprisingly, her measures of intentions to lose weight, obtained at the beginning of the semester, were uncorrelated with actual weight changes obtained at the semester's end. One analysis that was not performed but which might have been illuminating could have looked at only those subjects who valued

health and/or physical appearance highly and who stated an intention to lose weight. The prediction would be that, of those subjects, only the ones who held internal beliefs would actually lose weight, and that those with external beliefs would not.

Saltzer's (1979) dissertation research did, in fact, do the analysis suggested above. She studied 115 women who began a voluntary, clinic-based medical weight reduction program. Of these women, 79 completed the 6-week program; 36 women dropped out. Scores on the MHLC Scale did not distinguish between completers and noncompleters, but the completers were more internal on Saltzer's Weight-Specific Locus of Control (WLOC) scale. "Weight locus of control internals with high values on physical appearance or health were significantly more likely than other respondents to translate their behavioral intentions to lose weight into successful actions [Saltzer, 1979, p. xiv]," but this finding is specific to the WLOC and does not hold up for the MHLC.

One of the problems with most of the research conducted in the weight management area is that the dependent variable is usually weight loss which is an outcome variable, not a behavioral variable. Locus of control expectancies, theoretically, are supposed to be most predictive of behaviors and only secondarily predictive of actual outcomes (especially if the relationship between behavior and outcome is tenuous at best). The only behavioral variables mentioned above are choice of treatment and completion of the program (Saltzer, 1979). We have already discussed why the choice of treatment study may not have worked out; what is most difficult to explain is why the PHLC Scale did not predict which of Saltzer's women would stay in the medical weight reduction program and which would drop out. Women who believe their health is controlled by powerful others should remain in a program led by "powerful others," such as doctors or nurses. Saltzer does point out, however, that the main motivation for women in weight reduction programs is a desire for improved physical appearance, not health, so it is not that surprising that general health beliefs are less predictive than weight-specific beliefs.

Behaviors Related to Dental Hygiene

Two studies have employed the MHLC Scale in an unsuccessful attempt to predict oral hygiene variables (e.g., brushing, flossing, improvements in plaque scores). Our own study found no relationship between health locus of control beliefs (alone or in conjunction with health value) and measures of self-reported brushing, flossing, or sugar consumption, or hygienist's ratings of teeth and gums. What did predict

some of the behavioral variables were specific questions relating to the perceived benefits and costs of carrying out the oral hygiene behaviors.

One explanation of the lack of relationship between general health locus of control beliefs and oral hygiene behaviors is that the latter set of behaviors are highly learned habits and have little to do with most people's conceptions of health and illness. Another possible explanation of the failure of our dental study was that the subjects were a highly self-selected group of persons already engaged in a high level of dental hygiene behaviors. They were regular customers of a private dentist committed to prevention and, on the average, reported a high level of brushing and flossing. Carnahan's (1979) sample consisted of college students, and her study included the Multidimensional Dental Locus of Control (MDLC) scales, which she developed, along with the MHLC Scales as predictors of dental home care behaviors. Carnahan's MDLC scales were no more successful in predicting scores on a plaque index—a measure shown to be related to the effectiveness of brushing and flossing—than the more general MHLC Scales. [10]

Our dental study measured health value and found it to be a useless construct in predicting dental behaviors. Carnahan (1979) developed the Dental Health Value Scale and, despite the fact that it measured the value of dental health, it too, was unrelated to her criterion measures. However, Saltzer's (1978, 1979) assessment of the value of physical appearance as well as health value in her weight management studies was successful and points to the benefit of taking a new look at measuring motivational constructs and their utility in predicting behaviors.

Adherence Behaviors

With only a few exceptions, most of the studies reviewed so far in this section have dealt with relatively healthy subjects, that is, with persons who are neither sick nor identified as having a chronic disease. There have been some investigations, however, of actual patients where the purpose was to see whether health locus of control beliefs related to sick-role behaviors, including the extent to which patients adhered to their medical regimen.

Key (1975) administered the HLC Scale to a sample of predominantly black, elderly, low-SES, female hypertensive patients as part of

[10] In research of this nature, one never knows if the failure to predict is due to theoretical inadequacies, problems with the predictors, inappropriate criterion measures, or all three. Carnahan (1979) has pointed out some potential problems with her use of the plaque index that might have contributed to her null findings.

a follow-up evaluation of an experimental project designed to lower blood pressure. In addition to looking at appointment-keeping, she also assessed adherence to dietary and medical regimes by self-report and urinary assays. Key found a correlation between HLC scores and urinary drug levels, indicating that externality was positively associated with medication taking. In addition, she found a negative relationship between HLC scores and an estimate of the amount of sodium in the patients' diet, which also suggested a relationship between adherence and externality. No other relationships with HLC scores were significant, but Key's sample size was small ($N = 38$). Wallston and McLeod (1979) studied adherence and blood pressure control in a sample of 78 male Veterans Administration outpatients who had been undergoing treatment for hypertension. They found no relationship between HLC scores and blood pressure control, clinic appointment keeping, or self-reported medication compliance, but they did find a relationship between internality and judged dietary compliance. Lewis, Morisky, and Flynn (1978) included the HLC items in an interview study of a large sample of patients with essential hypertension treated in an ambulatory care setting in a large inner-city university hospital. The characteristics of this sample were similar to those of Key's (1975) sample. The major dependent variable was a 5-item self-reported medication compliance scale. Lewis *et al.* (1978) found a significant two-way interaction between HLC and home assistance, such that internals who perceived a high level of assistance in following their regimen reported a greater amount of medication-taking behavior than other individuals.

