Multidimensional Health Locus of Control: Comments on the Construct and its Measurement

ALEKSANDRA LUSZCZYNSKA & RALF SCHWARZER
University of Sussex, UK & Freie University of Berlin, Germany

ALEKSANDRA LUSZCZYNSKA is lecturer in psychology at the University of Sussex. Her main interests are social-cognitive predictors of health behavior change. She has been an Alexander von Humboldt Fellow.

RALF SCHWARZER is professor of psychology at the Freie University of Berlin, Germany, and Adjunct Professor at York University, Canada. He specializes in the areas of health behaviors, stress, coping and social support.

COMPETING INTERESTS: None declared.

ADDRESS. Correspondence should be directed to: DR ALEKSANDRA LUSZCZYNSKA, University of Sussex, Department of Psychology, Pevensey Building, Falmer, BN1 9QH, UK. [email: a.luszczynska@sussex.ac.uk]

Journal of Health Psychology

London, Thousand Oaks and New Delhi,
www.sagepublications.com
Vol 10(5) 633–642
DOI: 10.1177/1359105305055307

Abstract

In the present commentary, the theoretical construct of Multidimensional Health Locus of Control (MHLC) is described and evaluated in terms of its contributions to health psychology. This concept is compared to other control beliefs, in particular to perceived self-efficacy. It is argued that MHLC has supplied health psychology with essential insights and has offered a great deal of intellectual stimulation. Nevertheless, for some applications, different constructs might be more promising, in particular when it comes to predicting health behavior change. MHLC measurement, specifically its factorial structure, its proximity to health outcomes and health behaviors and its cultural sensitivity are addressed. Further refinement of the instrument is recommended, and the range of promising applications needs to be clearly defined.

Keywords

control beliefs, health behavior, health outcomes, Multidimensional Health Locus of Control, self-efficacy

THE multidimensional Health Locus of Control (MHLC) construct has been around for more than a quarter of a century (Wallston, 1989, 2001; Wallston, Wallston, & DeVellis, 1978). It has helped to shape our thinking about the role of beliefs in the context of health behaviors, health outcomes and health care. It has been used in numerous studies, sparking a great deal of valuable findings in health psychology research. Databases such as Academic Search Premier, Medline, Eric, Health Source: Nursing/Academic Edition, American Humanities Index, Health Source Consumer Edition and Psych ARTICLES include over 380 MHLC articles published up through February 2004.

In this commentary, we discuss the utility of the locus of control construct in comparison to its main competitors, such as perceived self-efficacy. We argue that locus of control has some value, although limited, when the research goal is to predict whether people engage in healthy behaviors or avoid risky behaviors. Another issue is the generality of the construct (versus its specificity). We also deal with its measurement. Finally, dimensions of MHLC and its cultural sensitivity are addressed.

Control beliefs and Multidimensional Health Locus of Control

Locus of control is one type of control belief that has several competitors when it comes to explaining and predicting health-related outcomes. Other psychological constructs similar to locus of control are *perceived self-efficacy* (Bandura, 1997), *perceived behavioral control* (Ajzen, 1991), *mastery* (Pearlin & Schooler, 1978), *competence* (White, 1959) and *explanatory* style (Seligman, 1991).

According to Rotter's (1966) social learning theory, people may have either an internal or an external locus of control, often abbreviated as the I/E-dimension. The level of generality or situation specificity of this construct can vary. The research team of K. A. Wallston deserves the acclaim to have applied successfully Rotter's basic idea to the health domain. This domain specificity may be regarded as a medium level of generality, constrained to the subjective interpretation of various phenomena such as health behaviors, health outcome, health care, etc. (Wallston et al., 1978). The term 'locus' refers to the *location* where control resides—either internal (I) to the individual (based on one's traits or behaviors) or external (E) to the individual (due to other forces or chance).

Although internal and external beliefs were originally supposed to represent opposite ends of a continuum, empirical evidence has revealed that these two belief orientations are independent of one another. One can simultaneously hold both internal and external beliefs about control of an event or behavior (see Wallston & Wallston, 1982). For example, one might attribute a myocardial infarct to an internal factor, such as smoking or obesity, and at the same time to external causes, such as environmental stress. Thus, there are two dimensions, I and E, and, obviously, it is possible to subdivide them further. For example, chance and powerful others are quite distinct subfactors of the E dimension. The construct of MHLC has been built upon this idea, and its corresponding measure, the MHLC scales, contain exactly these three subscales, one I dimension and two E dimensions, all of which are considered to be orthogonal (Wallston et al., 1978).

