

Holländare, Askerlund, Nieminen & Engström: Can the BDI-II and MADRS-S be transferred to online use without affecting their psychometric properties?

Can the BDI-II and MADRS-S be Transferred to Online Use Without Affecting their Psychometric Properties?

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Abstract

The Internet has brought new possibilities to psychological assessment. Although there are several advantages to online assessment, there are also challenges. The aim of this study is to test the psychometric equivalence of the traditional paper versions and Internet adapted versions of the BDI-II and the MADRS-S. The 71 participants were recruited at a university campus, and filled out the BDI-II and MADRS-S on both Internet and paper. They were randomized to complete either the Internet versions or the paper versions first, and then complete the other version on the next day. For both the BDI-II and the MADRS-S the Chronbach's alpha levels were similar in the two mediums of administration. No significant differences were found between the paper versions and the Internet versions and the scores from the two differing mediums correlated highly for both questionnaires. Therefore, it was concluded that the psychometric properties of the BDI-II and the MADRS-S remained unchanged after transformation to online use.

Keywords: *Questionnaires; Internet; Depression; Psychometrics*

Introduction

The Internet has provided us with new possibilities in handling information such as with the use of online psychological assessments of various forms. In the case of questionnaires, measuring for example psychiatric symptoms, the Internet is well suited (Buchanan, 2002). There are several advantages with assessment being done online (described more in detail by Naglieri et al., 2004), the most obvious one being the automated calculation of total scores, which saves time and can eliminate the risk of calculation error. Furthermore, by making it impossible to submit answers without answering all items in a

questionnaire, missing values can be avoided. When test takers do submit answers, the professional can see them instantly, which saves time compared to posting papers through the mail. It has also been reported that people prefer using a computer based test rather than a paper-and-pencil test (Wijndaele et al., 2007; Schulenberg & Yutrzenka, 2001).

However, online assessments also present challenges. Evidence of good psychometric properties in an offline version of the same questionnaire is not enough to assume that they will apply to the online version (Buchanan, 2003). The recommendation from the International Testing Commission (ITC) is that when a test is being adapted for online use, evidence of equivalence between the paper version and the Internet version should be presented. The most important aspects of this are, according to the ITC, that the two versions have comparable reliabilities, produce comparable means and standard deviations and correlate with each other on the expected level from the reliability estimates (Coyne, 2006). In a study by Schulenberg & Yutrzenka (2001), a computerized version of the Beck Depression Inventory – Second Edition (BDI-II) (Beck, Steer & Brown, 2005) was compared with the paper version of the questionnaire. They did not find a significant difference between the means created from the different mediums of administration, however a 2.28 points higher standard deviation in the answers from the computerized version was found. The Chronbach's alpha levels were similar. The equivalence between paper and Internet versions of the BDI-II and the Montgomery Åsberg Depression Rating Scale – Self rated version (MADRS-S) (Svanborg & Åsberg, 1994) has been studied previously. In a study by Carlbring et al. (2007), a sample recruited for a trial of Internet based self-help for panic disorder completed a number of questionnaires both on paper and on the

Internet. The internal consistency did not change when the BDI-II and the MADRS-S were used online with this sample. The mean score created by the MADRS-S was unchanged, but for the BDI-II, a significantly higher mean was detected from the Internet version compared to the paper version.

The aim of the present study was to test if the psychometric properties of Internet adapted versions of the BDI-II and the MADRS-S were the same as the properties of paper versions of the same questionnaires.

Method

Participants and Procedure

A convenience sample was recruited at a university campus. Two of the authors recruited the participants by asking passers-by near the campus main entrance if they wanted to participate in a research study. One hundred and twenty students and teachers agreed to participate in the study. Seventy one of those filled out both measurements and are included in the analyses. Twenty one reported being female, 45 male, and five did not fill out any gender information. All participants were randomly assigned to one of two groups. One group ($n=31$) filled out the questionnaires on the Internet first, and then filled them out again using paper and pencil the following day. For the other group ($n=40$) a reversed order was used. When a potential participant agreed to participate a sealed envelope was opened. The envelope contained information about the group they were assigned to (i.e., whether to fill out the questionnaires on the Internet or on paper first), paper questionnaires, a return envelope, and a paper with instructions on how to access the questionnaires on the Internet using a password and username. The participants were able to backtrack and change their answers before submitting them. All participants were instructed to fill out the questionnaires the first time immediately, and then wait until they had a nights sleep before filling them out again using the other media. All participants were informed on where to find publicly accessible computers with Internet access on campus, although they could choose to use any computer. The study was approved by the regional ethical vetting board in Uppsala.