In addition to the study by Binik & Devins (1979) mentioned earlier in the section entitled "Known Groups" and the one by Sproles (1977) discussed in the section on information seeking, two other studies have looked at the health locus of control beliefs of patients with end-stage renal disease. Hatz (1978) administered the MHLC Scales to a small sample of dialysis patients and found that PHLC scores were negatively correlated with amount of weight gain between treatments, a good proxy measure of adherence to their regimen. Levin & Schulz (1980) also administered the MHLC to dialysis patients and found that those scoring above the median on IHLC were more compliant on diet and restricted weight gain than those scoring low on Internality. For their sample, PHLC was unrelated to these adherence measures.

Two studies using the HLC Scale have been done with psychiatric patients. Witt (1978) administered the HLC and health-value measures to 33 patients who were about to be discharged with a prescription for a major tranquilizer. A pill-count measurement of medication com-

pliance was taken on all subjects 10–14 days postdischarge. Witt found only a main effect for health value, with subjects who placed a high value on health more compliant than low health-value subjects. HLC internals and externals did not differ on medication taking, and HLC did not interact with health value. Battle and Halliburton (1979) conducted a study similar to Witt's, but used different dependent measures. It was Battle and Halliburton's intent to study medication-taking longitudinally after their psychiatric patients were discharged from the hospital, but they ran into a problem with differential return rates for follow-up. Their patients needed to come back to the VA in order to get their medicine, but HLC external, high health-value patients were most likely to keep their initial follow-up appointment while internal, low health-value patients were least likely to show up. This made it impossible to assess postdischarge compliance. However, when the investigators looked at medication compliance at the time of discharge, assessed by urine assays, they found that the least adherent patients were the external, low health-value patients. In neither the Witt (1978) nor the Battle and Halliburton (1979) studies did self-medication classes preparing patients for discharge have any impact on measured adherence, either alone or in interaction with HLC beliefs.

It is difficult to summarize the research done to date using health locus of control beliefs to predict the behavior of actual patients. With some samples, internality appears to be associated with desired behaviors, but it is more often the case that adherence is related to holding external beliefs. This would make sense if powerful others externality was the construct being measured, but most of these studies have used the HLC Scale, which includes only one powerful-others item. A number of studies that are currently in progress or in the planning stage are using the MHLC Scales with patient populations and thus may someday clarify these relationships. It is noteworthy, however, that to date, most studies that have used health locus of control measures with actual patients find some significant relationships; this has not been the case when nonpatient populations have been studied.

Conclusions

In the preface to our monograph on health locus of control (K. A. Wallston & B. S. Wallston, 1978), we wrote, "With the publication of this monograph, research on (health) locus of control beliefs matures from its infancy stage to one of adolescent growth and development. This stage is characterized by tentativeness and uncertainty, coupled

with great potential. In order to mature, however, a number of research issues must be resolved [p. 103]." Two years later, as we write this chapter, health locus of control research is still in its adolescence, full of pimples and promises, quivering on the brink of adulthood. Some of the best and most creative research with the locus of control construct has been done using health-specific measures, but some of the worst and most ill-conceived studies have also been carried out.

We are continually asked by persons interested in our measures, "Are the health locus of control scales reliable and valid?" as if there were easy answers to these important, but naive questions. Only some of these questioners add "for such and such a purpose." Heretofore we have been very hesitant to reply to these inquiries. In this conclusion to our chapter, however, we feel we must try to provide some answers.

The issue of reliability is the easier of the two to address. The internal consistency (alpha reliability) of the MHLC Scales has held up remarkably since their development, and the test–retest data that are available suggest fairly good stability, especially for populations expected to remain stable over time. One would not expect the beliefs of patients who are about to undergo surgery or who are ravaged by cancer or its treatment to remain the same over time, and they do not. For these reasons we conclude that the MHLC Scales have acceptable levels of reliability (especially the 12-item versions, combining Forms A and B).