The independence of I and E causes problems in interpretation. Groups of individuals might be distinguished who have strong internal beliefs about control and, at the same time, strong beliefs in chance and powerful others (see Ozolins & Stenström, 2003). If someone is internal as well as external, what does that tell us? Individuals make causal attributions to the diagnosis of heart disease and believe that internal factors are as important as external ones (which may be true). However, this is of limited value, especially if differences between groups of patients are investigated. It is valuable only if other patients are clearly distinct from this explanation. If we can contrast the above persons to others who make either an internal or an external attribution, we might gain groups of people who are distinguishable in terms of health behaviors or health outcomes. So far, there is no clear-cut empirical evidence regarding the pattern of MHLC scores that would be most closely related to good health. For example, it has been found that among patients with diabetes, Pure Internal individuals (high internal, low powerful others and low chance scores) and Believers in Control (high internal,

high powerful others and low chance scores) have lower HbA1C values (that is, higher adherence to self-care regimens) than all other subgroups with all other possible combinations of control beliefs (Stenström, Wikby, Andersson, & Ryden, 1998). Women with strong internal, strong powerful others and strong chance beliefs rated their health poorer and reported higher negative affect than all women with different MHLC patterns (Raja, Williams, & McGee, 1994).

Moreover, an individual may have different orientations when it comes to the cause of a problem or the solution of the same problem (see Brickman et al., 1982). For example, one could have been infected by a virus, which is more or less external, but given this cause, one could feel responsible to select a proper treatment and adhere to the medical regimen, which is internal. Often there is an asymmetric attribution in the opposite direction. People succumb to an illness due to lack of health behaviors (e.g. lack of physical exercise), which is internal, but they rely completely on the help of doctors, which is external (powerful others), to deal with the illness. Many patients feel that health professionals should have control over the course of an illness. Other examples refer to high internal control for both cause and course of a condition. One might have become obese due to poor nutrition habits, and then one might become a restrained eater by adhering conscientiously to self-imposed diet rules.

Internal beliefs about one's health are poor predictors of engaging in healthy behaviors or avoiding health risks, except for a subgroup of people who highly value good health (see Wallston, 1992). The dimensions of health locus of control can serve to explain individual differences in affect and quality of life (Pucheu, Consoli, D'Auzac, Francais, & Issad, 2004). For the prediction of health behaviors, however, they are only of limited value. The internality dimension appears to be less powerful than related constructs that go beyond locus in several ways, such as perceived self-efficacy (Bandura, 1997), perceived behavioral control (Ajzen, 1991) or explanatory style (Seligman, 1991). Therefore, one would choose one of the latter constructs when it comes to predicting health behavior. Self-efficacy, in particular, is a powerful construct that plays a major role in any kind of goal attainment process (see Wallston, 1992; Wallston, Wallston, Smith, & Dobbins, 1987).

Perceived self-efficacy and MHLC

Perceived self-efficacy is the belief in one's competence to tackle difficult or novel tasks and to cope with adversity in specific demanding situations. Self-efficacy makes a difference in how people think, feel and act (see Bandura, 1997, for a review of the evidence). People with high self-efficacy choose to perform more challenging tasks. They set themselves higher goals and stick to them. Actions are pre-shaped in thought, and once an action has been taken, highly self-efficacious people invest more effort and persist longer than those low in self-efficacy. When setbacks occur, they recover more quickly and remain committed to their goals. High self-efficacy also allows people to select challenging settings and explore their environment or create new ones. Thus, it represents a belief in one's competence in dealing with all kinds of demands. This implies an internal-stable attribution of successful action and a prospective view. These characteristics make it a unique theoretical construct different from related ones, such as self-esteem, locus of control or self-concept of ability. Self-esteem has an emotional connotation ('I feel that I have a good character' or 'I am proud of myself'). Locus of control refers to an attribution of responsibility for outcomes (internal versus external causation), and self-concept of ability pertains to a judgment of one's competence ('I am good at math') without referring to any subsequent action. Only self-efficacy ('I am certain that I can quit smoking even if my partner continues to smoke') is of a *prospective* and *operative* nature, which furnishes this construct with additional explanatory and predictive power in a variety of research applications. In sum, perceived self-efficacy can be characterized mainly as being competence-based, prospective and action-related, as opposed to similar constructs that share only part of this portrayal (Bandura, 1997).

Self-efficacy might be defined in a general or a specific way. Some researchers suggest that optimistic self-beliefs might be conceptualized

as being general, referring to various areas of human functioning (see Luszczynska, Gutiérrez-Doña, & Schwarzer, in press). Bandura (1997) advocates that self-efficacy should rather refer to the particular task or specific behavior that is being predicted.

