Psychological Assessment –
Science and Practice

Assessment in Health Psychology

Yael Benyamini
Marie Johnston
Evangelos C. Karademas
(Eds.)

hogrefe

Assessment in Health Psychology

About the Editors

Yael Benyamini, PhD, is Professor at the Bob Shapell School of Social Work, Tel Aviv University (Israel). She attained her PhD in Health and Social Psychology at Rutgers University (USA). She teaches assessment in her master's- and doctoral-level methodology courses and has a long record of research on self-regulation and the role of perceptions of health and illness in chronic diseases, women's health issues, and health promotion, including the development and adaptation of research instruments for specific health contexts. She has authored over 70 journal articles and book chapters and is an elected honorary fellow of the European Health Psychology Society.

Marie Johnston, PhD, is Emeritus Professor of Health Psychology in the College of Life Sciences and Medicine at the University of Aberdeen (UK). She gained her degrees and training in Aberdeen, Hull, and Oxford (UK). She is an ex-president and elected honorary fellow of the European Health Psychology Society, honorary fellow of the British Psychological Society, and fellow of the Academy of Medical Sciences. She taught behavioral sciences to medical students for 25 years in addition to undergraduate and postgraduate psychology courses. Her research interests focus on theory, methods (including measurement), and interventions to achieve health- and disability-related behavior change. She has published over 200 peer-reviewed journal articles as well as books and other publications.

Evangelos C. Karademas, PhD, is Associate Professor of Clinical Health Psychology at the Department of Psychology, University of Crete (Greece). He was trained and obtained his PhD in Health Psychology at the University of Athens (Greece). He teaches undergraduate and postgraduate health psychology courses at the universities of Crete and Athens. His research interests include adaptation to chronic illness, self-regulation, quality of life, and CBT interventions. He has authored more than 60 peer-reviewed journal articles as well as several book chapters.

Psychological Assessment – Science and Practice

Each volume in the series *Psychological Assessment – Science and Practice* presents the state-of-the-art of assessment in a particular domain of psychology, with regard to theory, research, and practical applications. Editors and contributors are leading authorities in their respective fields. Each volume discusses, in a reader-friendly manner, critical issues and developments in assessment, as well as well-known and novel assessment tools. The series is an ideal educational resource for researchers, teachers, and students of assessment, as well as practitioners.

Psychological Assessment – Science and Practice is edited with the support of the European Association of Psychological Assessment (EAPA).

Psychological Assessment – Science and Practice, Vol. 2

Assessment in Health Psychology

Edited by

Yael Benyamini, Marie Johnston, and Evangelos C. Karademas

hogrefe

Library of Congress Cataloging in Publication information for the print version of this book is available via the Library of Congress Marc Database under the LC Control Number 2015952378

Library and Archives Canada Cataloguing in Publication
Assessment in health psychology/edited by
Yael Benyamini, Marie Johnston, and Evangelos C. Karademas.

(Psychological assessment--science and practice ; vol. 2)
Includes bibliographical references and index.
Issued in print and electronic formats.
ISBN 978-0-88937-452-2 (paperback).--ISBN 978-1-61676-452-4 (pdf).--
ISBN 978-1-61334-452-1 (html)

1. Clinical health psychology. 2. Clinical health psychology--Methodology.
3. Clinical health psychology--Practice. 4. Health--Psychological aspects. I. Karademas, Evangelos, author, editor II. Benyamini, Yael, 1959-, author, editor III. Johnston, Marie, 1944-, author, editor IV. Series: Psychological assessment--science and practice vol. ; vol. 2

R726.7.A87 2015 616.001'9 C2015-906584-4
C2015-906585-2

http://www.hogrefe.com

PUBLISHING OFFICES
USA: Hogrefe Publishing Corporation, 38 Chauncy Street, Suite 1002, Boston, MA 02111
Phone (866) 823-4726, Fax (617) 354-6875; E-mail customerservice@hogrefe.com
EUROPE: Hogrefe Publishing GmbH, Merkelstr. 3, 37085 Göttingen, Germany
Phone +49 551 99950-0, Fax +49 551 99950-111; E-mail publishing@hogrefe.com

SALES & DISTRIBUTION
USA: Hogrefe Publishing, Customer Services Department,
30 Amberwood Parkway, Ashland, OH 44805
Phone (800) 228-3749, Fax (419) 281-6883; E-mail customerservice@hogrefe.com
UK: Hogrefe Publishing, c/o Marston Book Services Ltd., 160 Eastern Ave., Milton Park,
Abingdon, OX14 4SB, UK
Phone +44 1235 465577, Fax +44 1235 465556; E-mail direct.orders@marston.co.uk
EUROPE: Hogrefe Publishing, Merkelstr. 3, 37085 Göttingen, Germany
Phone +49 551 99950-0, Fax +49 551 99950-111; E-mail publishing@hogrefe.com

OTHER OFFICES
CANADA: Hogrefe Publishing, 660 Eglinton Ave. East, Suite 119-514, Toronto, Ontario, M4G 2K2
SWITZERLAND: Hogrefe Publishing, Länggass-Strasse 76, CH-3000 Bern 9

Format: PDF
ISBN 978-0-88937-452-2 (print) • ISBN 978-1-61676-452-4 (PDF) • ISBN 978-1-61334-452-1(EPUB)
http://doi.org/10.1027/00452-000

Table of Contents

Part I

Introduction

Chapter 1

Introduction

Evangelos C. Karademas[1], Yael Benyamini[2], and Marie Johnston[3]

[1]Department of Psychology, University of Crete, Greece
[2]Bob Shapell School of Social Work, Tel Aviv University, Israel
[3]Aberdeen Health Psychology Group, Institute of Applied Health Sciences, University of Aberdeen, UK

As early as the beginning of the 1980s, it was pointed out that effective measurement and assessment are a sine qua non for the advancement of health psychology and the development of rigorous and successful theories and applications (Karoly, 1985; Keefe & Blumenthal, 1982). Properly developed, reliable, and well-validated assessment instruments and sound measurement procedures are needed for (a) the assessment of health status and the consequences of illness on quality of life and functioning; (b) the examination of the type and the strength of the association between well-being and other variables, including stress, health behaviours, and personal and social characteristics; and the assessment of the ability of a theoretical model or a construct to explain and predict health- and illness-related reactions, as well as the evaluation of the effectiveness of an intervention programme. Although frequently ignored, assessment and advancement in assessment lie at the heart of the scientific knowledge developed in each discipline, including health psychology, and of its contribution to human welfare.

From the early simplified ways of assessing mortality rates (as a first health indicator) in pre-industrial societies to the sophisticated methods of assessing health-related behaviours, cognitions, emotions, and an array of health indices at the present time, assessment has come a long way (McDowell, 2006). However, the progress in the assessment of health-related phenomena depends on the definition: How we assess health, illness, and psychological factors related to health and illness is influenced by the ways we understand and represent *health*, while at the same time our understanding of health is influenced by the ways we assess it. This bi-directional effect between health psychology history and theory, on the one hand, and assessment, on the other, guides the evolution of basic and applied science in health psychology.

The Roots and Development of Health Psychology

It is noteworthy that the history of health psychology is often reflected in the history of assessment in the field, and vice versa. Therefore, in order to better understand this link, a brief description of the roots and the history of health psychology is required.

