

AGE EDUCATION ADJUSTMENTS AND THEIR EFFECTS ON NEUROPSYCHOLOGICAL TEST SCORES

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We have recently completed a paper that reviews the book by Heaton, Grant and Matthews (1991), the various critiques of age and education normative transformations, responses to these critiques, and summaries of the very limited number of empirical investigations of the effects of applying the Heaton, Grant, and Matthews (HGM) "corrections."

Our review of information regarding age and education corrections using the Heaton, Grant, and Matthews (HGM) procedure indicates, as Heaton, Matthews, Grant and Avitable (1996) have also found, that corrections are made principally for lesser educated groups and older groups. In effect, this means that poor raw-scores for these groups are adjusted so that the distributions fall at an average level, thus yielding a mean T-score of about 50. More specifically, inasmuch as persons with lower education and older age (regardless of the reasons involved) tend to show impairment on neuropsychological measures, their scores are transformed so that they are equivalent to those of the rest of the overall distribution.

Our contention is that impairment of brain functions is one of a number of factors that produces evidence of neuropsychological impairment in persons with lesser educational achievement (particularly among early drop-outs) and in older persons (since older brains suffer from well-documented neuropathological changes). Thus, the HGM "corrections" may, at least in part, eliminate the effects of brain impairment – the very factor that neuropsychological tests were designed to measure! If this is the case, lesser educated persons and older persons who earn scores ordinarily considered to represent brain impairment will earn normal scores when the Heaton, Grant, and Matthews adjustments are made. The effect of the transformations, in certain groups, may be to turn neuropsychological evidence of brain damage into evidence of normal brain functions.

A definitive answer to this question is obviously of immediate practical importance, since these norms are used on a widespread basis to reach diagnostic conclusions, both in clinical and forensic settings.

Golden and van den Brock (1998) compared raw HRB scores with HGM corrected scores for groups of persons with focal brain lesions and concluded that "the raw and T-scores showed numerous differences across the scoring systems," and that the raw scores showed impairment more frequently than did the HGM scaled scores or HGM T-scores. This was true for level of performance as well as right-left differences. In other words, the HGM transformations tended to turn indications of impairment (as derived from raw scores) into indications of non-impairment (as derived from HGM scaled scores or T-scores).

In the current paper, we have investigated this question specifically. In order to avoid any possibility of influencing the results in composing new groups, we selected the data published previously for 26 men with diffuse vascular disease and compared it with 26 equivalently-aged men who were functioning normally. The mean age in each group was approximately 54 years. Raw scores in each group were converted to Neuropsychological Deficit Scale (NDS) scores (which represent a straightforward transformation according to categories of normal versus impaired functioning [see Reitan & Wolfson, 1998, 1993]), and HGM T-scores. The analyses consisted simply of counting the number of scores for each variable that fell in the normal range and impaired range (NDS scores of 0-1 vs. NDS scores of 2-3; HGM: T-scores below 40 vs. T-scores 40 and above), adding these numbers for all tests, and comparing the results using the chi-squared test.

The results showed significant differences between the methods for each group. The HGM method classified 87% of all scores for the controls as being normal, whereas the NDS scores found 76% to be normal. Conversely, the HGM method found 63% of the scores for the groups with cerebral vascular disease to be impaired, whereas the NDS method found 82% to be impaired. Chi-squared values were highly significant ($p < .001$) in each instance.

There is no doubt that the two methods differed in their classification of scores as being normal or impaired when applied to the same data set. The question is this: Which method is more accurate? A host of empirical studies over the years has been published which support the validity of raw scores and NDS scores. Although very few studies have been done using HGM T-scores, Heaton, Ryan, Grant, and Matthews (1996) have stated that age and education transformations "are critical to neuropsychology" (p. 143) and that without the use of age and education corrections "the interpretation of test scores will continue to rely more on educated guesswork than on science" (p. 160).

This paper, which can be read on this website, goes into detail about the issues relevant to age and education adjustments.

As always, we welcome your comments and suggestions.

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