General self-efficacy and health locus of control dimensions are related, but usually these relations are weak. Internal health locus of control and general self-efficacy were correlated in healthy older adults (Waller & Bates, 1992). Correlations between general self-efficacy and internal health locus of control as well as chance health locus of control were found for students (Bonetti et al., 2001), but the coefficients were rather low. In some cases, however, the relations between MHLC and self-efficacy were not significant, for example for patients with rheumatoid arthritis, multiple sclerosis or stroke (Bonetti et al., 2001).

The relations between general self-efficacy and MHLC and their differential effects on health outcomes were tested in some studies. Searching for the predictors of quality of life and psychosocial adjustment in patients with epilepsy, Gramstad, Iversen and Engelsen (2001) found that correlations between general self-efficacy and health outcomes were stronger than correlations between MHLC and health outcomes. Anxiety of patients was explained by both general self-efficacy and health locus of control (chance), with the unique contribution of .12 and .04, respectively (Bonetti et al., 2001).

Other studies aimed at investigating the relations between specific self-efficacy and MHLC. In an Australian community sample, correlations between MHLC and weight control self-efficacy were also nonsignificant (Paxton & Sculthorpe, 1999). The lack of significant relations may result from some discrepancies in the way the MHLC and self-efficacy measures are designed. Self-efficacy might be measured in a very specific way—that is, referring to one aspect of a disease or a behavior. MHLC scales might tap a broader range of health beliefs related to health or a specific disease. For example, a diabetes-related MHLC measure might refer to *all* aspects of diabetes, while diabetes-related self-efficacy might refer to physical activity, nutrition or adherence to medication.

General, condition-related and outcome-specific beliefs about health locus of control

Health beliefs regarding personal agency or control might be general, referring to all aspects of health, as well as referring to a specific aspect of health, such as specific diseases, symptoms or behaviors. The general approach to cognitions, beliefs or attitudes is sometimes criticized because of its lower predictive power (see Bandura, 1997). This issue has been raised in self-efficacy studies in which both general and specific self-efficacy beliefs (e.g. regarding academic performance or nutrition) are considered as complementary approaches (see Luszczynska et al., in press).

The measurement of MHLC (Forms A and B) refers to wide areas of functioning, health and medical conditions (see Wallston et al., 1978). This generality might also explain the lack of significant associations between the loci and specific measures of health status or health behaviors, such as compliance with fluid-intake restrictions among patients under haemodialysis (Pang, Ip, & Chang, 2001) or number of migraine attacks per year, duration of disease, time of last migraine attack and number of aura symptoms in patients with migraine (Lampi et al., 2003). When health behaviors are under examination, only small amounts of variance are accounted for by the general measure of health locus of control (see Bennett, Norman, Murphy, Moore, & Tudor-Smith, 1997; Steptoe & Wardle, 2001a, 2001b). Students with high internal locus of control ratings were carrying out more frequently 4 out of 10 health-promoting behaviors: they were more active, had higher fiber intake and avoided fat and salt. High chance locus of control was inversely related to 6 out of 10 health-promoting behaviors: students with high chance health locus of control (CHLC) scores were less likely to engage in frequent physical activity, had higher alcohol consumption, irregular breakfast, lower fruit intake, lower fiber intake and higher fat consumption than those low in CHLC. Results regarding powerful others were more ambiguous. Individuals with high beliefs in powerful others performed frequently 3 out of 10 health-promoting behaviors (they limited alcohol consumption, ate more fruit and avoided fat).

However, such individuals also had low levels of physical activity, brushed their teeth irregularly and consumed more salt (Steptoe & Wardle, 2001b).

The first forms used to assess MHLC were designed to measure healthy individuals rather than patients with current or chronic diseases (Wallston et al., 1978). For individuals with a chronic or terminal illness, items such as 'my good health is largely a matter of good fortune' could be difficult to agree or disagree with. Form C contains the generic word 'condition' that might be replaced with a specific disease, for example arthritis (see Wallston, Stein, & Smith, 1994). Still, this reference to chronic disease is general. Therefore, the relations between pain in arthritis and arthritis-related MHLC scales was low or even nonsignificant (*r*s from .10 to .19; see Wallston et al., 1994). Among patients who had undergone major surgery, health locus of control dimensions (assessed prior to surgery) were unrelated to the morphine dose of patient-controlled analgesia use (Brandner, Bromley, & Blagrove, 2002). It might be assumed that pain-related MHLC and depression-related MHLC would account for more variance of such outcomes of arthritis as pain and depression, or of such outcomes of surgery as morphine use. The C scale of MHLC allows the assessment of disease-related cognitions, but they are still not outcome-specific.

