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## Reliability of factorial structure of the Peters et al. delusions inventory (PDI-21)

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### Abstract

The 21-item version of the Peters et al. Delusions Inventory (PDI-21) is a commonly used tool to measure delusional ideation in the normal population. Two recent principal component analyses have concluded that the PDI-21 has a seven-factor structure. Although these studies found identical factors associated with religiosity and grandiosity, the items loading on the remaining five factors, and hence the interpretation of these, differed. Such seven-factor structures of the PDI-21 are beginning to be used in research; however, a consistent item-level seven-factor structure has not been replicated and no data have been reported to support the reliability of such factors. We administered the PDI-21 to a non-psychiatric sample ( $N = 493$ ). It was found that, with the exception of religiosity/religiousness, the previously reported factors of the PDI-21 had Cronbach's alphas of less than 0.7. After a factor analysis using principal axis factoring, parallel analysis suggested the extraction of three factors. Of these factors, only one (religiosity/religiousness) was found to be both internally reliable and meaningful. It is concluded that the PDI-21 is best used with a unidimensional scoring system and that new measures are needed to assess specific types of delusion-like beliefs in the normal population.

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## 1. Introduction

Delusional beliefs have been found not to be limited to pathological conditions but also to exist in the normal population (Eaton, Romanoski, Anthony, & Nestadt, 1991; Johns & van Os, 2001). However, measurement of such sub-clinical delusional beliefs has until recently been problematic. Peters, Joseph, and Garety (1999) noted that existing psychometric instruments either examined first-rank symptoms of psychosis, which are rarely endorsed by the general populace, or asked about superstitious beliefs which are widespread and thus, hard to justify as delusional. Furthermore, the existing measures only investigated a subset of the delusional themes found in psychosis. In order to address these problems the Peters et al. Delusions Inventory was developed (Peters et al., 1999). This is a 40-item measure of tendency to delusional ideation in non-clinical samples. In order to make this tool easier to administer, an abbreviated 21-item version was subsequently developed.

The 21-item Peters et al. Delusions Inventory (PDI-21; Peters & Garety, 1996; Peters, Joseph, Day, & Garety, 2004) was designed to measure delusional ideation in the general population incorporating measures of the distress, preoccupation and conviction associated with delusional beliefs. Its originators specifically designed the PDI-21 not to consist of a limited number of well-defined subscales with high internal reliability but instead to “sample as wide a variety of delusions as possible” (Peters et al., 2004, p. 558). Accordingly, the inventory contains items addressing a wide range of delusional beliefs. The authors note that paranoia is a central theme of the PDI-21, with multiple items measuring persecution, suspiciousness and paranoid ideation. Amongst other delusional beliefs addressed are those relating to religiosity, grandeur, reference and depersonalisation. Peters et al. (2004) performed a confirmatory factor analysis ( $N = 444$ ) with a forced one-component solution of the PDI-21. Loadings on this single factor ranged from 0.31–0.63, which was taken to support the adequacy of a unidimensional scoring system for the PDI-21. Given this intended unidimensional scoring system, a principal components analysis (PCA) was not performed to investigate multifactoriality.

In a separate study, Verdoux et al. (1998) administered a French translation of the PDI-21 to a sample of adults ( $N = 444$ ) with no history of psychiatric disorder. A PCA using varimax rotation was performed on the PDI-21 items. A total of seven factors with eigenvalues greater than one (which explained 55.3% of the variance) were found and hence, following Kaiser's (1960) eigenvalue rule, seven factors were extracted. These factors were labeled as persecution, thought disturbances, grandiosity, religiosity, paranormal beliefs, reference guilt, and apocalypse. Verdoux et al. then went on to examine the association between each of these factors and participants' age and gender. Associations were reported between five of the seven factors of the PDI-21 (persecution, thought disturbances, grandiosity, religiosity and paranormal beliefs) and age, as well as an association between one factor (religiosity) and gender.

One limitation of this study was that it used Kaiser's rule to select the number of factors extracted. Tabachnick and Fidell (2007) note that Kaiser's rule should function as a “quick first estimate” (p. 644) of the number of factors, and that this procedure may lead to incorrect estimation of the number of factors to be extracted. A second limitation was the failure to report whether the factors had adequate internal reliability. Internal reliability can be assessed through an examination of a factor's Cronbach's alpha values (e.g., Blumberg, 2000), and is generally accepted to be guaranteed by a Cronbach's alpha greater than 0.7 (Bland & Altman, 1997). The failure of Ver-

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