The roots of health psychology go very deep (Friedman & Adler, 2011). From the ancient world of the Greeks and the Romans, through the philosophy and practice of the medieval ages and the Renaissance, and to the modern era, a long line of philosophers, physicians, and other practitioners have raised questions and issues that still challenge health psychology. As

Friedman and Adler (2011) point out, the modern field of health psychology has emerged and was influenced by an array of intellectual trends in the understanding of health that appeared during the history of human science, but especially by those developed in the 19th and 20th centuries. The development in the areas of biology, medicine, and psychology during the last two centuries has also significantly contributed to the development of health psychology.

In fact, health psychology has evolved as a 20th-century discipline related to many other disciplines and its roots can be detected in several fields (Friedman & Adler, 2011; Johnston, Weinman, & Chater, 2011). First, the work of Sigmund Freud and his students in the fields of psychoanalysis and psychosomatic medicine (e.g., Alexander, 1950; Marty & M'Uzam, 1963; McDougall, 1974) brought forth the role of psychological factors in the causation and progress of somatic symptoms and linked certain psychological processes to bodily manifestations and illnesses. By the 1970s, behaviour modification and therapy had demonstrated that methods based on psychological theory could be clinically effective (O'Leary & Wilson, 1975; Yates, 1970). Second, medical sociology and medical anthropology, and social science in general, contributed to the understanding of the social, cultural, and sociodemographic aspects of health and illness and of the human reactions to these (e.g., Kleinman, 1988; Parsons, 1958). It was Viktor von Weizsäcker, the founder of medical anthropology, for example, who underlined the significance of the patient–physician interaction and attempted to describe the relation between physiological and psychological phenomena (von Weizsäcker, 1949). Third, medical and clinical psychologists became involved in assessment and treatment based on psychological theory in hospitals and in primary care settings where the line between physical and mental health was more blurred. This enhanced their collaboration with other health professionals and advanced knowledge about medical science and medical care as well as its caveats, and also strengthened the interest of psychologists in physical health issues. Additionally, psychologists were increasingly involved in the teaching and training of medical students. They taught about behavioural factors in health and health care and were frequently involved in providing communication skills training aimed at increasing adherence to medical regimens and patient satisfaction. In the UK, publication of projects conducted with medical students created a body of health psychology research evidence (Johnston et al., 2011). Another area of psychology that was influential was social psychology:

> Social psychologists frequently used the health domain to test theoretical propositions, such as the relations between beliefs, attitudes and behaviour (e.g., Fishbein & Azjen, 1975), resulting in a body of evidence and theory development in factors that can predict health behaviour. (Johnston et al., 2011, p. 890)

The disciplines of epidemiology and public health reported research evidence that raised issues concerning long-term care and put great emphasis on the role of personal lifestyle as well as on that of the community in health promotion. Consider, for example, the impact of the Framingham Study in defining the role of psychological factors in chronic illness (e.g., Haynes, Levine, Scotch, Feinleib, & Kannel, 1978) or in the use of advanced statistics in health sciences (e.g., Wu & Ware, 1979). Johnston et al. (2011) also noted the importance of this evidence:

> Epidemiological evidence of the importance of behavioural factors in health: such as the link between reduced smoking behaviour and rates of lung cancer (Doll et al., 2004), as well as the early results from the Alameda County Study (Housman & Dorman, 2005), underlining the potential for behaviour change as a method of enhancing health. (p.890)

Overall, the issues raised by these scientific areas affected the rationale and the range of research and professional practice efforts undertaken by the founders of health psychology and their successors.

Finally, the emerging disciplines of psychophysiology and psychoneuroimmunology (PNI) were based on an understanding of how psychological and physiological factors interact, particularly in the cardiovascular (Steptoe, 2007) and immune (Ader & Cohen, 1975) systems. In the 1980s, the first diagnoses of HIV/AIDS added urgency and momentum to the development of behaviour change interventions to address prevention and, later, to enhance adherence to medications controlling viral load.

Besides the impact of other disciplines, several movements have contributed to the emergence of health psychology. Pickren and Degni (2011) highlighted the role of the American 19th- and early-20th-century emphasis on personal health and well-being as well as on the effects of mental factors and personal behaviour on maintaining and improving health. The same authors also underlined the contribution to the development of health psychology of the works of Hans Selye on general adaptation syndrome (e.g., Selye, 1956) and of George Engel on the biopsychosocial model (e.g., Engel & Schmale, 1972), the rapid growth of psychology and, especially, clinical psychology after World War II, and the acknowledgement in the 1960s that the primary causes of mortality and disability are chronic conditions, such as cardiovascular disease and cancer (for a detailed recounting of the history of the development of health psychology, we refer the reader to Pickren & Degni, 2011).

Furthermore, a crucial aspect of the intellectual roots of health psychology can be traced to the biopsychosocial model (Friedman & Adler, 2011). This model was based on the work of several researchers and theorists in the fields of stress, social perception, and autonomic and immune systems, including Meyer, Cannon, Selye, Janis, Lazarus, Miller, Ader, and Cohen (Friedman & Adler, 2011; Rodin & Stone, 1987). The model was presented by George L. Engel in his 1977 article in *Science* and detailed in his 1980 article in the *American Journal of Psychiatry* (Engel, 1980). In general, the model posits that, in contrast to the traditional biomedical model and away from a mechanistic understanding of health and illness, not only biological, but also psychological (i.e., cognition, emotion, and behaviour), social, and cultural factors play a crucial role in the onset and the progression of a disease and in patients' adaptation to illness. Although not without criticism (e.g., McLaren, 2009), the biopsychosocial model has become a very popular concept and a paradigm for health psychology in terms of both theory and practice.

The factors that guided the development of health psychology and the intellectual roots of the field, which were very briefly described here, as well as the adoption of the biopsychosocial model are reflected in the definition of the discipline. Not only the original definition by Matarazzo (1980), but also the modern definitions of health psychology (e.g., Belar & Deardorff, 2009; Friedman & Adler, 2011) or Johnston's (1994) simpler definition of health psychology as "the study of psychological and behavioural processes in health, illness and health care" (p. 114) emphasize the extensiveness of the psychosocial processes that are related to health and illness and the significance of understanding these processes in order to promote health and facilitate adaptation to illness.

In the same line, health psychologists' research scope and practice have grown to such an extent that they currently refer to a large number of health-related phenomena including stress and coping, health behaviour, health promotion, adaptation to illness, communication and decision making within the health-care system, illness management and relevant interventions, psychological factors affecting health and illness, social and cultural determinants of health, quality of life, patients' and professionals' mental health and well-being, psychoneuroimmunology, and several others. All these are reflected in the assessment domains and processes employed in health psychology, as we will describe in the following sections.

The Context and Purpose of Assessment in Health Psychology

Assessment in health psychology is often a complicated task and depends on the purpose of the assessment. It demands an extensive knowledge of theory and of the existing assessment methods and tools as well as their psychometric properties. It also requires flexibility in the application of this knowledge, especially when new questions and theoretical models are examined. In any case, a sound assessment of the concepts employed in any study is a prerequisite for valid results and conclusions.

Assessments may be conducted in order to:

1. Reach a clinical decision, for example, about initiation or change of an intervention programme, about eligibility for a programme, about referral to a different agency;
2. Describe a population, for example, the patients of a clinic, the participants in a study;
3. Predict outcomes, for example, health behaviours predicting later health, affectivity predicting coping with stressful medical procedures; and
4. Test theory, for example, whether scientific evidence supports or contradicts the theory, whether a theory explains the behaviour of a single individual or organization.