Materials

The Beck Depression Inventory – Second Edition (BDI-II) is a 21 item questionnaire measuring depressive symptoms and is a revised version of the original BDI first published in 1961 (Beck et al., 1961). The questionnaire has shown good psychometric properties in several studies and takes 5 – 10 minutes to complete. The Montgomery Åsberg Depression Rating Scale – Self-rated version is a 9-item questionnaire measuring depressive symptoms. It is the self-rated version of the original MADRS that was designed to be sensitive to change and first published in 1979 (Montgomery & Åsberg, 1979). Swedish translations of both questionnaires were used. For the Internet based questionnaires a web site originally constructed for an intervention study was used. An agreement was made with Harcourt Assessment for the use of the BDI-II online. Numbered envelopes were used for concealment of the randomization sequence.

Statistical Analyses

To test differences between media of administration (Internet and paper) and order of administration 2×2 ANOVAs were used. Pearson's (r) correlation was calculated between the two mediums of administration. As a measure of internal consistency, Chronbach's alpha (α) levels were calculated for the two mediums of administration.

Results

BDI-II

Chronbach's alpha was $\alpha=0.95$ in the scores from the Internet administration and $\alpha=0.94$ in the scores from the paper administration. The correlation between the scores obtained from the Internet administration and the paper administration was high ($r=0.94$) and significant ($p<0.01$). No significant main effect for medium of administration, or order could be found for BDI-II. No significant interaction could be found between media of administration and order.

Table 1: Mean (SD), main effects and interaction for MADRS-S, BDI-II and BDI-II item 9, when administered on the Internet and on paper.

	Group	Internet <i>M</i> (SD)	Paper <i>M</i> (SD)	Main effect		Interaction <i>F</i>
				Media <i>F</i>	Order <i>F</i>	
MADRS-S	Internet first	8.71 (6.95)	6.42 (6.08)	0.09 ($p>0.05$)	2.288 ($p>0.05$)	0.143 ($p>0.05$)
	Paper first	6.32 (7.74)	7.85 (8.44)			
BDI-II	Internet first	9.39 (7.75)	8.52 (7.43)	0.01 ($p>0.05$)	0.365 ($p>0.05$)	0.522 ($p>0.05$)
	Paper first	7.25 (11.1)	8.33 (10.4)			
BDI-II item 9	Internet first	0.10 (0.30)	0.10 (0.30)	0.02 ($p>0.05$)	0.03 ($p>0.05$)	0.297 ($p>0.05$)
	Paper first	0.15 (0.53)	0.13 (0.52)			

Item 9 on the BDI-II is of special clinical interest since it is used to assess suicidal ideation. No significant main effect for medium of administration, or order could be found for item 9 on the BDI-II. No significant interaction could be found between medium of administration and order for item 9 on the BDI-II.

MADRS-S

The internal consistency (Chronbach's α) of the MADRS-S was similar across mediums of administration with $\alpha=0.90$ for the Internet administration and $\alpha=0.91$ for the paper administration. The correlation between the scores obtained from the Internet administration and the paper administration of MADRS-S was high ($r=0.92$) and significant ($p<0.01$). No significant main effect for medium of administration, or order could be found for MADRS-S. No significant interaction could be found between medium of administration and order.

Discussion

The results indicate that the BDI-II and the MADRS-S can be transferred to online use without affecting the psychometric properties. This is of importance because of the frequent use of the Internet in measuring depression, for example in combination with online self-help programmes. The ratings of suicidal ideation on BDI-II was similar on paper and on the Internet, and although the suicidal ideation was very low, this gives some indication that the media of administration does not affect answers to this important question. The results in this study replicate, in part, the findings in the article by Carlbring et al. (2007), but contrary to their results, no significant main effect were found in this study for media of administration on the BDI-II. The similar alpha levels in the current study also replicate the findings in the study on the computerized version of BDI-II by Schulenberg et al. (2001), but contrary to their results, the standard deviations was similar across medias of administrations in the current study.

There are several limitations to this study, the most important one being the low level of depressive symptoms in the sample. The media of administration may influence the psychometric properties to a higher extent in a sample of clinically depressed persons. Other limitations to this study are the moderate sample size and the recruitment method. The sample, being recruited at a university campus, may be relatively used to computers. To generalize the results to a wider population is therefore problematic.

Conclusion

No significant differences could be found between the online versions of the BDI-II and MADRS-S and the paper versions. The alpha levels and the standard deviations from the different versions were similar. The correlation between the scores from the administrations from different mediums was high. This indicates that the psychometric properties of

the two tests did not change when the questionnaires were presented on the Internet instead of on paper.

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Research profile

Fredrik Holländare is a psychologist and a PhD student and the main focus of his research is Internet based guided self-help for depression, and Internet based measurement of depressive symptoms. He also does clinical work, with a special interest for behavioural activation for depression.

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