Research article

Psychometric analyses of the Bangla version of the Dark Triad Dirty Dozen

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A B S T R A C T

Three undesirable social traits (Machiavellianism, psychopathy, and narcissism) collectively known as the 'Dark Triad' have gained huge empirical attention during the past decades. The Dark Triad Dirty Dozen (DTDD) is a brief and psychometrically sound tool for assessing dark traits. In the present study, the psychometric properties of the DTDD-Bangla were assessed (n = 371) as there no information about its psychometric adequacy in the Bangladesh context. The item analysis results demonstrated that the DTDD-Bangla had good item discrimination indices in both CTT and IRT. The confirmatory factor analysis results supported the three factors-first-order model in terms of model fits and items' factor loadings over the bi-factor model. Scale level analyses revealed that this scale and its subscales had good internal consistency reliabilities and composite reliability. The MGCFA supported scalar invariance between males and females. Overall, the DTDD-Bangla seems psychometrically sound measure to assess the dark traits and can be used in further researches in the Bangladesh context.

1. Introduction

Personality is the unique pattern of behavioral and mental processes that represents our responses to the environment in a particular manner. In recent years, the three most popular malevolent personality traits that are much fond of empirical attention (Furnham et al., 2013) are known as “Dark Tried”. These malignant personality constructs are Machiavellianism, psychopathy and narcissism (Paulhus and Williams, 2002). Machiavellianism trait is conceptualized as extreme extensions of manipulation and pessimistic cynicism (Jones and Paulhus 2013; Miller et al., 2016; Paulhus and Williams 2002) through which a person strives for some argentic goals like-money, power, and status (Christie and Geis, 1970). On the other hand, psychopathy reveals particular reckless behaviors, including aggression, impulsivity, stress etc (Jones and Paulhus, 2011; Noser et al., 2014). Kajonius et al. (2016) showed psychopathy as the core of the Dark Triad where exploitation considered as the driving factor. The last malevolent trait is narcissism often characterized by two forms - feelings of grandiosity (John and Robins 1994; Raskin et al., 1991) and feelings of vulnerability (Miller et al., 2010; Wink, 1991). The earlier one is responsible for high self-esteem and entitlement (Gore and Widiger 2016) where later one for anxiety and low self-esteem (Gore and Widiger 2016) that compiles together as neuroticism (Miller et al., 2011). Paulhus and Williams (2002) reported that sometimes people show Dark Triad (Machiavellianism, narcissism and psychopathy) criteria which are overlapping, but they have distinct constructs in nature. Studies suggested that the dark side of personality is developed based on flawed assumptions about one's self or personal interests to get along or ahead without considering the needs of other people (Elliot and Thrash, 2002; Hogan and Hogan, 2001; Hogan et al., 2010; Kaiser and Kaplan, 2006). Although these dark traits have short-time benefits, people suffer lots having negative impacts like disrupted relationships with others, corrupted judgments, etc. in the long run (Baumeister and Scher, 1988). Studies also identified considerable signs regarding the development of Dark Triad personality traits like- lack of empathy and regard for others (Campbell and Miller, 2011), inclination to manipulate (Furnham et al., 2014; Persson et al., 2019), cynical or misanthropic beliefs (Christie and Geis, 1970) and overall erratic lifestyle and displaying antisocial behaviors (Hare, 2003). Wai and Tiliopoulos (2012) suggested that Dark Triad personality characteristics are more related to deficits in affective empathy and less with cognitive empathy. These personality traits are related to the use of dishonest, manipulative and unethical behaviors such as white-collar crimes (Wise and Sleebos, 2016). Individuals having higher dark traits may have difficulties in understanding and managing their emotional states (Schimmenti et al., 2019). Studies suggested that men had higher scores on these dark traits compared to women (Cale and Lilienfeld 2002; Carter et al., 2015; Grijalva et al., 2015; Jonason and Webster, 2010). Kawamoto et al. (2020) have found a significant negative association between the Dark Triad traits and age.

Regarding the assessment of these dark traits, there are scales for assessing each attribute - the MACH-IV (Christie and Geis, 1970) for...
Machiavellianism, the Self-Report Psychopathy Scale (SRP-III; Hare, 1985) for psychopathy, the Narcissistic Personality Inventory (NPI; Raskin and Hall, 1979) for narcissism, etc. During the assessment of dark traits using these standard measures, participants need to complete more than 90 items that are highly time-consuming and participants may bore and find difficulties in keeping their concentration. From the necessity of short scales for assessing these traits, Jonason and Webster (2010) developed a brief questionnaire to assess these dark traits, the Dirty Triad Dirty Dozen (DTDD).