The development of disease-related measures of MHLC is useful if homogeneous groups of patients who perceive that they have one major health concern participate in the study. The MHLC scales had little predictive value for quality of life of patients in late stages of cancer, although other measures of personal control were related to patients' well-being (Lewis, 1982). When cancer patients were under study, their general and cancer-specific scores for internal, general and powerful others scales of the MHLC did not differ significantly (Dahnke, Garlick & Kazoleas, 1994). This shows that the disease-specific measure of MHLC has been used in a way that is not sufficiently proximal to specific ailments and outcomes.

Some criticism has been raised that the MHLC does not predict some aspects of health, such as pain (Brandner et al., 2002), metabolic control in diabetes measured as HbA1C levels (Auerbach et al., 2002) or survival rates in cancer patients (Soler-Vila, Kasl, & Jones, 2003). The findings suggesting low predictive power of the MHLC variables might result from a relatively low sensitivity of the general or disease-related MHLC scales to various problems of post-surgery patients and/or patients with chronic or terminal diseases. Patients might perceive that some aspects of their condition are very much under their own control, while other aspects are not. This might confuse patients who answer the questionnaire, resulting in less meaningful MHLC scores.

Patients with a certain disease might suffer from multiple health problems and might perceive control over different simultaneous ailments in different ways. Besides the need to adhere to a daily self-care regimen, patients with diabetes might suffer from chronic complications, such as nephropathy, retinopathy, neuropathy and macrovascular complications. Beliefs about control over progress in retinopathy might be unrelated to beliefs about control over adherence to nutrition regimen. Therefore, general disease-related locus of control measures (see Ferraro, Price, Desmond, & Roberts, 1987) might be of limited value. General diabetes-related locus of control is a poor predictor of metabolic control (see Stenström et al., 1998). Locus of control related to adherence to a nutrition and physical activity regimen could be a stronger predictor of metabolic control in diabetes. Compared to disease-related measures of MHLC, outcome- or behavior-specific MHLC used in certain populations of patients (e.g. related to pain or disability) may provide valuable information for medical practice.

Predictive power of MHLC compared to other control constructs

Another criticism refers to the predictive power of the MHLC as compared to the Theory of Planned Behavior (TPB; see Armitage, 2003; Armitage, Norman, & Conner, 2002). Armitage (2003) found that MHLC variables accounted for significant proportions of variance in 8 out of 12 intentions to behave in a healthy way. The MHLC variables accounted, on average, for 4 percent of variance. Health value explained an additional 1 percent. Perceived behavioral control, a construct similar to self-efficacy,

explained significant additional variance in 11 out of 12 cases and accounted, on average, for 21 percent of additional variance of the behavioral intention. The variables in the TPB are perceived behavioral control, subjective norms and attitudes regarding the behaviors under study. These variables were of higher predictive value across behaviors (e.g. condom use, binge drinking and drunk driving) than the MHLC dimensions, that is, internal, chance and powerful others loci of control (Armitage et al., 2002).

The TPB variables mediated the effects of MHLC dimensions on intention and behavior. The more specific TPB measure of perceived behavior control might be driven by MHLC beliefs. MHLC beliefs might also be causally antecedent to perceived control over more specific behaviors. Again, the inferior predictive value of the MHLC might result from the generality of the measure, since situation-specific measures (that is, TPB variables) are typically more strongly related to behaviors. The effects of powerful others on intentions to use condoms and reduce binge drinking, however, were *partially* mediated by the constructs of the TPB (Armitage et al., 2002). This means that the MHLC variables have a predictive value over and above such specific constructs. Therefore, it might be assumed that the potential predictive power of the MHLC dimensions would increase if they would be defined in an outcome-specific way.

Dimensions of health locus of control

The three-factorial structure of health locus of control has been confirmed in various studies. The factors were distinguished in samples of middle-class Brazilian adults (Paine, Pasquali, Paulo Ede, Bianchi, & Solha, 1994). A comparison of the three-factorial structure versus a two-factorial structure (with chance and powerful others loci lumped together) showed a better fit than the original, three-factorial structure (Menzione, Paganucci, Primi, & Siani, 2003). Still, the fit of the model was not ideal, suggesting that the data collected in women attending a breast cancer screening program differed significantly from the theoretical model (Menzione et al., 2003). Data collected among adolescents provide moderate support for the structure of the inventory (Stanton, Nada Raja, & Langley, 1995). A careful examination of the MHLC structure employing a confirmatory factor analysis supported a three-dimensional structure (Talbot, Nouwen, & Gauthier, 1996). Data from clinical and nonclinical samples fit a three- rather than a two-factor solution. The three-factorial structure was confirmed for the MHLC-C scale, adjusted to cancer patients (Dahnke et al., 1994). Analyzing data from patients with a chronic disease, Wallston et al. (1994) found that the Powerful Others subscale might consist of two factors that refer to health care professionals and other people.