The issue of validity is much trickier, and our conclusions about the scales' validity are much less certain. If the validity question is phrased, "Do the scales measure persons' beliefs about the locus of control of their health?", our tendency is to answer, "Yes," although we admit that the "proof" for such a conclusion is far from definitive. The construct validity question, however, is, perhaps, more important. When health locus of control is conceived of as a dependent variable, the evidence for the validity of the measures appears greater than when the construct is used as a predictor of behavior. Even this latter conclusion, however, must be tempered by the realization that the conceptual framework linking locus of control beliefs to specific behaviors in specific situations has not been adequately tested yet. While our work (and that of some investigators influenced by us) is somewhat unique in attempting to measure the value of outcomes to the individual as well as his or her locus of control beliefs,[11] we readily admit that we have not paid sufficient attention to which values we measure and how we go about measuring them. Also, hardly any attention has

[11]See Chapter 4, by Reid and Ziegler, in this volume for another approach measuring both expectancy and value of outcome.

been paid by us or other health researchers to the theoretical notion that generalized expectancies only predict behavior in novel situations, but specific expectancies (e.g., "behavior *X* will lead to reinforcement *r* in situation s") become important with repeated exposure (Rotter, 1954; Rotter, Chance, & Phares, 1972). One thing is exceedingly clear: Human behavior is complex and multidetermined. It is simplistic to believe that health locus of control beliefs will ever predict very much of the variance in health behavior by itself. The health locus of control scales are not the magic panacea many people believe they are.

Implications for Future Research

1. The MHLC Scales should be used, rather than the HLC Scale, since the IHLC and CHLC dimensions can always be combined to approximate the unidimensionality of the HLC Scale, but the powerful others externality dimension is unique and shows the most potential for producing interesting results in the health area.
2. There is no reason for investigators concerned with specific health areas to cease developing highly specific locus of control measures to suit their own purposes. Robert Feldman at the University of Maryland (personal communication, 1979) has even developed a "needle injury locus of control scale," which he administered to a sample of hospital employees. We are no longer even convinced that it is important to use sophisticated scale development techniques after seeing Saltzer's (1978, 1979) success with her 4-item weight locus of control scale compared with Carnahan's (1979) lack of success with her carefully constructed and developed multidimensional dental locus of control scales.
3. Insufficient attention has been paid to the notion of tailoring treatment programs to individuals' existing health locus of control beliefs or matching individuals to programs. This is an important area worthy of further research.
4. Research studies attempting to relate health locus of control beliefs to health behaviors should measure those behaviors directly and not rely on health status measures as proxies. This might be the reason why health locus of control beliefs have been shown to be related to smoking reduction, a behavioral variable, but not to weight loss, a status measure. (In the latter

case, reduction in calories or increase in physical activity would be appropriate behavioral measures.) These same studies, of course, should also not rely solely on HLC beliefs to predict behaviors, but should also measure the value to the individual of the expected outcome and the perceived costs and instrumentalities of the behavior.

5. The analytical strategies for handling data sets, including health locus of control beliefs (especially those using multidimensional measures), have lagged far behind the generation of those data sets. Some progress in this area has been made, but much creative work remains to be done. It may be that some of the lack of significant findings with the Health Locus of Control Scales is due to investigators not having used the proper analysis strategies.
6. One potential use of the health locus of control scales is as a clinical tool rather than as (or in conjunction with) a research instrument. At the Swedish Wellness Center in Englewood, Colorado, the MHLC is administered as part of a battery of tests given to each new participant upon enrolling in the Center. The enrollee, after filling out the instruments, goes over the resultant profile with a counselor and uses this information in planning an individualized wellness program. There are, of course, possible misuses of psychological instruments such as the MHLC Scales. However, if they are presented for what they are—measures of one aspect of one's health belief system at a given point in time—rather than what they are not (e.g., a measure of an individual's "personality"), then they might be useful in a clinical sense. In any case, systematic evaluation of their usefulness in this regard is in order.
7. We have been more successful in predicting the behavior of chronic patient populations with the MHLC than in trying to predict preventive behaviors. Whether the latter work should be abandoned or whether better conceptualizations should be developed is not clear. However, this distinction between sick-role behavior and health behavior (Kasl & Cobb, 1960) is an important one to be considered when planning research.
8. Research in health locus of control has failed totally to take into account actual control in situations as well as preferences for control. This is a new direction we are taking in our own work. At one time, there was some consensus that to be "internal" was positive. This is now being questioned (e.g., Wortman &

Dunkel-Schetter, 1979), and researchers in locus of control need to become more aware of how expectancies for control relate to actual environmental contingencies.

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Appendix A: Situational Inventory (Example)

Directions: Please mark the response that best describes what you would actually do. We are interested in what you would do, so please make your choices based on how you would actually behave. There are no right or wrong answers—we want to know what you would do. Please mark only one response to each item.

1. While taking a shower, you notice an unusually discolored patch of skin about the size of a quarter on your leg. Would you be most likely to:

I	C	P	
2	7	2	a. Ignore it and hope that it goes away.
6	1	7	b. Try to get an appointment as soon as possible with a doctor or other health professional to have it checked out.
2	2	7	c. Point it out to a family member or close friend in the hope that they would tell you what to do about it.
7	3	2	d. Closely watch it for a few days to see if it changes in size or color.
8	2	2	e. Try to find some salve or medicine with which you can treat the spot yourself.
8	2	3	f. Search through medical books for some indication of what it might be.

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