The DTDD has the adequacy of the psychometric properties, including internal consistency reliability, test-retest reliability, factor structure, convergent validity (Jonason et al., 2013; Jonason and Luevano, 2013; Jonason and Webster, 2010; McLarnon and Tarraf, 2017; Maples et al., 2014). Regarding factor structure, some studies supported the three factors first-order model (Jonason and Webster, 2010; Klimstra et al., 2014), while other supported the bi-factor model (Jonason et al., 2013; McLarnon and Tarraf, 2017) as the best-fitted model among the tested model. Graded response model analysis under the item response theory showed that items adequately discriminate among individuals in these latent traits (Garcia et al., 2018; Savard et al., 2017; Webster and Jonason, 2013). However, to the best to our knowledge only four studies reported the measurement invariance of the DTDD between male and female (Chiorri et al., 2017; Klimstra et al., 2014; Pechorro et al., 2019; Rogoza et al., 2020). Although Chiorri et al. (2017), Pechorro et al. (2019), and Rogoza et al. (2020) have suggested full scalar measurement invariance, Klimstra et al. (2014) found full scalar invariance as well as partial scalar invariance. Carter et al. (2015) have compared the factor structure of the DTDD between student sample and older aged sample and concluded that the DTDD was non-invariant across age. The DTDD has already validated in different languages, including German (Küfner et al., 2014), Japanese (Tamura et al., 2015), Polish (Czarna et al., 2016), Portuguese (Macedo et al., 2017), French-Canadian (Savard et al., 2017), Swedish (Garcia et al., 2017), and Turkish (Ozsoy et al., 2017), Serbian (Dinić et al., 2018), Spanish (Pineda et al., 2018), etc.

1.1. Present study

Research regarding dark personality traits is limited in the Bangladesh context due to lack of assessment tools for assessing these traits. Roy et al. (2010) investigated the association between personality traits, substance abuse, and anti-social behavior and have suggested personality as a determining factor of maladaptive behavior. Therefore, it is crucial to identify the malignant personality traits and its negatively-tuned impact on people’s adaptive functioning in daily life. As there are no assessment measures for assessing any of these dark traits in Bangla language, and the DTDD has good psychometric properties and provides a quick assessment of the Dark Triad, the present study was aimed to assess the psychometric properties of the Dark Triad Dirty Dozen – Bangla version. In this study, we evaluated the psychometric properties using both classical test theory (CTT) and item response theory (IRT). Due to lack of consensus among aforementioned studies regarding the factor structure and measurement invariance between men and women of the DTDD, these were also examined - factor structure and measurement invariance of the DTDD-Bangla. Moreover, the association between Dark Triad traits and age, educational and economic levels were also investigated in this study.

2. Methods

2.1. Data and sample

The data of the present study contained responses from 371 participants (41.3% female). Their age ranged between 18 years and 65 years (age mean = 24.67 years and standard deviation = 5.85 years). Among participants, 67 (18.1%) completed upper secondary education, 182 (49.1%) bachelor or equivalent degrees, and 115 (31.0%) master or equivalent degrees. Among them, 10 (2.7%) described their economic condition as lower than average, 84 (22.6%) as a bit lower than average, 231 (62.3%) as average, and 44 (11.9%) as a bit higher than average economic condition.

2.2. Measures

2.2.1. Dark Triad Dirty Dozen (DTDD)

The Dark Triad Dirty Dozen scale (DTDD: Jonason and Webster, 2010) is a reliable and valid assessment tool for assessment of three socially undesirable personality traits (i.e., Machiavellianism, Psychopathy and Narcissism). The DTDD comprises 12 items, four items in each of Machiavellianism (“I tend to manipulate others to get my way”), Psychopathy (“I tend to lack remorse”), and Narcissism (“I tend to seek prestige or status”). Participants responded on using a seven-point Likert-type scale, ranged from strongly disagree to strongly agree, in this online survey. Total scores for each subscale ranged from 4 to 28 and 12 to 84 as composite scores for the dark traits.

