

Assessment in Health Psychology

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(Eds.)

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Introduction

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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 preindustrial 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 ^[4]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.

[5] 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.

[6] **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^[7] 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^[8] 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,^[9] 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^[10] 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 [11] 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