In each case, good assessment is fundamental. Assessments may be descriptive and qualitative (see Chapter 22 in this volume) or may require quantitative measurement.

At the core of the measurement process lies Stevens' definition of measurement as "the assignment of numbers to aspects of objects or events according to one or another rule of convention" (Stevens, 1968, p. 850), provided, however, that these numbers (e.g., a scale) represent a meaningful and clear attribute/construct (Judd & McClelland, 1998). In this case, there is evidence that respondents can make remarkably consistent and accurate numerical estimates of phenomena, even when they are subjective and the comparisons between the numbers of the scale are more or less abstract (McDowell, 2006).

With respect to health psychology, we require assessment and measurement of a wide range of constructs. The biopsychosocial model of health entails biological, psychological, and sociocultural processes that should all be integrated in research and practice. Thus, assessment in health psychology includes a variety of domains, such as physical–biological factors, cognitive and emotional phenomena, behaviours, social variables, the health-care system, social networks, and the social–cultural context. The assessment of these domains demands the use of several methods and sources of information, including health-care records and other archival data, clinical and pathophysiological indices, physiological measures, interviews, observation (e.g., of behaviour), automatic electronic recordings, diaries, standardized tests, and, of course, self-report questionnaires.

According to Smith (2003), this wide range of assessment domains in health psychology can be organized into three overlapping areas: (a) health behaviour and prevention, which includes the relationship between a diversity of health-related behaviours (from smoking and physical activity to the use of seat belts and vaccination) and health outcomes, as well as the theoretical models and the corresponding intervention programmes developed to facilitate health behaviour modification; (b) stress and health (or psychosomatics), which incorporates the effort to define which bio-psychological factors are involved in medical illness (e.g., stress, emotions, personality, social factors) and in what ways, as well as the interventions to minimize the impact of relevant detrimental influences; (c) psychosocial aspects of medical

illness and care, which refers to adaptation to illness, to the impact of illness on functioning, well-being, and quality of life and the factors involved in this process, to the characteristics and the factors related to the health-care system, as well as to the interventions aimed at facilitating patients' adaptation to illness and improving their well-being. Likewise, Johnston, French, Bonetti, and Johnston (2005) noted that assessment in health psychology refers to three main clusters of questions concerning: (a) the psychological and behavioural indices of the status or amount of health, illness and health care; (b) the psychological and behavioural consequences of health, illness and health care; (c) the psychological or behavioural factors that may act as predictors or explanations of health, illness and health care. To this complexity, one should add the different levels of analysis (e.g., individual, couple/family, group, social, psychological, biological) that are often incorporated in the same assessment efforts.

Health psychologists have to manoeuvre through this farrago of assessment domains and methods, which very often is quite a challenging task. Yet, the roots and the history of health psychology may also prove to be a great advantage towards a more effective assessment process. In other words, the knowledge and the experience transferred to health psychology by its interdisciplinary origins may provide the pledge and also the context for successfully overcoming assessment difficulties. As Smith (2011) notes, health psychology has drawn from concepts and methods in other fields of psychology (e.g., reliability, validity), as well as other scientific areas, including biomedical sciences (e.g., heart rate, immune function), medicine (e.g., disease indices), public health (e.g., sensitivity, specificity), and social sciences (e.g., social deprivation indices). Thus, health psychology can also benefit from the accumulated knowledge and experience gained in these areas regarding assessment processes. In addition, the collaboration of health psychologists with experts coming from other psychology fields or other sciences in a diversity of contexts (from hospitals to schools and research centres) facilitates the improvement and refinement of the assessment processes being used in health psychology. Several examples of this are provided throughout this volume.

Key Issues in Assessment

Assessment is subject to a number of potential challenges that may affect the conduct of the assessment and may influence results. The choice of assessment method, including its length and burden, intelligibility, sensitivity, and relevance to the population assessed may affect the motivation of participants. The quality and relevance of data obtained may be affected by the mode of assessment: by interview, face-to-face or by telephone, direct observations, self-report (e.g., in questionnaires or diaries), electronically (e.g., online or by smart phone), or automatically (e.g., ambulatory heart rate or physical activity monitoring).

The context of assessment (e.g., whether for clinical or research purposes, whether the participants have consented and/or are volunteers, whether assessed individually or in groups) may additionally impact on ethical issues as well as completion of the assessment. Respondents' fatigue, motivation, negative emotions, personal biases, and interests may further affect the quality of the assessment.

Another issue of importance refers to the applicability of a measure to the population under study. For instance, measures that apply to patients with chronic pain may not be suitable for acute pain, while measures addressed to patients may not be appropriate for their partners – an

issue particularly relevant to studies with dyadic data. One should also consider whether the possible norms or cut-off points of a measure apply to every population or not, whether a full or a short version of a measure fits better the respondents' needs or the situation, etc. Age, sex, and culture are also important matters to be considered in this regard.

Key Issues in Quantitative Assessment

Besides these issues, assessment tools per se are often subject to flaws that do not permit an accurate estimation of the construct being assessed. As McDowell (2006,) puts it, "someone learning archery must first learn how to hit the center of the target, and then to do it consistently" (p. 30). This is also true with any assessment tool in use: It needs to be accurate, valid, and reliable. However, as a full discussion of these issues is beyond the scope of this chapter, only a short presentation of the necessary properties of an assessment tool is made here. For a more detailed presentation and discussion of these issues, we refer the reader to Anastasi (1968), Nunnally (1978), Meier (1994), Smith (2011), as well as to the American Psychological Association relevant edition (APA, 1985).

Three properties are all necessary for the instruments, which are used to assess a specific construct or quality in an accurate way: reliability, validity, and sensitivity. Reliability refers to the overall consistency of a measure; that is, its ability to produce similar results across time, individuals, or observers. Validity is commonly defined as the extent to which a measure actually assesses the construct or quality that it is intended to assess. Finally, sensitivity refers to the ability of a measure to discriminate degrees of difference between individuals, populations, or situations.

Reliability

Typically, four methods are used to evaluate the reliability (or consistency) of an assessment tool:

1. Internal consistency, which indicates the degree to which each item of a measure is related to the other items of this measure. In other words, it indicates the extent to which all of the items reflect the same construct or concept. The most frequently used test to assess internal consistency is Cronbach's α coefficient (Cronbach, 1951). This coefficient reflects the average of the correlations between all possible split halves of a set of items. A high level of internal consistency, although a prerequisite, is not sufficient to indicate that a scale is unidimensional (i.e., it assesses a single construct or concept). For instance, the α coefficient can be influenced by the number of the items included in a scale: too many may increase the strength of the coefficient, whereas too few may decrease it. Furthermore, several researchers have seriously questioned the use of the α coefficient as an adequate or even accurate way to estimate reliability (e.g., Peters, 2014; Raykov, 1997). New methods that can provide more accurate reliability estimates have recently been developed. For instance, Sijtsma (2009) has proposed the use of the greatest lower bound, McDonald (1999) the use of the ω coefficient, Revelle and Zinbarg (2009) the use of the ω total, and Raykov (2004) the use of the ρ coefficient. In general, these coefficients are based on hierarchical factor models and not on the inter-item correlations, as is the case with Cronbach's α. Also, Cronbach's α depends on certain assumptions (e.g., that each variable contributes equally to the factor), whereas the afore-mentioned indices do not and, therefore,

may estimate reliability more accurately. Finally, where measures have been developed to have a hierarchical or cumulative structure and use scaling reflecting this structure, item response theory methods, such as Rasch or Mokken methods, are necessary to assess internal consistency.