Despite encouraging results that confirm the theoretical assumption of the multidimensionality of health locus of control, the MHLC scale has been subjected to ongoing criticism. Comparisons between two scales to measure the MHLC (Forms A and B) showed that the factor structure of both forms was not equivalent. The forms might be not sufficiently parallel (Hubley & Wagner, 2004). Maclachlan, Ager and Brown (1996) could not replicate the factorial structure of MHLC among Malawi students. They distinguished three factors, referring to limits of medical care and influence over health. Factor analysis for data collected among adolescents in Ghana yielded a two-factorial structure (Astrøm & Blay, 2002). Between-factor correlations were higher than expected for a sample from New Zealand (Stanton et al., 1995).

Besides the three subscales included in the MHLC, Wallston and coworkers (1999) have begun to measure separately God Locus of Health Control (GHLC). Among patients with rheumatoid arthritis, the GHLC subscale was moderately correlated to the Chance and Other People subscales, but it was unrelated to the Internality or Doctors subscales (Wallston et al., 1999). Further investigations yielded that the factors referring to external locus of control (powerful other, God and chance) were substantially correlated in Canadian women (see Chaplin et al., 2001).

Cultural sensitivity of MHLC

The average MHLC scores might differ across countries and cultures (see Stein, Smith, & Wallston, 1984). Young adults in Eastern Europe have higher beliefs in chance and

powerful others locus of control as compared to their Western European counterparts (Steptoe & Wardle, 2001a). African-American women with breast cancer have stronger beliefs in chance and powerful others than White women (Barroso et al., 2000). Spanish patients have lower scores on internal health locus of control beliefs than Scottish or Irish patients (Bonetti et al., 2001). MHLC scales failed to predict health risk among Malawi undergraduates (Maclachlan et al., 1996). Of course, such comparisons suffer from the methodological pitfall that samples are seldom representative for the respective country or culture.

Ethnicity and religiosity affect results of all three subscales of the MHLC. Compared to Asians, Europeans score higher on internal locus and lower in the two other scales (Wrightson & Wardle, 1997). Black, Native and European Canadian women scored lower on the God Locus of Control scale than Caucasian American students (Chaplin et al., 2001). Religiosity might be expected, especially if God Health Locus of Control is studied. Patients with rheumatic diseases who actively practice religion scored higher on the God Health Locus of Control scale than those who do not. In some cultures or communities, strong religiosity might result in a ceiling effect in the scales and in lack of relations between the MHLC scale and health-related outcomes.

Regardless of differences in average levels of health locus of control scores, some dimensions might play a more salient role in some cultures (see Hofstede, 2001). For example, internal health locus of control might be related to better health and healthier behaviors in countries that favor high individualism, compared to countries high in collectivism. Further studies should test the cross-cultural validity of the MHLC variables.

Theoretical and empirical developments: future directions

As a theoretical approach that claims to explain aspects of human health, the MHLC construct would benefit from further development into a larger conceptual framework. The pathways in which the MHLC act upon health should be elaborated in more detail. Other theoretical approaches, such as Social Cognitive Theory, suggest direct and indirect ways in which control beliefs (i.e. self-efficacy) affect behaviors and well-being or other self-regulatory beliefs (see Bandura, 1997). Theories such as Social Cognitive Theory, the Health Action Process Approach or the Theory of Planned Behavior (see Ajzen, 1991; Bandura, 1997; Schwarzer, 2001) suggest also how relations between constructs might be elaborated. This is a fruitful approach that facilitates application of theories and development of interventions.

According to implicit assumptions that form the background of many studies, a firm internal locus of control belief might promote better health or healthier behaviors (see, for example, Waller & Bates, 1992). The author of the MHLC construct, however, considers that internal locus of control is a necessary but not sufficient element in the promotion of healthier behaviors which, in turn, are one of the pathways to better health (K. A. Wallston, personal communication, 19 April 2004). Again, the explicit theoretical assumptions regarding which loci are health promoting or health compromising (in specific areas of health) would help to design interventions. As long as it is not clear which profile of the MHLC is related to better health in populations with specific health conditions, the practical implications of the MHLC theory are limited.