Under the project, the DTDD was translated into Bangla language from the English along with others scale following the guidelines of the International Test Commission (International Test Commission, 2018). The DTDD was forward translated into Bangla language by two language experts and their translations synthesized into one. Then, one expert in the field of psychometric research assessed this forward translation. Some corrections were made as per the expert’s recommendations. Next stage, the forward translated version was back translated into English language by two other experts, and these two back translations synthesized into one. Then, back translation of the DTDD was compared with the original English version to assess the discrepancy in meaning. As there was no discrepancy in meaning, this scale was placed for the field study.

2.3. Statistical analysis

The IBM SPSS version 26, IBM AMOS version 24, RStudio, JASP 0.12.1.0, and Microsoft Excel 10 were used for data management and data analyses. Data normality was assessed by skewness and kurtosis (recommended value 2 for skewness and 7 for kurtosis: Kim, 2013). The psychometric properties of the DTDD were assessed using both classical test theory (CTT) and item response theory (IRT).

Under the CTT, we assessed mean inter-item correlations (acceptable range between .15 and .50 [Clark and Watson, 1995]), corrected item-total correlations (accepted value ≥.3 [Field, 2017]) and internal consistency reliabilities (Cronbach’s alpha, McDonald’s omega, and split-half reliability (accepted reliability ≥.7 [Nunnally, 1978]). Factor loadings explored in CFA were used to calculate the average variance extracted (AVE) ≥.5 accepted; Baggozi and Yi, 1988), and the composite reliability ≥.7 accepted; Baggozi and Yi, 1988).

In CFA, we tested three models (single factor model, first-order three correlated factor model and bi-factor model) of the DTDD-Bangla. In the bi-factor model, individual items are loaded on two sorts of uncorrelated latent factors – (i) three latent factors associated with each subscale of the DTDD-Bangla, and (ii) a latent factor associated with the global Dark Triad factor. This model for DTDD implies that the latent global Dark Triad factor assesses the residual Dark Triad after removing the variance attributed to three latent factors. On the other hand, three latent factors assess respective associated traits after removing the variance attributable to the latent global Dark Triad. Model fits were assessed through the
following model fit indices: $\chi^2/df$ ratio ($<5$, Marsh and Hocevar, 1988), goodness-of-fit index [GFI], comparative fit index [CFI], Tucker-lewis index [TLI] ($\geq 90$, Dimitrov, 2012), root mean square error of approximation [RMSEA] and standardized root mean square residual [SRMSR] ($\leq 0.08$, Schreiber et al., 2006).

Under the IRT, we used the graded response (GRM) model for item analysis. IRT models provide information about individual items’ performance against the underlying traits. These models help to estimate the item contribution across the trait distribution. Before applying the GRM, the assumptions were tested – unidimensionality, local independence, and monotonicity. Unidimensionality suggests that a set of items assesses only a single trait (Yang and Kao, 2014). Unidimensionality can be assessed using the both CCFA model and monotonicity. Unidimensionality suggests that a set of items assesses one-way ANOVA.

### 3. Results

Table 1 presents the descriptive statistics and item-level psychometric properties of the Dark Triad Dirty Dozen. The skewness (ranged between -1.13 and 1.83) and kurtosis (ranged between -1.11 and 3.03) values were between the suggested values by Kim (2013) which suggested normality of the data. Item analysis results (Table 1) demonstrated that all items had good corrected item-total correlations (ranged between .631 and .764 for Machiavellianism subscale, between .420 and .596 for psychopathy subscale and between .631 and .764 for narcissism subscale). Results in Table 2 demonstrated that the DTDD-Bangla (subscales and full scale) had good internal consistency reliabilities (alpha ranged between .702 and .853, omega ranged between .713 and .858, and split-half reliability ranged between .732 and .894). The mean inter-item correlation for subscales ranged between .377 and .597, and .308 for the full inventory. The inter-item correlation matrix (Additional Table 1) showed that inter-item correlations for each subscale were higher than