2. Test–retest reliability indicates the degree to which a measure gives similar scores when repeated across time. Although a high test–retest reliability (expressed in correlation coefficients) is essential for a good assessment tool, it is not always relevant. There are certain constructs (e.g., mood, pain) that are expected to change over time. In these cases, high test–retest reliability may be a serious limitation.
3. Inter-rater reliability indicates the level of agreement between raters, judges, observers, or interviewers.
4. Alternative form reliability refers to the extent to which two forms of the same measure give the same result. It is relevant when two comparable versions of a measure, which are administered to the same (group of) individuals, are needed for theoretical or research reasons. It is seldom necessary to use this type of reliability in health psychology.

Reliability is a critical issue for the measures used in psychological research. Low reliability may lead to underestimations of the actual relations between two measures, may negatively affect statistical power and the observed effect sizes, and may produce wrong null results and affect multivariate and mediational analysis. Furthermore, while a measure may be reliable without being valid, reliability is a prerequisite for validity. For all these reasons, researchers should be sensitive to the reliability of the measures they intend to use.

Validity

Validity is the link between a measure and the construct that this measure is intended to assess. Therefore, a clear and well-developed definition and theory detailing this construct and its relationships to other constructs is critical for the evaluation of the overall validity of the relevant measure (West & Finch, 1997).

Content validity refers to the extent that the items/questions of a measure are relevant and representative of the themes described in the construct it is intended to assess, and is essential before construct validity can be achieved. Content validity has frequently been evaluated in terms of face validity, that is, the validity of a measure is inferred from the comments of experts or users who examine whether the items of a measure appear to measure the intended concept. Sometimes, more formal focus groups or in-depth interviews may be used to evaluate the content validity of a new instrument (McDowell, 2006). However, recently new methods of assessing content validity quantitatively have been proposed. The method of discriminant content validation (DCV) can be applied to measures before using them to assess participants. It gives a transparent, quantitative index of the extent to which a measure assesses the proposed construct and is distinguishable from other constructs in the theory or assessment protocol (Johnston et al., 2014).

Construct validity, which is an overarching type of validity, refers to whether a measure behaves in a way consistent with the theoretical schemes of the construct being assessed. A well-developed theory is expected to describe and define a specific construct in a precise way as well as to indicate the relations between this construct and others either coming from the same theoretical model or not. Thus, a high construct validity requires stronger relations between multiple measures of the same construct (i.e., convergent construct validity) and weaker

relations with measures of different constructs (i.e., discriminant construct validity).[1] Factor analysis, which identifies strongly inter-correlated groups of items within a larger scale or questionnaire, is often used to evaluate construct validity but may be misleading unless content validity has been established. A large body of evidence regarding the associations of a measure is often necessary in order to establish the construct validity of an assessment instrument.

Construct validity also entails criterion validity, the extent to which a new measure is related to the present (concurrent) or future (predictive criterion validity) score of an already existing measure, which is used as a criterion of validity (e.g., a gold standard measure of the same construct). Alternatively, criterion validity may be assessed as the extent to which the measure differentiates between groups of persons known to vary on the variable(s) being assessed (also known as the *known groups* validity).

Sensitivity and Other Issues

Sensitivity refers to the extent to which an assessment tool can measure/detect (even small) changes over time. This is especially important for longitudinal studies as well as for the evaluation of the effectiveness of an intervention programme. Sensitivity also refers to the extent to which an assessment tool can differentiate between individuals or populations. Therefore, although validity and reliability are crucial, they are not sufficient when a sensitive measure is needed.

Several of the issues raised above may be addressed with the use of classical test theory (CTT; e.g., factor analysis) or procedures related to item response theory (IRT). Both approaches apply to multi-item or multi-indicator measures but make different assumptions about how the items within the measure are related. In CCT, it is assumed that each item works in the same way as other items; whereas in IRT, items may give information at different levels of difficulty of the construct investigated and with different degrees of sensitivity. It is beyond our scope to present these procedures in detail. However, we will try to briefly present them.

Factor analysis is probably the most frequently used method to evaluate the structure of a measure. There are two types of factor analysis: (a) exploratory, which seeks to identify the underlying structure of a set of items/variables, and (b) confirmatory, which is used to examine whether the structure of a measure corresponds to a hypothesized model (by the researcher or the theory) or one known from previous research. Exploratory factor analysis (EFA) is typically used with new or understudied measures, or when the researcher has no clear hypothesis regarding the factors measured by a specific instrument. Confirmatory factor analysis (CFA) can be used when a specific prediction of the structure of a measure is available. Sometimes, a confirmatory factor analysis follows an initial exploratory one.

IRT and the associated Rasch and Mokken models have been less used in health psychology as a method for designing, analysing, and scoring measures. IRT is based on the principle that each item included in a measure may be sensitive at different levels of the construct, that is, they may be more or less extreme, or more or less difficult. Therefore, IRT treats the difficulty of each item as information important for the scaling purpose and process (Bond & Fox, 2001; Schmidt & Embretson, 2003). Because IRT takes into account both the characteristics of the

1 It should be stressed that not all researchers agree that theory is important for the development or the evaluation of a measure. These researchers follow the well-known and influential tradition of operationalism. For an excellent discussion of the issues concerning the operationalism and the post-operationalism approaches and the role of the advances in the philosophy of science in this debate, we refer the reader to Strauss and Smith (2009).

scale (items) and the respondent, it is already regarded as a superior method for addressing complex aspects of content validity, for reducing the number of items included in a measure, and for increasing the overall quality of a measure. An example of the application of both CTT and IRT can be found in Pollard, Dixon, Dieppe, and Johnston (2009).

Two further methods are used in measurement evaluation, namely, *clinimetrics* and signal detection theory (SDT). SDT is generally used to quantify the ability to differentiate between information-bearing stimuli and random patterns that distract from the information. In psychology, SDT can be used to measure decision making under conditions of uncertainty and, thus, it is useful for evaluating the criterion validity and the sensitivity of a measure (McFall, 2005; Smith, 2011).

Clinimetrics was initially proposed as a "subset of clinical epidemiology" (Feinstein, 1987) and the items included in a measure were those found to be predictive of a critical outcome. Examples include the Apgar score used to assess infants, and cardiac risk scores, which combine information about behavioural risk factors such as smoking with clinical measures such as cholesterol levels. They represent a different way of evaluating the quality of a measure (e.g., does not regard internal consistency as a necessary property of a measure).

There is much concern whether clinimetrics, as opposed to psychometrics, is a truly useful or even a unique/distinct contribution to the assessment process (see, e.g., Streiner, 2003). Still, several researchers believe that clinimetrics is a useful approach to *metrics*, as it may facilitate doctors' involvement in assessment issues and also emphasize what is really important in clinical practice and research (e.g., de Vet, Terwee, & Bouter, 2003).

Is There a Need for a New Book on Assessment in Health Psychology?

There are a number of reasons that render the collection and coding of existing knowledge and experience regarding assessment in health psychology a crucial task. These reasons include: (a) the expanding field of health psychology and the need to cover an extended area of topics ranging from health status to health behaviours and beliefs, (b) the increasing number of studies and intervention programmes developed within the context of health psychology, (c) the collaboration between health psychologists and experts from other psychology fields and other sciences and the need to bring good health psychological measures to these research and clinical contexts, (d) the geometrical growth in the assessment tools being published, (e) the need, above all, for sound assessment processes that will permit health psychology to achieve and further promote its goals in terms of theory building, research and clinical practice.