Further theoretical developments of the MHLC variables might aim at defining them as more proximal to specific health outcomes or health behaviors. This should be followed by a refinement of measures tapping beliefs about control over one's own condition in a more specific way. As pointed out, disease-related MHLC (e.g. arthritis-related) could be supplemented by an outcome-specific construct (related to pain or disability, etc.).

The uniqueness of the MHLC variables, compared to similar constructs (such as optimism, self-efficacy or perceived behavioral control), should be further elaborated, both theoretically and empirically. This is an emerging issue in studies on MHLC because many studies provide evidence that other constructs have a stronger predictive value.

Other questions address moderators of MHLC effects, such as health status, type of disease and severity of disease. Health locus of control

might depend on current health status. Compared to healthy women, cancer patients had higher levels of external and chance control and lower internal loci of control (Bremer, Moore, Bourbon, Hess, & Bremer, 1997). Therefore, changes in MHLC might be observed when a healthy individual becomes sick. The increase of severity of the disease is related to changes in health locus of control. Patients with mild and severe asthma do not differ in terms of psychopathology or personality measures (Brinke, Ouwerkerk, Bel, & Spinhoven, 2001). However, compared to patients with mild asthma, those with severe asthma had lower beliefs in control of powerful others over their health. The questions arise whether a lack of confidence in the influence of medication or physicians is the cause or the consequence of disease severity, and whether the MHLC dimensions result from the current health status and its changes. These crucial issues require further theoretical elaboration. Although a large number of studies using the MHLC scales exist, these questions remain unresolved. A vast majority of studies employed cross-sectional and correlational designs. Therefore, one of the key theoretical issues needs to be addressed: MHLC might both predict and result from medical conditions or health complaints.

The causal relations between health and control beliefs should also be tested in experimental studies. So far, only a few interventions addressed health locus of control beliefs. Changes in internal locus of control were observed after an intervention addressing nutrition change (Murphy, Prewitt, Bote, West, & Iber, 2001). Education programs for diabetes patients resulted in changes in loci of control; however, adherence to medical regimens changed only marginally (de Weerdt, Visser, Kok, & van der Veen, 1989).

Conclusions

The MHLC construct has had a successful history during the last quarter of a century. It constitutes an integral part of health psychology and deserves attention for having helped to shape our thinking about the beliefs of humans facing stress, illness and adversity. Despite all critical comments that might address theory, measurement and research on multidimensional locus of control, this construct contributes to our understanding and to the explanation of human health. Although its measure has been criticized, it seems that the majority of studies support the multidimensionality of health locus of control. Measured in a general or disease-related manner, the MHLC explains a significant proportion of variance of health-related outcomes. Some elaboration could be done to embed the construct into a broader theoretical framework that would define its position as a distal or proximal antecedent of health behaviors and as a consequence of certain health events. Further studies may also focus on designing interventions aimed at enhancing loci of control in various populations.

References

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, *50*, 179–211.

Armitage, C. J. (2003). The relationship between multidimensional health locus of control and perceived behavioural control: How are distal perceptions of control related to proximal perceptions of control? *Psychology and Health*, *18*, 723–738.

Armitage, C. J., Norman, P., & Conner, M. (2002). Can the Theory of Planned Behavior mediate the effects of age, gender and multidimensional health locus of control? *British Journal of Health Psychology*, *7*, 299–316.

Astrøm, A. N., & Blay, D. (2002). Multidimensional Health Locus of Control scales: Applicability among Ghanaian adolescents. *East African Medical Journal*, *79*, 128–133.

Auerbach, S. M, Clore, J. N., Kiesler, D. J., Orr, T., Pegg, P. O., Quick, B. G., & Wagner, C. (2002). Relation of diabetic patients' health-related control appraisals and physician–patient interpersonal impact to patients' metabolic control and satisfaction with treatment. *Journal of Behavioral Medicine*, *25*, 17–35.

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: Freeman.

Barroso, J., McMillian, S., Casey, L., Gibson, W., Kaminski, G., & Meyer, J. (2000). Comparison between African-American and white women in their beliefs about breast cancer and their health locus of control. *Cancer Nursing*, *23*, 268–276.

Bennett, P., Norman, P., Murphy, S., Moore, L., & Tudor-Smith, C. (1997). Health locus of control and value for health in smokers and nonsmokers. *Health Psychology*, *16*, 179–182.

Bonetti, D., Johnston, M., Rodriguez-Marin, J., Pastor, M., Martin-Aragon, M., Doherty, E., & Sheehan, K. (2001). Dimensions of perceived control: A factor analysis of three measures and an examination of their relation to activity level and mood in a student and cross-cultural patient sample. *Psychology and Health*, *16*, 655–674.