| Items                              | Mean   | SD     | Skewness | Kurtosis | Item-total correlation | Factor Loading | Graded Response Model |
|------------------------------------|--------|--------|----------|----------|------------------------|----------------|-----------------------|
| Machiavellianism: M = 10.16, SD = 5.32, M_females = 8.78, SD_females = 4.60, M_males = 11.14, SD_males = 5.58, $t_{gender}(369) = -4.30$, $p < .001$, Cohen d = -.45 |
| Item 1                             | 2.93   | 1.73   | .55      | -1.03    | .631                   | .70            | 2.070                 | -3.844, -1.271, .550, .834, 1.836, 2.894 |
| Item 2                             | 2.44   | 1.57   | .95      | -1.34    | .666                   | .75            | 3.110                 | -1.377, .563, .815, 1.091, 1.814, 3.415 |
| Item 3                             | 2.23   | 1.46   | 1.19     | .36      | .729                   | .71            | 3.955                 | -1.197, .675, .864, 1.226, 1.870, 3.255 |
| Item 4                             | 2.57   | 1.61   | .82      | -.64     | .764                   | .84            | 3.486                 | -.480, .480, .658, .929, 1.819, 2.948 |
| Psychopathy: M = 9.07, SD = 4.28, M_females = 8.22, SD_females = 3.79, M_males = 9.67, SD_males = 4.52, $t_{gender}(369) = -3.27$, $p < .001$, Cohen d = -.35 |
| Item 5                             | 2.16   | 1.43   | 1.58     | 1.88     | .475                   | .59            | 1.617                 | -1.418, 1.119, 1.494, 1.833, 2.488, 3.360 |
| Item 6                             | 2.06   | 1.32   | 1.83     | 3.03     | .476                   | .59            | 1.792                 | -.407, 1.301, 1.662, 1.915, 2.355, 3.428 |
| Item 7                             | 2.20   | 1.47   | 1.29     | .52      | .596                   | .75            | 3.354                 | -.236, .818, 1.006, 1.237, 1.855, .586 |
| Item 8                             | 2.64   | 1.66   | .83      | -.62     | .420                   | .57            | 1.367                 | -.806, .628, .902, 1.332, 2.219, 4.453 |
| Narcissism: M = 18.73, SD = 5.66, M_females = 18.22, SD_females = 5.79, M_males = 19.08, SD_males = 5.56, $t_{gender}(369) = -1.44$, $p < .153$, Cohen d = -.15 |
| Item 9                             | 4.51   | 1.77   | -.54     | -.82     | .734                   | .83            | 3.725                 | -1.675, -.862, -.642, -.344, .417, 1.357 |
| Item 10                            | 4.76   | 1.68   | -.89     | -.18     | .764                   | .74            | 4.177                 | -.637, .994, .808, .589, .269, 1.374 |
| Item 11                            | 5.22   | 1.55   | 1.13     | .60      | .631                   | .67            | 2.006                 | -2.453, -1.631, -1.234, -.968, -.123, 1.236 |
| Item 12                            | 4.24   | 1.79   | -.37     | -1.11    | .652                   | .71            | 2.146                 | -.182, -.790, -.588, -.161, .587, 1.978 |

Dark Triad: M = 37.97, SD = 11.57, M_females = 35.22, SD_females = 10.60, M_males = 39.89, SD_males = 11.84, $t_{gender}(369) = -3.91$, $p < .001$, Cohen d = -.41.
items of other subscales. These results suggested the homogeneity of items in each subscale for the specific dark traits. The AVE values were also above the recommended value (≥.5), except AVE value of the Psychopathy subscale (.396) that was below the recommended value. Results in Table 2 also suggested that the DTDD - Bangla had good composite reliability (ranged between .721 and .856) and discrimination power (Ferguson's delta ranged between .984 and .946).

In confirmatory factor analysis, the bi-factor model [Additional Figure 2] had good model fits ($\chi^2$/df = 1.67, $p = .004$, GFI = .97, CFI = .98, TLI = .98, RMSEA = .04 [LO 90 = .02, HI 90 = .06, pclose = .750], SRMR = .03) compared to the single factor model [Additional Figure 1] ($\chi^2$/df = 13.62, $p < .001$, GFI = .71, CFI = .62, TLI = .53, RMSEA = .19 [LO 90 = .17, HI 90 = .20, pclose < .001], SRMR = .14) and the three factors first-order model [Figure 1] ($\chi^2$/df = 2.23, $p < .001$, GFI = .95, CFI = .97, TLI = .95, RMSEA = .06 [LO 90 = .04, HI 90 = .07, pclose = .176], SRMR = .04). However, two items' (item 2 and item 3) factor loadings (-.16, and -.32) in Machiavellianism specific latent factor were negative and factor loading of item 1 of this latent factor was also very low (.14). Therefore, the bi-factor model is not acceptable. The rest of the two model, the three factor first order model also had good model fits. Factor loadings of the latent factors were substantially higher, ranged between .84 and .70 for the Machiavellianism latent factor, between .75 and .54 for psychopathy latent factor, and between .87 and .67 for narcissism latent factor. This model fit indices suggested that the DTDD - Bangla assess these three dark traits.