So far, the topic of assessment in health psychology has been addressed in a number of chapters included in health psychology or behavioural medicine publications. Also, certain editions (e.g., Bowling, 2001, 2004; McDowell, 2006) include descriptions of a significant number of specific measures concerning health and illness. Nonetheless, chapters can provide only a brief or limited illustration of the topic, while the existing publications lack a particular focus on health psychology, as they concentrate on specific topics and do not cover many crucial areas for the field (e.g., illness cognitions or health behaviours).

In addition, there are several websites that present assessment tools. However, some of them refer only to particular themes, such as quality of life or mental health (e.g., http://www.qolid.

org and http://www.wiley.com/legacy/products/subject/reference/salek_index.html that include a great number of measures but only regarding quality of life); some sites offer large numbers of measures concerning the broader field of psychology (e.g., http://www.psychtesting.org.uk and http://www.assessmentpsychology.com); others focus on a specific measure (e.g., http://www.uib.no/ipq/, which is dedicated to the Illness Perception Questionnaire and its various forms). The well-known and broadly used portfolio of *Measures in Health Psychology* edited by Johnston, Wright, and Weinman in 1995 provided a wide range of measures with separate booklets for each domain of measurement in health psychology. It used a format entirely different from a typical textbook as it included the measures in a format that could be used in research and practice. However, it needs updating. It does not address recent and crucial developments in assessment (e.g., issues related to the cultural adaptation of measures or new assessment methods). Further, with Internet access to measurement instruments and their updating, provision of the actual measures is no longer necessary or desirable.

For the reasons enumerated here, we believe that there is need for a new integrated publication that will fill the lack of a major edition, particularly focusing on assessment in health psychology and also presenting current knowledge and issues relevant to the breadth of this field. Therefore, we decided to publish *Assessment in Health Psychology*, which aspires to be a comprehensive resource for all those interested in assessment in health psychology.

Purpose and Intended Audience for This Book

Assessment in Health Psychology seeks to provide accurate and in-depth knowledge on issues related to assessment as well as on specific measures used in health psychology research and practice. This volume is intended to serve two important purposes. The first major purpose is to present and discuss the appropriate assessment methods and/or instruments for specific areas that are central for health psychologists (e.g., illness cognitions, quality of life, and pain). The second purpose is to describe the conceptual and methodological bases for assessment in health psychology, including important issues in health psychology assessment (e.g., translation and validation across languages/cultures), as well as recent progress in methods (e.g., ecological momentary assessment, self-report vs. other methods of assessing behaviour and health). A unique feature of this volume is its emphasis on the bidirectional link between theory and assessment.

Assessment in Health Psychology is intended for a broad audience. First, it is addressed to the very large number of master's and doctoral students in health psychology. In the US, more than 45 programmes offer training just in health psychology (related areas and fields are not included; http://www.health-psych.org/LandingEducation.cfm, accessed September 9, 2014), while there are about 40 accredited postgraduate (master's and doctoral) professional training programmes in the UK (http://www.bps.org.uk/bpslegacy/ac?frmAction=results & Course_IDs_Selected=&CourseType=PG&Search_Type=NC&OrderBy=NAME&OrderDir =ASC&INSTITUTION_NUMBER=&TRAINING_COMMITTEE=DHPTC, accessed September 9, 2014). Numerous other programmes across Europe and the world offer training in health psychology. All of these graduate students who are interested in (a) a thorough update of the progress made in assessing health and illness related issues and (b) in a discussion of emerging and/or controversial issues may find this edition very helpful for their research and intervention efforts.

We anticipate the book being useful also to researchers from other disciplines including clinical psychology, rehabilitation, as well as health promotion, health behaviour change, public

health, and health services research. In the interdisciplinary collaborations, the book should prove useful in enabling good communication between disciplines about measures used in the collaboration.

Furthermore, given that *Assessment in Health Psychology* is intended to provide state-of-the-art knowledge about assessment methods and instruments in several areas, as well as to put an emphasis on the bidirectional link between theory and assessment, it can also serve as a reference source for health policymakers and health-care practitioners. Finally, we believe that this edition will be very helpful for all those who teach health psychology in their work with their students.

Structure of the Book

For these goals to be achieved, *Assessment in Health Psychology* brings together top experts with noteworthy involvement in their field of expertise who will present the current trends in assessment and measurement. Their long experience and contribution in health psychology-related research and practice ensure an integrated and thorough presentation of all topics covered in the edition. We are grateful to them for accepting our invitation to contribute.

Assessment in Health Psychology consists of 24 chapters organized in four main sections. This introduction is the first section. Sixteen chapters constitute the second part of the volume, which refers to assessment issues and measures used in domains relevant to health psychology. A broad range of domains are covered, including, for example, quality of life, health behaviours, beliefs about health and illness, neuropsychological assessment, coping, pain, and social support.

The third part of the book comprised five chapters. These refer to critical and/or novel aspects of assessment in health psychology. Specifically, the topics of ecological momentary assessment, reporting behaviour change interventions and techniques, issues related to the cultural adaptation of measures, qualitative assessment, and assessment in children are presented and discussed in this part. The final part consists of two chapters. The first of these considers how assessment might be used in explanation and intervention. The final chapter addresses issues and concerns often raised throughout this volume and proposes basic considerations for developing measures in health psychology.

Each chapter is structured in the following manner: In a short introduction, the theoretical/conceptual background of the topic under discussion is briefly presented. Its relevance to health psychology research and practice is also noted. Next, a presentation is made of what is measured and why, as well as of the possible difficulties and challenges of assessment in this particular area. The description of the main instruments in the domain follows with notes regarding their psychometric properties. Instructions about how to obtain open-access measures are also given here. Finally, an illustration of the use of the measures under discussion in research and/or practice, as well as authors' comments about these instruments, concludes each chapter.

This volume is not intended to prescribe which assessment tool or method is suitable for each specific case or cause. This lies with the reader, either a researcher or a practitioner, who is aware of the details and the needs of the particular study or application. It is our hope, nevertheless, that *Assessment in Health Psychology* will provide a thorough record of available assessment tools and methods used in health psychology, facilitate relevant quests, and, thus, make easier the work of all those who are interested in the matter. We hope you will enjoy reading and using *Assessment in Health Psychology*.

References

Ader, R., & Cohen, N. (1975). Behaviorally conditioned immunosuppression. *Psychosomatic Medicine, 37*, 333–340. http://doi.org/10.1097/00006842-197507000-00007

Alexander, F. (1950). *Psychosomatic medicine: Its principles and applications*. New York, NY: Norton.

American Psychological Association. (1985). *Standards for educational and psychological testing*. Washington, DC: Author.

Anastasi, A. (1968). *Psychological testing*. New York, NY: Macmillan.

Belar, C. D., & Deardorff, W. W. (2009). *Clinical health psychology in medical settings: A practitioner's guidebook* (2nd ed.). Washington, DC: American Psychological Association. http://doi.org/10.1037/11852-000

Bond, T. G., & Fox, C. M. (2001). *Applying the Rasch model: Fundamental measurement in the human sciences*. Mahwah, NJ: Erlbaum.

Bowling, A. (2001). *Measuring disease: A review of disease specific quality of life measurement scales* (2nd ed.). London, UK: Open University Press.

Bowling, A. (2004). *Measuring health: A review of quality of life measurement scales* (3rd ed.). London, UK: Open University Press.

Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika, 16*, 297–334. http://doi.org/10.1007/BF02310555

de Vet, H. C. W., Terwee, C. B., & Bouter, L. M. (2003). Variance and dissent. A reply to: Clinimetrics and psychometrics: Two sides of the same coin. *Journal of Clinical Epidemiology, 56*, 1146–1147. http://doi.org/10.1016/j.jclinepi.2003.08.010

Engel, G. L. (1977). The need for a new medical model: A challenge for biomedicine. *Science, 196*, 129–136. http://doi.org/10.1126/science.847460

Engel, G. L. (1980). The clinical application of the biopsychosocial model. *American Journal of Psychiatry, 137*, 535–544. http://doi.org/10.1176/ajp.137.5.535

Engel, G. L., & Schmale, A. H. (1972). Conservation-withdrawal: A primary regulatory process for organismic homeostasis. In R. Porter & J. Knight (Eds.), *Physiology, emotion & psychosomatic illness. Ciba Foundation Symposium 8* (pp. 57–85). Amsterdam, The Netherlands: Elsevier-Excerpta Medica.

Feinstein, A. R. (1987). *Clinimetrics*. New Haven, CT: Yale University Press.

Friedman, H. S., & Adler, N. E. (2011). The intellectual roots of health psychology. In H. F. Friedman (Ed.), *The Oxford handbook of health psychology* (pp. 3–14). Oxford, UK: Oxford University Press.

Haynes, S. G., Levine, S., Scotch, N., Feinleib, M., & Kannel, W. B. (1978). The relationship of psychosocial factors to coronary heart disease in The Framingham Study. I. Methods and risk factors. *American Journal of Epidemiology, 107*, 362–383.

Johnston, M. (1994). Current trends in health psychology. *The Psychologist, 7*, 114–118.

Johnston, M., Dixon, D., Hart, J., Glidewell, L., Schröder, C., & Pollard, B. (2014). Discriminant content validity (DCV): A quantitative methodology for assessing content of theory-based measures, with illustrative applications. *British Journal of Health Psychology, 19*, 240–257. http://doi.org/10.1111/bjhp.12095

Johnston, M., French, D. P., Bonetti, D., & Johnston, D. (2005). Assessment and measurement in health psychology. In S. Sutton, A. Baum, & M. Johnston (Eds.), *The SAGE handbook of health psychology* (pp. 360–401). London, UK: Sage.

Johnston, M., Weinman, J., & Chater, A. (2011, December). 25 Years of health psychology in the BPS. *The Psychologist, 24*, Part 12, 890–892.

Johnston, M., Wright, S., & Weinman, J. (1995). *Measures in health psychology: A user's portfolio*. Windsor, UK: NFER-Nelson.

Judd, C. M., & McClelland, G. H. (1998). Measurement. In D. T. Gilbert, S. T. Fiske, & G. Lindzey (Eds.), *Handbook of social psychology* (*Vol. 2*, pp. 180–232). Boston, MA: McGraw-Hill.

Karoly, P. (Ed.). (1985). *Measurement strategies in health psychology*. New York, NY: Wiley.

Keefe, F. J., & Blumenthal, J. A. (Eds.). (1982). *Assessment strategies in behavioral medicine*. New York, NY: Grune and Stratton.

Kleinman, A. (1988). *The illness narratives: Suffering, healing and the human condition*. New York, NY: Basic Books.

Marty, P., & M'Uzam, M. (1963). La pensée opératoire [Operational thought]. *Revue Française de Psychoanalise, 27*, 345–356.

Matarazzo, J. D. (1980). Behavioral health and behavioral medicine: Frontiers for a new health psychology. *American Psychologist, 35*, 807–817. http://doi.org/10.1037/0003-066X.35.9.807

McDonald, R. P. (1999). *Test theory: A unified treatment*. Mahwah, NJ: Erlbaum.

McDougall, J. (1974). The psychosoma and the psychoanalytic process. *International Review of Psycho-Analysis, 1*, 437–459.

McDowell, I. (2006). *Measuring health: A guide to rating scales and questionnaires* (3rd ed.). Oxford, UK: Oxford University Press. http://doi.org/10.1093/acprof:oso/9780195165678.001.0001

McFall, R. M. (2005). Theory and utility – key themes in evidence based assessment: Comment on the special section. *Psychological Assessment, 17*, 312–323. http://doi.org/10.1037/1040-3590.17.3.312

McLaren, N. (2009). *Humanizing psychiatry*. Ann Arbor, MI: Loving Healing Press.

Meier, S.T. (1994). *The chronic crisis in psychological measurement and assessment: A historical survey*. San Diego, CA: Academic Press.

Nunnally, J. O. (1978). *Psychometric theory*. New York, NY: McGraw-Hill.

O'Leary, K. D., & Wilson, G. T. (1975). *Behavior therapy: Application and outcome*. Englewood Cliffs, NJ: Prentice-Hall.

Parsons, T. (1958). Definitions of health and illness in the light of American values and social structure. In E. G. Jaco (Ed.), *Physicians, patients, and illness: Sourcebook in behavioral science and medicine* (pp. 165–187). Glencoe, IL: Free Press.

Peters, G.-J. Y. (2014). The alpha and the omega of scale reliability and validity. *The European Health Psychologist, 16*, 56–69.

Pickren, W. E., & Degni, S. (2011). A history of the development of health psychology. In H. F. Friedman (Ed.), *The Oxford handbook of health psychology* (pp. 15–41). Oxford, UK: Oxford University Press.

Pollard, B., Dixon, D., Dieppe, P., & Johnston, M. (2009). Measuring the ICF components of impairment, activity limitation and participation restriction: An item analysis using classical test theory and item response theory. *Health and Quality of Life Outcomes*, *7*, 41.

Raykov, T. (1997). Scale reliability, Cronbach's coefficient alpha, and violations of essential tau-equivalence with fixed congeneric components. *Multivariate Behavioral Research, 32*, 329–353. http://doi.org/10.1207/s15327906mbr3204_2

Raykov, T. (2004). Point and interval estimation of reliability for multiple-component measuring instruments via linear constraint covariance structure modeling. *Structural Equation Modeling, 11*, 342–356. http://doi.org/10.1207/s15328007sem1103_3

Revelle, W., & Zinbarg, R. E. (2009). Coefficients alpha, beta, omega, and the glb: Comments on Sijtsma. *Psychometrica, 74*, 145–154. http://doi.org/10.1007/s11336-008-9102-z

Rodin, J., & Stone, G. (1987). Historical highlights in the emergence of the field. In G. C. Stone, S. Weiss, J. D. Matarazzo, N. E. Miller, J. Rodin, C. D. Belar, … J. F. Singer (Eds.), *Health psychology: A discipline and a profession* (pp. 15–26). Chicago, IL: University of Chicago Press.

Schmidt, K. M., & Embretson, S. E. (2003). Item response theory and measuring abilities. In J. A. Schinka & W. Velicer (Eds.), *Comprehensive handbook of psychology, Vol. 2: Research methods* (pp. 429–446). Hoboken, NJ: Wiley.

Selye, H. (1956). *The stress of life*. New York, NY: McGraw-Hill.

Sijtsma, K. (2009). On the use, the misuse, and the very limited usefulness of Cronbach's alpha. *Psychometrika, 74*, 107–120. http://doi.org/10.1007/s11336-008-9101-0

Smith, T. W. (2003). Health psychology. In J. A. Schinka & W. Velicer (Eds.), *Comprehensive handbook of psychology, Vol. 2: Research methods* (pp. 241–270). Hoboken, NJ: Wiley.

