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Journal of Behavior Therapy
and Experimental Psychiatry 34 (2003) 25–43

JOURNAL OF
behavior
therapy
and
experimental
psychiatry

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Screening for generalized anxiety disorder using the Penn State Worry Questionnaire: a receiver operating characteristic analysis

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Received 26 October 2001; received in revised form 11 December 2002; accepted 8 January 2003

Abstract

The present study examined the usefulness of the Penn State Worry Questionnaire (PSWQ) as a means of screening for generalized anxiety disorder (GAD). Using receiver operating characteristic analyses, the accuracy of the PSWQ in screening for GAD was examined in both clinical and analogue diagnosed GAD samples. Given high comorbidity between GAD and other emotional disorders, we also investigated the usefulness of the PSWQ in selecting non-cases of GAD that were also free of PTSD, social phobia, or depression versus non-cases of GAD that met criteria for one of these conditions. The overall usefulness of the PSWQ as a screening device is discussed.

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Keywords: Receiver operating characteristics; Penn State Worry Questionnaire; Screening; Worry; Diagnosis

1. Introduction

The Penn State Worry Questionnaire (PSWQ) is a commonly used and psychometrically sound measure of the symptoms of pathological worry (Molina

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& Borkovec, 1994). Individuals diagnosed with generalized anxiety disorder (GAD), a condition characterized by excessive and uncontrollable worry, score significantly higher on the PSWQ than do those who meet only some of the GAD criteria (Meyer, Miller, Metzger, & Borkovec, 1990) as well as clients meeting the criteria for other anxiety disorders (Brown, Antony, & Barlow, 1992). Despite the widespread use of this questionnaire, its applicability as a screening device for GAD has not been examined

The purpose of the present investigation was to evaluate the usefulness of the PSWQ for screening using receiver operating characteristic (ROC) analysis. ROC was developed in the context of signal detection theory to detect the presence or absence of a signal in engineering and psychophysics (Green & Swets, 1966). More recently, ROC has been used in clinical applications as a means of assessing the accuracy of predictions of violence (e.g., Rice & Harris, 1995) and conduct problems (Bennett et al., 1999), the evaluation of medical imaging techniques and neuropsychological tests, and the diagnostic accuracy of psychological measures (e.g., Child Behavior Checklist; Chen, Faraone, Biederman, & Tsuang, 1994). In ROC analysis, one obtains an ROC curve in which the sensitivity (i.e., the rate at which the screening device is accurately detecting the presence of a condition [number of true-positive cases divided by the total number of positive cases as determined by the standard of comparison]) is plotted against the specificity (i.e., the rate at which the instrument is indicating the absence of a condition when in actuality the condition does not exist [the number of true-negative cases divided by the total number of negative cases as determined by the standard of comparison]) of the measure. As Rice and Harris (1995) point out, the usefulness of ROC analysis lies partially in the fact that one need not assume normality of one's data.

In addition to providing information about sensitivity and specificity, ROC analysis can also yield information about the predictive power of a measure. Predictive power may be more clinically meaningful than sensitivity and specificity values (Kessel & Zimmerman, 1993) in its provision of information regarding the probability that an individual actually has a disorder or does not have a disorder, given that the measure has identified that individual as disordered or non-disordered, respectively. Thus, positive predictive power is the probability that an individual is disordered, given that the test has identified that individual as disordered (the number of true-positive cases divided by the total number of cases the test indicated as being positive), while negative predictive power is the probability that an individual is non-disordered, given that the test has identified him/her as such (the number of true-negative cases divided by the total number of cases the test indicated as being negative). Therefore, sensitivity/specificity values and predictive power values offer slightly different information regarding screening utility. Sensitivity/specificity values represent the percentage of "gold" standard-determined disordered/non-disordered persons correctly identified by the measure, while positive/negative predictive power values represent the accuracy (as determined by a "gold" standard) of classifications made by the measure.

When appropriate in the various investigations reported below, we determined *sensitivity* (the percentage of individuals with a diagnosis of GAD identified by the

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