Results regarding IRT assumptions in Table 3 showed that the Machiavellianism and narcissism subscales were strongly unidimensional (H coefficient were .627 and .629 respectively), and psychopathy subscale was moderately unidimensional (H coefficient was .402). The residual correlation coefficients ($Q_3$ coefficient) (Table 3) were ranged between -.447 and .116 for Machiavellianism subscale, between -.442 and .066 for psychopathy subscale, and between -.443 and .001 for narcissism subscale. None of the $Q_3$ coefficients exceeded the critical value .2 that suggested the absence of possible local dependence between items. Additional Table 3 also demonstrated the monotonicity results of the DTDD-Bangla. Three items (item 4 of the Machiavellianism subscale, and item 5 and 8 of psychopathy subscale) had a violation of monotonicity. However, none of these three violations were significant. Moreover, these three items' crit statistics were lower than 40 (2-14, and 13, respectively). Additional Figure 3 demonstrated that curves were increased monotonically and absent of decrement in all curves. Both monotonicity values in Table 3 and additional Figure 3 suggested the monotonicity of the DTDD-Bangla.

Results regarding the graded response model in Table 1 demonstrated that all items of the DTDD-Bangla provided reasonable information about the dark traits that assess the scale and thus effective in discriminating among individuals in these traits. Item discriminations ranged between 2.070 and 3.955 for Machiavellianism subscale (Mean $\alpha = 3.155$), between 1.367 and 3.354 for psychopathy subscale (Mean $\alpha = 2.033$), and between 2.006 and 4.177 for Narcissism subscale (Mean $\alpha = 3.014$). All items had very high as except item 5 and item 8. Results regarding b coefficients in Table 1 showed that Machiavellianism and psychopathy subscales required a higher latent trait or theta to endorse any item of these subscales than narcissism subscale. For instance, all the $b_3$ coefficients of these two subscales are positive that suggest that above-average level of latent trait(s) is needed to endorse Likert response categories between 3 and 7. Such information suggests that the Machiavellianism and psychopathy subscales were efficient to assess average to higher levels of these traits. Between these two subscales, items of the psychopathy subscale required a relatively higher threshold for endorsement. On contrary to these subscales, the narcissism subscale required lower latent traits to endorse its items. This subscale is more efficient to assess information about individuals having lower to higher narcissism trait. Scale information curves in Figure 2 present a clear understanding regarding information provided by each subscale. The scale information curve for psychopathy subscale provides more information about people between 1.5 and 2.0 $\theta$ level, but, least information than the other two. However, the scale information curve for the Machiavellianism and narcissism subscales were much wavy. The highest peak of Machiavellianism was in $\theta$ level between 0 and 2$\theta$, and this for narcissism subscale was between-1.5 and -.5 $\theta$ level.

Results in Table 4 demonstrated that the DTDD - Bangla had metric and scalar invariance between between males and females. The configurual model of gender had satisfactory model fits ($\chi^2 = 173.854$, df = 99, $p < .001$, CFI = .957, RMSEA = .064). There were negligible changes in CFI and RMSEA values between configural and metric models (.006 , .002, respectively) and between metric and scalar models (.001 , .004, respectively). These invariance results suggested that the DTDD-Bangla assess the same construct for both males and females.
Table 3. H coefficient, Q3 coefficient, monotonicity outputs of the DTDD- Bangla.

| Machiavellianism: H coefficient = .627 | Monotonicity | Residual coefficients (Yen’s Q3 Coefficients) |
|---------------------------------------|---------------|-----------------------------------------------|
|                                       | #ac (active comparison) | #vi (violations) | #zsig (significant violation) | crit | item1 | item2 | item3 |
| Item1                                 | .589           | 36              | 0                             | 0    | 0     | 0     | 0     |
| Item2                                 | .598           | 30              | 0                             | 0    | .285  | 1     | 0     |
| Item3                                 | .657           | 27              | 0                             | 0    | .295  | -2    | -.339 |
| Item4                                 | .665           | 29              | 1                             | 0    | -1.16 | .001  | -.004 |
| Psychopathy: H coefficient = -.402   | Item5          | .385            | 17                            | 0    | 14    | 1     | 0     |
|                                       | Item6          | .396            | 30                            | 0    | 0     | 0     | .066  |
|                                       | Item7          | .463            | 24                            | 0    | 0     | -.401 | -.442 |
|                                       | Item8          | .365            | 29                            | 1    | 0     | 13    | -.211 |
| Narcissism: H coefficient = -.629    | Item9          | .648            | 28                            | 0    | 0     | 0     | 0     |
|                                       | Item10         | .673            | 31                            | 0    | 0     | 0     | .443  |
|                                       | Item11         | .591            | 25                            | 0    | 0     | 0     | -.227 |
|                                       | Item12         | .603            | 31                            | 0    | 0     | 0     | -.309 |