Brandner, B., Bromley, L., & Blagrove, M. (2002). Influence of psychological factors in the use of patient controlled analgesia. *Acute Pain*, *4*, 53–56.

Bremer, B. A., Moore, C. T., Bourbon, B. M., Hess, D. R., & Bremer, K. L. (1997). Perceptions of control, physical exercise, and psychological adjustment to breast cancer in South African women. *Annals of Behavioral Medicine*, *19*, 51–60.

Brickman, P., Ravinovitz, V. C., Karuza, J., Jr, Coates, D., Cohn, E., & Kidder, L. (1982). Models of helping and coping. *American Psychologist*, *37*, 368–384.

Brinke, A., Ouwerkerk, M. E., Bel, E. H., & Spinhoven, P. (2001). Similar psychological characteristics in mild and severe asthma. *Journal of Psychosomatic Research*, *50*, 7–10.

Chaplin, W. F., Davidson, K., Sparrow, V., Stuhr, J., van Roofsmalen, E., & Wallston, K. A. (2001). A structural evaluation of the expanded Multidimensional Health Locus of Control scale with a diverse sample of Caucasian/European, Native, and Black Canadian women. *Journal of Health Psychology*, *6*, 447–455.

Dahnke, G. L., Garlick, R., & Kazoleas, D. (1994). Testing a new disease-specific health locus of control scale among cancer and aplastic anaemia patients. *Health Communication*, *6*, 37–53.

De Weerdt, I., Visser, A. P., Kok, G., & van der Veen, E. A. (1989). Randomized controlled evaluation of an education program for insulin treated patients with diabetes: Effects on psychosocial variables. *Patient Education and Counseling*, *14*, 191–215.

Ferraro, L. A., Price, J. H., Desmond, S. M., & Roberts, S. M. (1987). Development of diabetes locus of control scale. *Psychological Reports*, *61*, 665–670.

Gramstad, A., Iversen, E., & Engelsen, B. A. (2001). The impact of affectivity dispositions, self-efficacy and locus of control on psychosocial adjustment in patients with epilepsy. *Epilepsy Research*, *46*, 53–61.

Hofstede, G. (2001). *Culture consequences: Comparing values, behaviors, institutions, and organizations across the nations*. Thousand Oaks, CA: Sage Publications.

Hubley, A., & Wagner, S. (2004). Using alternate forms of the Multidimensional Health Locus of Control scale. *Social Indicators Research*, *65*, 167–186.

Lampi, C., Heuberger, B., Haas, S., Yazdi, K., Buzath, A., & Kemetzhofer, P. (2003). Relationship of locus of control in women with migraine and healthy volunteers. *Headache*, *43*, 878–883.

Lewis, F. M. (1982). Experienced personal control and quality of life in late-stage cancer patients. *Nursing Research*, *31*, 113–119.

Luszczynska, A., Gutiérrez-Doña, B., & Schwarzer, R. (in press). General self-efficacy in various domains of human functioning: Evidence from five countries. *International Journal of Psychology*.

Maclachlan, M., Ager, A., & Brown, J. (1996). Health locus of control in Malawi: A failure to support the cross-cultural validity of the HLOCQ. *Psychology and Health*, *12*, 22–28.

Menzione, M., Paganucci, C., Primi, C., & Siani, R. (2003). Multidimensional Health Locus of Control (MHLC): Comparisons across factorial models. *Bollettino do Psicologia Applicata*, *239*, 27–33.

Murphy, P. A., Prewitt, T. E., Bote, E., West, B., & Iber, F. L. (2001). Internal locus of control and social support associated with some dietary changes by elderly participants in a diet intervention trial. *Journal of the American Dietetic Association*, *101*, 203–208.

Ozolins, A. R., & Stenström, U. (2003). Validation of health locus of control patterns in Swedish adolescents. *Adolescence*, *152*, 651–657.

Paine, P., Pasquali, L., Paulo Ede, S., Bianchi, A. L., & Solha, A. C. (1994). Psychometric properties of the Brazilian Health Locus of Control scale. *Psychological Reports*, *75*, 91–94.

Pang, S.-K., Ip, W.-Y., & Chang, A. M. (2001). Psychosocial correlates of fluid compliance among Chinese haemodialysis patients. *Journal of Advanced Nursing*, *35*, 691–699.

Paxton, S. J., & Sculthorpe, A. (1999). Weight and health locus of control beliefs in an Australian community sample. *Psychology and Health*, *14*, 417–431.

