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Testing construct independence in the Short Dark Triad using Item Response Theory

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ABSTRACT

The Dark Triad (i.e., Machiavellianism, narcissism and psychopathy) is a popular construct for describing socially aversive personality traits. In recent years, the Short Dark Triad (SD3; Jones & Paulhus, 2014) has become a popular measure for assessing the Dark Triad constructs. However, recent research has called the supposed dissimilarity between the Dark Triad constructs into question. In particular, theoretical and empirical evidence suggests that a distinction between Machiavellianism and psychopathy may not be tenable. In order to investigate this issue further, we analyzed the SD3 in a large sample (N = 1983) using Item Response Theory. We establish item response parameter estimates for each Dark Triad construct and further test whether the Dark Triad constructs can be modelled together. Results show that Machiavellianism and narcissism could not be modelled together, but the combinations Machiavellianism and psychopathy, and narcissism and psychopathy, yielded acceptable model fit. The implications of these results are discussed in terms of how the Dark Triad constructs may be interpreted and studied in the future.

In recent decades, interest in research about socially aversive personality traits in subclinical populations has grown. One of the more extensively researched constructs is the constellation of traits known as the Dark Triad (DT; Paulhus & Williams, 2002), which includes Machiavellianism, narcissism, and psychopathy. These three traits are supposedly both partially overlapping and yet distinct (e.g., Furnham, Richards, Rangel, & Jones, 2014; Paulhus & Williams, 2002). Machiavellianism is delineated by glib social charm and manipulativeness. Narcissism is characterized by entitlement, superiority, and dominance, while psychopathy is characterized by callous social attitudes, impulsivity, and interpersonal antagonism. The DT has proved to be a valuable predictor of various outcomes, including mating (Jonason, Li, Webster, & Schmitt, 2009), workplace (O'Boyle, Forsyth, Banks, & McDaniel, 2012), interpersonal (Jones & Paulhus, 2017), and educational behaviors (Nathanson, Paulhus, & Williams, 2006). A number of reviews have been written covering the differential predictive patterns of the respective DT constructs (e.g., Furnham, Richards, & Paulhus, 2013; Furnham et al., 2014; Paulhus, 2014).

One of the more popular measurements of the DT is the Short Dark Triad (Jones & Paulhus, 2014), which is a 27 item inventory (9 items per factor) measuring all three aspects of the DT. The SD3 has proven to be a relatively good inventory, in terms of its validity in relation to other DT inventories (Maples, Lamkin, & Miller, 2014). However, previous research has questioned the distinction between Machiavellianism and psychopathy for theoretical reasons (McHoskey, Worzel, & Szyarto, 1998), for empirical reasons pertaining to the DT in general (Miller, Hyatt, Maples-Keller, Carter, & Lynam, 2016; Vize, Lynam, Collison, & Miller, 2016), and regarding the SD3, opinions differ about whether Machiavellianism and psychopathy provide meaningful discriminant validity (cf. Dowgwillo & Pincus, 2017; Jones & Paulhus, 2014; Persson, Kajonius, & Garcia, 2017). On the basis of previous theoretical contributions (McHoskey et al., 1998), more recent empirical research has suggested that Machiavellianism and psychopathy may not provide independent divergent validity (Miller et al., 2016; Persson et al., 2017). For instance, Persson et al. (2017) used confirmatory factor analysis (CFA) for modelling SD3 Machiavellianism and psychopathy as one factor. Model fit increased, albeit non-significantly, in two factor models. On that basis, the authors concluded that a bi-factor model with a specific narcissism factor and a second specific Machiavellianism-psychopathy

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factor was more parsimonious than a three factor model (but see also McLarnon & Tarraf, 2017). Accordingly, an empirical distinction between Machiavellianism and psychopathy may not be viable, and is at the very least up for debate. Furthermore, a recent study related facets from the Five-Factor Model of personality (Digman, 1990) with the DT and concluded that Machiavellianism and psychopathy were highly correlated (DeShong, Helle, Lengel, Meyer, & Mullins-Sweatt, 2017). In the present study, we use Item Response Theory (IRT) to further the investigation of the SD3, and provide additional tests of the proposed independence of the three DT constructs.

1. Item Response Theory

IRT is a family of psychometric methods well-suited for analysis of item and scale level properties. There are a number of IRT models available, but in the present study we used a graded response model (GRM), which is appropriate for polytomous (e.g., Likert scale) items. The GRM generates two defining characteristics for each item: a slope coefficient, or discrimination parameter alpha (a), and a location coefficient, or threshold parameter beta (b). The a-parameter shows how strongly an item relates to a given latent trait theta (θ), and can be analogized as a factor loading. The threshold parameters (b_{1-4}) relates to the level of the latent trait at which the next higher response category has at least 50% probability of being endorsed (e.g., b_1 denotes answering option 1 vs. 2, 3, 4, and 5). The b-parameters are scaled on the same metric as the latent trait (θ) and higher thresholds imply more difficult items. The a-parameter typically ranges from 0.5–2.0 in personality scales (Morizot, Ainsworth, & Reise, 2007). It's not uncommon for b-parameters to have extreme values (i.e., >3 and < -3), especially in clinical settings (Reise & Waller, 2009).