Table 4. Measurement invariance of the DTDD-Bangla across gender.

| Model                       | χ²       | df | Δ   | p value | CFI | Δ   | RMSEA | Δ   |
|-----------------------------|----------|----|-----|---------|-----|-----|-------|-----|
| Gender (Male vs female)     |          |    |     |         |     |     |       |     |
| Configural                  | 173.854  | 99 |     | .957    | .064|     |       |     |
| Metric                      | 194.083  | 108| 20.229| .017    | .951| .006| .066  | .002|
| Scalar                      | 206.772  | 120| 12.689| .392    | .950| .001| .062  | .004|

Figure 2. Scale information curves of the Machiavellianism, Psychopathy, and Narcissism subscales of the DTDD-Bangla.

Results regarding mean differences (Table 1) in scores in subscales and full DTDD-Bangla showed that males had significantly higher scores in Machiavellianism (t-value (369) = -4.30, p < .001, Cohen d = -.45), psychopathy (t-value (369) = -3.20, p = .001, Cohen d = -.35) and full DTDD-Bangla (t-value (369) = -.91, p < .001, Cohen d = -.41). Although mean differences in narcissism (t-value (369) = -1.44, p = .153, Cohen d = -.15) between males and females, but males (Mean = 19.08, SD = 5.56) had higher scores compared to female (Mean = 18.22, SD = 5.79).

Results in Table 2 demonstrated non-significant mean differences in Machiavellianism (F(3, 365) = .421, p = .738, effect size (f) = .059), psychopathy (F(3, 365) = .215, p = .886, effect size (f) = .042), narcissism (F(3, 365) = 1.356, p = .256, effect size (f) = .106), and full DTDD-Bangla (F(3, 365) = .910, p = .436, effect size (f) = .087) scores by economic classes. In terms of education levels, results (Additional Table 2) also suggested non-significant mean differences in the Machiavellianism (F(3, 365) = .938, p = .423, effect size (f) = .088), psychopathy (F(3, 365) = .715, p = .543, effect size (f) = .077), narcissism (F(3, 365) = 1.136, p = .334, effect size (f) = .097) and full DTDD-Bangla (F(3, 365) = .972, p = .406, effect size (f) = .089) scores. Results regarding the association between dark traits showed that age was non-significantly correlated to the Machiavellianism (r = -.929, p = .511, 95% CI [-.130,.073]), psychopathy (r = .007, p = .890, 95% CI [-.095,.109]), narcissism (r = .015, p = .774, 95% CI [-.117,.087]), and total DTDD-Bangla (r = -.018, p = .731, 95% CI [-.119,.084]) scores.

4. Discussion

The present study was aimed to assess the psychometric properties of the Bangla version of the Dark Triad Dirty Dozen (DTDD-Bangla) that was translated as part of a cross-cultural study. We assessed both item and scale level psychometric properties of the DTDD-Bangla. Results showed that all items of each subscale (Machiavellianism, psychopathy, and narcissism) had good item-total correlations (corrected). This psychometric feature suggests that the items of DTDD-Bangla would be able to discriminate between low scorers and high scorers in each subscale of this scale. Among subscales, items of the Machiavellianism and narcissism subscales had higher item-total correlations compared to psychopathy subscale. Jonason and Webster (2010) and Savard et al. (2017) also found a similar pattern of corrected item-total correlation among items. Results demonstrated that the mean inter-item correlation of the Machiavellianism and narcissism subscales were just above the recommended range. Although mean inter-item correlations of these two subscales were higher, none of the inter-item correlated reached to .90 or above which poses the multicollinearity problem. Therefore, these mean inter-item correlation scores suggested the homogeneity of the subscales. In their study, Chiorri et al. (2017) also found that the Machiavellianism subscale’s mean inter-item correlation was above the recommended value. In the psychopathy subscale, item 8 had low correlations to item 5 and item 6 and a moderate correlation to item7. The social desirability to the “cynical” term might be a reason for these low and moderate correlations of this item with other psychopathy subscale items. Jonason and Luevano (2013) identified this item as an ambiguous item.
(2017) also found a similar inter-item correlation of this item. They have suggested to replace “I am cynical and mocking towards others” [this item developed by Muris et al. (2013) for assessing adolescents’ dark traits] instead of item 8. However, the item suggested by Muris et al. (2013) would be problematic. Therefore, this item would be kept intact as this item remained same in other cultures. Results regarding reliabilities suggested that the DTDD-Bangla had good internal consistency reliabilities and composite reliabilities for all subscale and the full DTDD-Bangla (> .70). Most of the studies in different languages found good internal consistency reliability (Jonason and Webster, 2010; Ozsoy et al., 2017; Savard et al., 2017).