Smith, T. W. (2011). Measurement in health psychology research. In H. F. Friedman (Ed.), *The Oxford handbook of health psychology* (pp. 42–72). Oxford, UK: Oxford University Press.

Steptoe, A. (2007). Psychophysiological contributions to behavioral medicine and psychosomatics. In J. T. Cacioppo, L. G. Tassinary, & G. Bernston (Eds.), *The handbook of psychophysiology* (3rd ed., pp. 723–751). New York, NY: Cambridge University Press.

Stevens, S. S. (1968). Measurement, statistics, and the schemapiric view. *Science, 161*, 849–856. http://doi.org/10.1126/science.161.3844.849

Strauss, M. E., & Smith, G. T. (2009). Construct validity: Advances in theory and methodology. *Annual Review of Clinical Psychology, 5*, 1–25.

Streiner, D. L. (2003). Clinimetrics vs. psychometrics: an unnecessary distinction. *Journal of Clinical Epidemiology, 56*, 1142–1145. http://doi.org/10.1016/j.jclinepi.2003.08.011

von Weizsäcker, V. (1949). Psychosomatische Medizin [Psychosomatic medicine]. *Psyche, 3*, 331–341.

West, S. G., & Finch, J .F. (1997). Personality measurement: Reliability and validity issues. In R. Hogan, J. Johnson, & S. Briggs (Eds.), *Handbook of personality psychology* (pp. 143–164). Dallas, TX: Academic Press.

Wu, M., & Ware, J. H. (1979). On the use of repeated measurements in regression analysis with dichotomous responses. *Biometrics, 35*, 513–521. http://doi.org/10.2307/2530355

Yates, A. J. (1970). *Behavior therapy*. New York, NY: Wiley.

Part II

Domains Assessed

Chapter 2

Social Cognitions in Health Behaviour

Mark Conner

School of Psychology, University of Leeds, UK

Introduction

The psychological determinants of health behaviours have been an important focus of health psychology for a number of years. The behaviour-specific thoughts and feelings that an individual has about a particular health behaviour have received particular attention (Conner & Norman, 1996, 2005, 2015). These are commonly referred to as social cognitions (or health cognitions). Part of the justification for a focus on social cognitions has been that they represent modifiable determinants of health behaviour that can be targeted in interventions to improve health outcomes. Rather than being examined as individual social cognitions, research has tended to focus on groups of social cognition variables as specified by models such as the theory of planned behaviour, the health belief model, protection motivation theory, and social cognitive theory (Conner & Norman, 2005). These models suggest that the thoughts and feelings I have now about a behaviour will predict whether I perform that behaviour in the future (partly because they inform my current decision or intention to perform that behaviour and partly because that decision plus those thoughts and feelings impact on the performance of the behaviour when the opportunity to act presents itself). This chapter first briefly describes the content of these theories. Second, it focuses on the assessment of key social cognitions as identified by these theories. This is done in relation to general principles guiding the appropriate development of measures rather than highlighting specific existing measures to use. This is because the social cognitions are nearly always developed as behaviour-specific measures that vary as a function of the behaviour being studied (and to some extent based on the population under study). Third, a short conclusion summarises the chapter and discusses future directions.

Key Social Cognition Models

The key social cognitions models include the health belief model (HBM; e.g., Abraham & Sheeran, 2005; Janz & Becker, 1984), protection motivation theory (PMT; e.g., Maddux & Rogers, 1983; Norman, Boer, & Seydel, 2005), theory of reasoned action/theory of planned behaviour (TRA/TPB; e.g., Ajzen, 1991; Conner & Sparks, 2005), and social cognitive theory (SCT; e.g., Bandura, 2000; Luszczynska & Schwarzer, 2005). These models will be briefly described here (see Chapter 3 in this volume for further details on SCT). There is significant

overlap between the models in terms of the key health cognitions they identify, which will become apparent as we consider measures of the key social cognitions.

Health Belief Model

The HBM posits that health behaviour is determined by two cognitions: perceptions of illness threat and evaluation of behaviours to counteract this threat. Threat perceptions are based on two beliefs: the perceived *susceptibility* of the individual to the illness ("How likely am I to get ill?"); and the perceived *severity* of the consequences of the illness for the individual ("How serious would the illness be?"). Similarly, evaluation of possible responses involves consideration of both the potential benefits of and barriers to action. Together these four beliefs are thought to determine the likelihood of the individual performing a health behaviour. The specific action taken is determined by the evaluation of the available alternatives, focusing on the benefits or efficacy of the health behaviour and the perceived costs or barriers of performing the behaviour. Individuals are assumed to be most likely to follow a particular health action if they believe themselves to be susceptible to a particular condition that they also consider to be serious, and believe that the benefits outweigh the costs of the action taken to counteract the health threat. Two further cognitions usually included in the model are cues to action and health motivation. Cues to action are assumed to include a diverse range of triggers to the individual taking action, which may be internal (e.g., physical symptom) or external (e.g., mass media campaign, advice from others) to the individual (Janz & Becker, 1984). Health motivation refers to more stable differences between individuals in the value they attach to their health and their propensity to be motivated to look after their health.

Protection Motivation Theory

In PMT the primary determinant of performing a health behaviour is protection motivation or intention to perform a health behaviour. Protection motivation is determined by two appraisal processes: threat appraisal and coping appraisal. Threat appraisal is based on a consideration of perceptions of susceptibility/vulnerability to the illness and severity of the health threat in a very similar way to the HBM. Coping appraisal involves the process of assessing the behavioural alternatives that might diminish the threat. This coping process is itself assumed to be based upon two components: the individual's expectancy that carrying out a behaviour can remove the threat (*action–outcome efficacy*), and a belief in one's capability to successfully execute the recommended courses of action (*self-efficacy*).

Theory of Planned Behaviour

The TPB specifies the factors that determine an individual's decision to perform a particular behaviour. Importantly this theory added perceived behavioural control to the earlier TRA (Ajzen & Fishbein, 1980). The TPB proposes that the key determinants of behaviour are *intention* to engage in that behaviour and perceived behavioural control over that behaviour. As in the PMT, intentions in the TPB represent a person's motivation or conscious plan or decision to exert effort to perform the behaviour. Perceived behavioural control (PBC) is a person's expectancy that performance of the behaviour is within his/her control (perceived control) and confidence that he/she can perform the behaviour (perceived confidence) and is similar to

Bandura's (1982) concept of self-efficacy. In the TPB, intention is assumed to be determined by three factors: attitudes, subjective norms, and PBC. Attitudes are the overall evaluations of the behaviour by the individual as positive or negative (and sometimes split into affective and instrumental attitudes). Subjective norms are a person's beliefs about whether significant others think he/she should engage in the behaviour (and sometimes split into injunctive norms and descriptive norms). PBC is assumed to influence both intentions and behaviour because we rarely intend to do things we know we cannot and because believing that we can succeed enhances effort and persistence and so makes successful performance more likely.