Pearlin, L. I., & Schooler, C. (1978). The structure of coping. *Journal of Health and Social Behavior*, *19*, 2–21.

Pucheu, S., Consoli, S. M., D'Auzac, C., Francais, P., & Issad, B. (2004). Do health casual attributions and coping strategies act as moderators of quality of life in peritoneal dialysis patients? *Journal of Psychosomatic Research*, *56*, 317–322.

Raja, S. N., Williams, S., & McGee, R. (1994). Multidimensional Health Locus of Control beliefs and psychological health for a sample of mothers. *Social Science and Medicine*, *39*, 213–220.

Rotter, J. B. (1966). Generalized expectancies for internal versus external control of reinforcement. *Psychological Monographs*, *80*, 1–28.

Schwarzer, R. (2001). Social-cognitive factors in changing health-related behavior. *Current Directions in Psychological Science*, *10*, 47–51.

Seligman, M. E. P. (1991). *Learned optimism*. New York: Knopf.

Soler-Vila, H., Kasl, S. V., & Jones, B. A. (2003). Prognostic significance of psychosocial factors in

African-American and White breast cancer patients. *Cancer: Diagnosis, Treatment, Research*, *98*, 1299–1308.

Stanton, W. R., Nada Raja, S., & Langley, J. (1995). Stability in the structure of health locus of control among adolescents. *British Journal of Clinical Psychology*, *34*, 279–287.

Stein, M. J., Smith, M., & Wallston, K. A. (1984). Cross-cultural issues of health locus of control beliefs. *Psychological Studies*, *29*, 112–116.

Stenström, U., Wikby, A., Andersson, P.-O., & Ryden, O. (1998). Relationship between locus of control beliefs and metabolic control in insulin-dependent diabetes mellitus. *British Journal of Health Psychology*, *3*, 15–25.

Steptoe, A., & Wardle, J. (2001a). Health behaviour, risk awareness and emotional well-being in students from Eastern Europe and Western Europe. *Social Science and Medicine*, *53*, 1621–1630.

Steptoe, A., & Wardle, J. (2001b). Locus of control and health behavior revisited: A multivariate analysis of young adults from 18 countries. *British Journal of Psychology*, *92*, 659–672.

Talbot, F., Nouwen, A., & Gauthier, J. (1996). Is health locus of control a 3-factor or a 2-factor construct? *Journal of Clinical Psychology*, *52*, 559–568.

Waller, K. W., & Bates, R. C. (1992). Health locus of control and self-efficacy beliefs in a healthy elderly sample. *American Journal of Health Promotion*, *6*, 302–309.

Wallston, K. A. (1989). Assessment of control in health care settings. In A. Steptoe & A. Appels (Eds.), *Stress, personal control and health* (pp. 85–105). Chichester, England: Wiley.

Wallston, K. A. (1992). Hocus-Pocus, the focus isn't strictly on locus: Rotter's social learning theory modified for health. *Cognitive Therapy and Research*, *16*, 183–199.

Wallston, K. A. (2001). Conceptualization and operationalization of perceived control. In A. Baum, T. A. Revenson, & J. E. Singer (Eds.), *The handbook of health psychology* (pp. 49–58). Mahwah, NJ: Erlbaum.

Wallston, K. A., & Wallston, B. S. (1982). Who is responsible for your health? The construct of health locus of control. In G. S. Sanders & J. Suls (Eds.), *Social psychology of health and illnes*s (pp. 65–95). Hillsdale, NJ: Erlbaum.

Wallston, K. A., Malcarne, V. L., Flores, L., Hansdottir, I., Smith, C. A., Stein, M. J., Weisman, M. H., & Clements, P. J. (1999). Does God determine your health? The God Locus of Control scale. *Cognitive Therapy and Research*, *23*, 131–142.

Wallston, K. A., Stein, M. J., & Smith, C. A. (1994). Form C of the MHLC Scales: A condition-specific measure of locus of control. *Journal of Personality Assessment*, *63*, 543–553.

Wallston, K. A., Wallston, B. S., & DeVellis, R. F. (1978). Development of the Multidimensional Health Locus of Control (MHLC) scales. *Health Education Monographs*, *6*, 160–170.

Wallston, K. A., Wallston, B. S., Smith, S., & Dobbins, C. J. (1987). Perceived control and health. *Current Psychological Research and Reviews*, *6*, 5–25.

White, R. W. (1959). Motivation reconsidered: The concept of competence. *Psychological Review*, *66*, 297–333.

Wrightson, K. J., & Wardle, J. (1997). Cultural variation in health locus of control. *Ethnicity and Health*, *2*, 13–25.