The confirmatory factor analysis results supported the three factors first-order model that suggested that the DTDD-Bangla assess Machiavellianism, psychopathy, and narcissism. This finding is consistent with other studies (Dinić et al., 2018; Jonason and Webster, 2010; Klimestone et al., 2014; Ozsoy et al., 2017; Persson et al., 2019; Rogoza et al., 2020). Rogoza et al. (2020) examined the factor structure of the DTDD across the eight regions of the world (North America, Oceania, Western Europe, Asia, Middle East, non-Western Europe, South America, sub-Saharan Africa) and supported the three factors first-order model. However, model fit indices supported the bi-factor model over the three factors first-order model. A number of studies also supported the bi-factor model as the best fit model over the correlated model (Jonason and Luevano, 2013; Kajonius et al., 2016; McLaren and Tarraf, 2017; Savard et al., 2017). However, the bi-factor model was rejected as two items of Machiavellianism had negative factor loadings. The Polish version of the DTDD (Czarna et al., 2016) had an almost similar pattern of factor loadings in the Machiavellianism subscale. Moreover, the probifactor bias (when a bi-factor model has better model fit indices over a predetermined nonbifactor population-level model [e.g. first order factors model], Greene et al., 2019) is subjected here to the bi-factor model. Rogoza et al. (2020) opined that the bi-factor model is not a good solution for the factor structure of the DTDD.

Results about the IRT assumptions suggested the suitability of applying any IRT model like the graded response model. Results regarding the graded response model explored what the Dirty Dozen endeavors to measure and showed that the DTDD-Bangla performed adequately to assess the dark traits among Bangladeshi people (Table 1). All items provided substantial information about dark traits. Items in the psychopathy subscale need higher threshold endorsement compared to Machiavellianism and narcissism subscales. As most of the items had higher difficulty level, the DTDD-Bangla is inefficient to discriminate people having lower levels of these traits, especially Machiavellianism and psychopathy subscales. As the traits under assessment are somewhat socially undesirable, therefore it might be related to need for average to higher latent traits. Regarding items’ performance, all items of the DTDD-Bangla, especially Machiavellianism and psychopathy, in five-point or nine-point scale compared to seven-point scale that used in differences between groups in terms of age and gender using the observed scores of the DTDD-Bangla are valid. Chiorri et al. (2017) and Pechorro et al. (2019) also showed measurement invariance of the DTDD between males and females. The present study also suggested that males had significantly higher scores in Machiavellianism and psychopathy than females. These results were consistent with previous studies (Chiorri et al., 2017; Savard et al., 2017; Ozsoy et al., 2017). The present study also suggested non-significant mean differences in narcissism scores between males and females. Several studies using DTDD have suggested similar non-significant mean differences between males and females in narcissism (Czarna et al., 2016; Savard et al., 2017; Ozsoy et al., 2017). The item difficulty index of GRM in Table 1 suggested that items of the narcissism subscale were easiest to endorse compared to two other subscales. These results reflected that these items manifested more socially acceptable behaviors compared to the Machiavellianism and psychopathy. Rauthmann and Kolar (2012) opined narcissism as the ‘brightest’ trait among the Dark Triad. Therefore, less manifestation of socially undesirable behaviors in narcissism subscale might be a possible reason for the non-significant mean differences between men and women. Cultural changes in gender roles over time might be another possible reason. Women have become more similar to men on various agentic traits like aggressiveness, displaying dominance, intimadating, directive leadership style and arrogance etc.