The IRT model utilized herein assumes unidimensionality. The assumption of unidimensionality states that item responses are caused by a single continuous latent variable (de Ayala, 2009). It is widely recognized that the majority of measures of psychological phenomena rarely adhere to a unidimensional factor structure. Violating the unidimensionality assumption can lead to biased IRT parameter estimates (Reise, Scheines, Widaman, & Haviland, 2013), but research has also shown that unidimensional IRT models are quite robust (Ip, 2010). For more information about IRT, numerous papers have been published making the topic more accessible (e.g., Morizot et al., 2007; Reise & Rodriguez, 2016; Reise & Waller, 2009; Thomas, 2011).

2. The present study

We extend the validation process (Cronbach & Meehl, 1955; Strauss & Smith, 2009) by modelling the SD3 using IRT in a large sample (N = 1983) collected using Amazon's Mechanical Turk (MTurk). This study had three specific goals. First, to establish item discrimination and location parameters in three separate IRT models, one for each factor. These parameters are of interest because they provide information about how different items relate to the latent variable and where on the latent trait spectrum the DT constructs provide information. We modelled each SD3 factor (i.e., 9 items per model) in three respective unidimensional IRT models. All analyses were carried out using the R package *MIRT* version 1.18 (Chalmers, 2012) in R version 3.2.4 (R Core Team, 2015).

Our second goal was to test the hypothesis that Machiavellianism items are more readily endorsed than psychopathy items. This hypothesis was based on the observation that psychopathy items are usually saturated by more aggressively antisocial content, whereas Machiavellianism is much less so. By extension, our reasoning was that individuals are more unlikely to endorse items that contain antisocial content. We test this hypothesis by analyzing the item locations (b) for the respective factors. The reasoning was that a lower level of the latent trait would be required for endorsement of Machiavellianism items because the item content is generally more benign (i.e., emphasis on hiding information, manipulating people) than for psychopathy items (i.e., aggressive impulsivity, meanness, revenge).

The third goal was to determine whether the SD3 constructs can be represented by a single unidimensional IRT model. Previous research on the SD3 has shown that Machiavellianism and psychopathy are almost indistinguishable while narcissism demonstrate clearer differential relations (Persson et al., 2017; Vize et al., 2016), thus we expected that Machiavellianism and psychopathy could be modelled together, while including narcissism would lead to poor model fit. In testing this, we fitted unidimensional models for all 27 items and for individual the constructs (9 items each). We also fit unidimensional IRT models with 18 items to investigate the consequences on model fit upon removing one of the factors (e.g., modelling Machiavellianism and narcissism without psychopathy). We subsequently compared these models with the 9 item models from the main analysis in order to assess whether parameter estimates changed markedly between models, thus serving as confirmation of the consequences of poor fit on parameter estimates. These models were believed to provide possible falsifications pertaining to the nature of the construct independence.

3. Method

3.1. Participants

The participant data (N = 1983, $n_{males} = 803$, $n_{females} = 1180$) was collected through MTurk, which has demonstrated reliability and validity, providing a wider range of socio-economic backgrounds compared to, for instance, student samples (Casler, Bickel, & Hackett, 2013). The MTurk workers received 50 cents (US-dollars) as compensation for participating and only residents of the US were allowed to accept participation. Two control questions were added to the survey, to control for inattention. A total of 20 participants responded erroneously to one or both of the control questions and were thus eliminated. Mean age was 34.08, $SD = 12.15$. Three participants did not report their age. The data in this study has been used for other purposes previously (Persson et al., 2017).

3.2. Measures

The Short Dark Triad (SD3; Jones & Paulhus, 2014) consists of 27 items that are rated on a 5 point Likert scale (1 = "Disagree strongly" and 5 = "Agree strongly"). The items consist of statements such as "Most people can be manipulated" (Machiavellianism) and "Many group activities tend to be dull without me" (narcissism). Reliability estimates in the form of coefficient omega were computed using the R package MBESS version 4.0 (Kelley, 2016) with 5000 bootstrap samples. Omegas were (with 95% CIs in brackets): 0.77 [0.75, 0.78], 0.75 [0.73, 0.77], and 0.74 [0.72, 0.76], for Machiavellianism, narcissism, and psychopathy, respectively (we followed the steps in Dunn, Baguley, & Brunsden, 2014). Descriptive statistics for the SD3 are reported as Supplementary information. Psychopathy item 8 was highly skewed and kurtotic (cf. Table S1, Supplementary information).

4. Results

Goal one was to present item discrimination and location parameters. Being that we assumed that unidimensionality for the entire SD3 would be violated, we ran three separate unidimensional models, one for each subscale. Scale information curves reported in Fig. 1 reveals that all three SD3 constructs deliver most information when θ levels are approximately between 0 and 3. This is particularly true for the Machiavellianism subscale, which generates most information when θ is around 0. In contrast, the psychopathy subscale peaks at about 1.5–2 θ. The IRT parameters are presented (in descending order based on alphas) in Table 1.

As scale information functions are item functions added together (Reise & Waller, 2009), the same pattern naturally occurs at the item