



Review article

Meta-analysis of the changes in correlations between depression instruments used in longitudinal studies



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ABSTRACT

Background: Correlations between instruments measuring the same construct reflect their concurrent validity. Little is known about changes in correlations between such instruments employed in studies with repeated assessment. The aim of this meta-analysis was to examine the changes in correlations between depression instruments in the course of longitudinal studies.

Methods: A literature search was conducted using MEDLINE and PsycINFO for the period from 1960 to 2013. The total number of collected articles was 3723, of which 61 were included. Three meta-analyses were performed for the changes in correlations between each pair of the three depression scales: Hamilton Rating Scale for Depression (HAM-D), Montgomery–Asberg Depression Rating Scale (MADRS) and Beck Depression Inventory (BDI). The effect size in these meta-analyses was obtained by the z-transformation of correlation coefficients.

Results: Correlations between depression scales increased over time in 52 studies. Significant changes in correlation coefficients were found for correlations between HAM-D and BDI ($p < 0.001$) and for correlations between HAM-D and MADRS ($p < 0.001$). An increase in correlations between the scales was associated with a decrease in depression scores and increase in their variability.

Limitations: Univariable and multivariable meta-regression models were not obtained in all three meta-analyses because of the lack of data.

Conclusions: A finding that correlations between depression instruments tended to increase over time has significant implications for assessment of the concurrent validity of these instruments. In longitudinal designs it is important to estimate correlations between depression scales over time because different thresholds for scale correlations indicate acceptable concurrent validity at different times.

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1. Introduction

Assessment of depressed mood largely depends on the account of the person experiencing it. Over the past few decades, many instruments have been developed for assessing depressed mood and depression. Among them, the Hamilton Depression Rating Scale (HAMD) (Hamilton, 1960) and the Montgomery-Asberg Depression Rating Scale (MADRS) (Montgomery and Asberg, 1979) are observer-rating instruments, while the Beck Depression Inventory (BDI) (Beck et al., 1961) is a self-rating measure. The HAMD was one of the first rating scales developed to quantify the severity of many symptoms of depression. The introduction of this scale led to the changes in the way research into depression is conducted. The HAMD assesses a wide variety of depressive symptoms and was found to be a multidimensional scale (Bech et al., 2011). In contrast, the MADRS appears to be a unidimensional scale (Uher et al., 2008) and it was designed to be more sensitive to treatment changes than HAMD (Iannuzzo et al., 2006). The BDI is a widely used self-rating scale, which assesses cognitive and affective features of depression (Brown et al., 1995).

The use of these scales reduces subjectivity in depression assessment. Scales are not a substitute, but a complement to the clinical assessment and diagnosis of depression (Carneiro et al., 2015). Reliable and valid instruments are necessary to corroborate the diagnosis of depression, reduce bias caused by physical symptoms, assess progress during treatment and evaluate outcomes (Cusin et al., 2009). Among many depression scales, HAMD is often considered a gold standard as a measure of depression (Carneiro et al., 2015). Researchers frequently use different depression instruments to comprehensively assess depression. Some authors suggest including both an observer-rating scale and a self-rating instrument so that different domains such as depressive symptoms and functioning are covered (Lin et al., 2014; Möller, 2000; Uher et al., 2008).

Correlations between different depression scales are reported both in psychometric and clinical studies. The correlation coefficients are indices of concurrent validity of the scales. Sufficiently high correlation coefficients suggest that the two instruments measure the same aspects of depression. However, these coefficients have commonly been derived from cross-sectional studies. With regards to correlations between depression instruments employed for repeated assessment, data have been inconsistently reported in longitudinal studies. In some studies, these coefficients were calculated only at baseline (e.g., Fisar et al., 2008), sometimes they were reported at the end of the study (e.g., Mulder et al., 2003; Lozano et al., 2008), while in other studies the coefficients were reported at certain stages of the study (e.g., Levkovitz et al., 2009). Some studies did not state when the correlation coefficients between the scales were calculated (e.g., Neuger et al., 2000).

Data about correlations between depressive scales employed in longitudinal studies are mixed. Some authors reported an increase in correlations between scales for assessing depression over time. For example, Sayer et al. (1993) found only a moderate baseline correlation ($r=0.48$) between HAMD and BDI; this correlation increased substantially at a later assessment ($r=0.78$). Similarly, Brown et al. (1995) reported that the correlation coefficients between HAMD and BDI consistently increased over time, ranging from 0.70 after one month to 0.85 after eight months. Further,

Zimmerman et al. (2004) reported that in three studies there were increasing correlations between the HAMD and MADRS during antidepressant treatment, and Jiang and Ahmed, (2009) found increasing correlations between HAMD and MADRS over the course of treatment. In contrast to these findings, El-Giamal et al. (2003) found a decrease in the correlation coefficients between HAMD and BDI, while Ramasubbu et al. (2013) reported a decrease in the correlations between HAMD and MADRS during the time of observation.

In view of the limitations of the previous reviews and studies and uncertainty about the changes in correlations between depression scales over time, the aim of this study was to conduct a meta-analytic review of the changes in correlations between HAMD, MADRS and BDI in longitudinal studies with repeated assessments. Based on the findings of most studies, we hypothesised that correlations between HAMD and BDI, HAMD and MADRS and MADRS and BDI would increase over time in longitudinal studies.

To our knowledge, this is the first meta-analytic study of the correlations between psychiatric scales used in longitudinal studies. The findings of the study were expected to have significant implications for the assessment of concurrent validity of the three most commonly used depression scales. In other words, the results were expected to shed more light on the issue of the extent to which different depression scales agree on what they measure at different points in time. This is of great importance for the quality of the measurement of depression both in routine clinical practice and clinical research.

2. Method

The methodology employed in this study is compliant with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) (Moher et al., 2009) and the guidelines for the Meta-analysis of Observational Studies in Epidemiology (MOOSE) (Stroup et al., 2000).

2.1. Literature search, study selection and data extraction

Literature search was performed in two stages (Fig. 1). In Stage I, we searched MEDLINE and PsycINFO databases for the period from 1960 to 2013. Searches were conducted using these exact phrases: “Hamilton Rating Scale for Depression”, “Hamilton Scale for Depression”, “Hamilton Depression Rating Scale” or “Hamilton Depression Scale” for HAMD; “Montgomery-Asberg Depression Rating Scale”, “Montgomery-Asberg Depression Scale” or “Montgomery and Asberg Depression Rating Scale” for MADRS; and “Beck Depression Inventory” for BDI. We used various combinations of these phrases to find studies with correlations between the corresponding depression scales. Primary search, without language restrictions, was conducted between 1 January 2014 and 1 June 2014. We pooled results from MEDLINE and PsycINFO databases. After removing false positive records and resolving duplicates, the total number of collected articles in full text was 3723.

In Stage II, we reviewed full-text papers and assessed their eligibility for inclusion in the meta-analysis. Inclusion criteria were as follows: (1) reported repeated correlation coefficients between HAMD, MADRS and BDI in longitudinal design or reported

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