In a nutshell, the Bangla version of the Dark Triad Dirty Dozen is a psychometrically sound instrument having adequate reliabilities and validity for assessing the dark part of human nature in the Bangladesh context. In the present study, both classical test theory (CTT) and item response theory (IRT) provided precise information about the psychometric properties of the DTDD-Bangla. IRT analysis provides item-level information that complements the data from CTT and IRT has some apparent advantages over the CTT. The IRT model (GRM) provided information regarding measurement precision. Scale information curves help to understand whether each subscale of the DTDD-Bangla is best suited for assessing the higher level of the respective dark trait or not. GRM also suggested possible improvements to the DTDD-Bangla. Item characteristic curves suggested to utilize the reduced number of response options instead of seven response options. Moreover, Rho reliability in IRT is almost unbiased (Sijsma and Molenaar, 1987) compared to Cronbach’s alpha. Therefore, the use of IRT models for assessing scale’s psychometric properties is becoming popular among researchers.

4.1. Limitations and recommendations

Nevertheless, the Bangla version of the Dark Triad Dirty Dozen has several limitations. Firstly, none of the participants selected the highest response option (strongly agree [7]) in item 7 (‘Callous or insensitive’). Bangla translation of this item might pose some undesirability, and therefore, participants might avoid endorsing the highest response option. Here, “insensitive, things don’t touch me” [developed by Muris et al. (2013)] could be replaced instead of “callous or insensitive”. It might give a more precise meaning of item 7. Reformation of this item could improve the psychometric properties of the psychopathy scale. Further study would be conducted to assess the suitability of the proposed alternative item of the psychopathy subscale. In the online survey which data were analyzed in this study, a seven-point Likert scale was used for the DTDD-Bangla as in Chiorri et al. (2017), Garcia et al. (2018), Jonason and Luevano (2013), Kajonius et al. (2016), etc. Some studies used a five-point Likert scale (Carter et al., 2015; Jonason et al., 2013; Ozsoy et al., 2017; Pechorro et al., 2019) and some other used a nine-point Likert type scale (Jonason and Webster, 2010; Savard et al., 2017). Hence, further researches are recommended to scrutinize the accurate number of response options of the DTDD-Bangla. These studies would also be helpful to assess the biasness in item 7. These future studies would also be helpful to evaluate differences in items’ performance of the DTDD-Bangla, especially Machiavellianism and psychopathy, in five-point or nine-point scale compared to seven-point scale that used in
the present study. Second, scales information curves for the Machiavellianism and narcissism subscales were much wavy. It is much difficul
to decide regarding at which θ level these provides the most information.
This might be due to the nature of the data (online data) or the language
of the DTDD-Bangla. Further research, including the interview data
collection method, might explore the possible reasons. Third, this scale’s
convergent and discriminant validities were not assessed in this study.
Future studies should include some standard measures that assess indi
vidual dark traits, personality, mental health, etc. along with the
DTDD-Bangla. Third, the current data collected via online data collection
platform, and these data may be subjected to social desirability bias.

5. Conclusion

In the present study, the psychometric properties of the DTDD-Bangla
were assessed. This scale had adequate item discrimination indices in
two classical test theory and item response theory. Besides, its factor
structure in the Bangla language as same as the other studies reported.
This scale had good reliabilities, discriminatory power, etc. The multi
group CFA suggested that this tool assess the same construct between age
groups and gender. This scale would be helpful for psychologists and
researchers to evaluate the dark traits among Bangladeshi people.

Declarations

Author contribution statement

O. Ahmed: Conceived and designed the experiments; Performed the
experiments; Analyzed and interpreted the data; Contributed reagents,
materials, analysis tools or data; Wrote the paper.

L. Nahter, R. Islam: Performed the experiments; Analyzed and inter
preted the data; Contributed reagents, materials, analysis tools or data;
Wrote the paper.

M. Akter, S. Deb: Performed the experiments; Contributed reagents,
materials, analysis tools or data; Wrote the paper.

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The authors declare no conflict of interest.

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Appendix

The Bangla version of the Dark Triad Dirty Dozen

1. আমার কাজের নৈতিক ভিত্তি নিয়ে চিন্তা করিনা
2. আমি প্রতিষ্ঠানের আদর্শকে নির্ভর করি না
3. আমার কাজের আদর্শকের আদর্শকে নির্ভর করে
4. আমি আমার কাজ সমস্ত করে অন্যদের কার্যগত কাজের পূর্বসূত্র আমার রয়েছে

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