Attitudes are based on behavioural beliefs (or outcome expectancies), that is, beliefs about the perceived outcomes of a behaviour. In particular, they are a function of the likelihood of the outcome occurring as a result of performing the behaviour (e.g., "How likely is this outcome?") and the evaluation of that outcome (e.g., "How good or bad will this outcome be for me?"). It is assumed that an individual will have a limited number of consequences in mind when considering a behaviour. This outcome expectancy framework is based on Fishbein's (1967) earlier summative model of attitudes. Subjective norm is based on beliefs about salient others' approval or disapproval of whether one should engage in a behaviour (e.g., "Would my best friend want me to do this?") weighted by the *motivation to comply* with each salient other on this issue (e.g., "Do I want to do what my best friend wants me to do?"). Again it is assumed that an individual will only have a limited number of referents in mind when considering a behaviour. PBC is based on control beliefs concerning whether one has access to the necessary resources and opportunities to perform the behaviour successfully (e.g., "How often does this facilitator/inhibitor occur?"), weighted by the perceived power, or importance, of each factor to facilitate or inhibit the action (e.g., "How much does this facilitator/inhibitor make it easier or more difficult to perform this behaviour?"). These factors include both internal control factors (information, personal deficiencies, skills, abilities, emotions) and external control factors (opportunities, dependence on others, barriers). As for the other types of beliefs, it is assumed that an individual will only consider a limited number of control factors when considering a behaviour.

Social Cognitive Theory

In SCT, behaviour is held to be determined by three factors: goals, outcome expectancies, and self-efficacy. Goals are plans to act and can be conceived of as intentions to perform the behaviour (see Luszczynska & Schwarzer, 2005). Outcome expectancies are similar to behavioural beliefs in the TPB but here are split into physical, social, and self-evaluative depending on the nature of the outcomes considered. Self-efficacy is the belief that a behaviour is or is not within an individual's control and is usually assessed as the degree of confidence the individual has that he/she could still perform the behaviour in the face of various obstacles (and is similar to PBC in the TPB). Bandura (2000) recently added socio-structural factors to his theory. These are factors assumed to facilitate or inhibit the performance of a behaviour and affect behaviour via changing goals. Socio-structural factors refer to the impediments or opportunities associated with particular living conditions, health systems, and political, economic, or environmental systems. This component of the model incorporates perceptions of the environment as an important influence on health behaviours.

Key Social Cognitions

The overlap between the aforementioned models in the social cognitions they describe as being key should be apparent. For example, intention, self-efficacy (or PBC), and attitude or

outcome expectancies appear in several models. A number of authors would consider these to be the key social cognitions determining health behaviours (e.g., Norman & Conner, 2005). Several other social cognitions are also widely used and worthy of consideration. Norms, susceptibility and severity, and benefits and barriers fall into this category. Cues to action in the HBM and socio-structural factors in the SCT tend to be less widely used and the measures of these constructs have not been well specified. Similarly, health motivation is less widely used and unlike other social cognitions is not specified in relation to particular behaviours (see Abraham & Sheeran, 2005). In the subsequent sections we look at the assessment of these key social cognitions (i.e., intention, self-efficacy/PBC, attitude/outcome expectancies, norms, susceptibility and severity, benefits and barriers).

Principle of Compatibility

One consideration in developing social cognition measures that has been particularly applied in relation to the TPB is the principle of compatibility (Ajzen, 1988). This principle is that each social cognition and behaviour has the four elements (sometimes summarised by the mnemonic *TACT*) of target, action, context, and time, and states that correspondence between social cognitions and behaviour will be greatest when both are measured at the same degree of specificity with respect to each element (see Ajzen & Fishbein, 2005, for a recent discussion). Hence, any behaviour consists of (a) an action (or behaviour), (b) performed on or toward a target or object, (c) in a particular context, (d) at a specified time or occasion. For example, a person concerned about oral hygiene (a) brushes (b) her teeth (c) in the bathroom (d) every morning after breakfast. In the study of health behaviours it is usually the repeat performance of a single behaviour (e.g., teeth brushing) or general class of behaviours (e.g., healthy eating) across contexts and times that we wish to predict (Ajzen, 1988). Social cognitions and behaviour will be most strongly related when both are assessed at the same level of specificity with regard to these four elements.

Other General Principles

The following sections set out the measurement of key social cognitions. Common to the development of many of these measures are pilot work and procedures to avoid bias and maximise reliability and validity. Pilot work often involves researchers conducting semi-structured interviews with 20 or 30 potential participants to generate the content of each measure (e.g. the salient outcomes to measure in outcome expectancies). Such pilot work can also be used to test the understanding of items in order to avoid biased responses. For example, it is common practice to reverse the wording of approximately half the items measuring a construct to reduce bias among those simply marking one end of all items regardless of content. Piloting can also ensure adequate variability in responses, which is essential if the items are to measure variations in the construct across individuals. Various standard procedures for assessing reliability and validity should also be employed. For example, the face validity of items should be judged by experts in this area of measurement. Internal reliability of items (i.e., a weighted measure of the correlation among items after recoding negatively worded items) should be assessed using Cronbach's α and should normally be above 0.6.

Measuring Intentions

Intentions are key components of the PMT, TPB, and SCT. They capture the motivational factors that influence a behaviour, how hard people are willing to try, how much effort they would exert to perform the behaviour (Ajzen, 1991, p. 181), or the self-instructions individuals give themselves to act (Triandis, 1977). There has been some variation in how the intention construct has been assessed. Common measures include behavioural intentions (e.g., "I intend to perform behaviour x"), self-predictions (e.g., "How likely is it that you will perform behaviour x?"), and behavioural desires (e.g., "I want to perform behaviour x"). In their review of the TPB, Armitage and Conner (2001) noted that the majority of studies they reviewed employed mixed measures of intention (combining measures of intention, self-prediction and/or desire). Conner and Sparks (2005) recommend a number of standard wordings that incorporate the same level of specificity with respect to action, target, context, and time frame as used in the behaviour measure. For example:

I intend to exercise at x health club at least four times each week during the next 2 weeks.

Definitely do not 1 2 3 4 5 6 7 *Definitely do*

I will make an effort to exercise at x health club at least four times each week during the next 2 weeks.

Definitely false 1 2 3 4 5 6 7 *Definitely true*

I will try to exercise at x health club at least four times each week during the next 2 weeks.

Definitely will not 1 2 3 4 5 6 7 *Definitely will*

Other terms commonly used in place of *intend* or *try* include *plan, expect*, and *want*. Generally these measures show high levels of internal reliability (Cronbach's $\alpha > 0.80$).

Measuring Perceived Behavioural Control/Self-Efficacy

Ajzen and Madden (1986) defined perceived behavioural control (PBC) as "the person's belief as to how easy or difficult performance of the behavior is likely to be" (p. 457). However, the items used to tap PBC included both perceptions of difficulty and perceptions of control over the behaviour. Ajzen (2002a) argues that PBC can be considered as a second-order construct that consists of two components that can be labelled *perceived confidence and perceived controllability*. The perceived confidence component of PBC "deals with the ease or difficulty of performing a behavior, with people's confidence that they can perform it if they want to do so" (Ajzen, 2002b). Ajzen (2002a) has suggested that this component of PBC can be tapped by items tapping the perceived difficulty of the behaviour (e.g., "For me to quit smoking would be …" – *very difficult–very easy*) and the perceived confidence the individual has that he/she can perform the behaviour (e.g., "I am confident that I could quit smoking" – *definitely false–definitely true*). Ajzen (2002b) suggests that the perceived control component of PBC "involves people's beliefs that they have control over the behavior, that performance or nonperformance of the behavior is up to them". Ajzen suggests this component of PBC can be tapped by items tapping the perceived control over performance of the behaviour (e.g., "How much control do you believe you have over quitting smoking?" – *no control–complete control*; "It is mostly up to me whether I quit smoking" – *strongly disagree–strongly agree*). Reviews