



Validating the Bangla version of the Dimensions of Mastery Questionnaire (DMQ-18) for preschoolers

Salowa Salam Shaoli^a, Shaheen Islam^a, Shamsul Haque^b, Azharul Islam^{a,b,*}

^a Department of Educational and Counselling Psychology, University of Dhaka, Dhaka-1000, Bangladesh

^b Department of Psychology, Jeffrey Cheah School of Medicine and Health Sciences, Monash University Malaysia, Jalan Lagoon Selatan, 47500 Bandar Sunway, Selangor Darul Ehsan, Malaysia

ARTICLE INFO

Keywords:

DMQ-18
Preschooler
Mastery motivation
Factors
Reliability
Validity

ABSTRACT

Background: The Preschool version of the Dimensions of Mastery Questionnaire (DMQ-18) is a popular instrument to assess children's ability to master the environment through action or activity to explore, influence, or control the physical atmosphere. Although this instrument was originally developed in English, it has now been translated and validated in five other languages: Hungarian, Turkish, Chinese, Spanish, and Persian. As we notice a growing interest in research on the mastery motivation among Bangladeshi preschoolers, we have taken this effort to translate and validate the DMQ-18 and explore the factor structure of the Bangla version of this questionnaire.

Method: After translating all 39 items of the questionnaire into Bangla, it was administered on 206 children, aged 3 to 6 years, recruited randomly from ten preschools in Dhaka. The schools were selected randomly from the official list of preschools prepared by the Dhaka City Corporation. Class teachers of the respective children completed the questionnaire with the assistant of research assistants.

Results: The Bangla version of the questionnaire retained all 39 items, with seven factors as they were in the English version. The Bangla version shows sufficient reliability (Cronbach's alpha = 0.87; test-retest reliability = 0.89 for whole questionnaire and .79–.89 for sub-scales; inter-rater reliability = 0.88 for whole questionnaire and .79–.88 for sub-scales), and validity (correlated positively with the English version; $r = 0.85$).

Conclusion: Due to its robust psychometric properties, the Bangla DMQ-18 is suggested to be used for Bangladeshi preschool children to assess their mastery motivation.

1. Introduction

Mastery motivation refers to an individual's drive to attempt independently, in a focused and persistent manner, to solve a problem or master a skill or task which is at least moderately challenging for the individual (Morgan et al., 1990). This drive is intrinsic to explore and master one's environment, and thus impact his/her psychosocial and cognitive development (Shonkoff and Phillips, 2000). It contributes to the development of quality social relations, achievements in physical activities, and coping with environmental challenges (Ryan and Deci, 2000). Further, it provides children with more positive attachment to their caretakers or teachers and helps develop positive behaviour towards school, with a positive effect on their academic achievement (Richard et al., 1994). Due to its critical role in the development of necessary skills among children, there is a need for assessing mastery

motivation to predict their future success in academic and social life (Morgan et al., 2017a).

Although the adult version of mastery motivation questionnaire was translated into Bangla to try it out on Bangladeshi population (see Gilmore et al., 2017), there has been no effort to do the same for the preschool version of the questionnaire. We also did not find any other mastery motivation assessment tools for Bangla speaking preschoolers. As interest in research on preschoolers' mastery motivation has been increasing in Bangladesh, we aimed to translate the Preschool version of the Dimensions of Mastery Questionnaire (DMQ-18) into Bangla and establish its psychometric properties, such as reliability, validity and factor structure.

With respect to children's motivation to achieve goals, several terms have been used, such as mastery motivation, competence, motivation, and achievement motivation (Messer, 1993). Competence motivation is

* Corresponding author.

E-mail addresses: salowasalam.shaoli@gmail.com (S.S. Shaoli), shaheen.islam8@gmail.com (S. Islam), shamsul@monash.edu (S. Haque), md.islam@monash.edu (A. Islam).

<https://doi.org/10.1016/j.ajp.2019.07.044>

Received 16 May 2019; Received in revised form 3 July 2019; Accepted 23 July 2019

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defined as children's motivation to master tasks and increase knowledge and skills. According to White (1959), competence motivation is "an organism's capability to act effectively with the environment" (p. 297). Mastery motivation and achievement motivation are quite related. Achievement motivation is a drive to fulfil three distinct objectives, such as acquiring new knowledge and skill, obtaining favourable judgments from others, and avoiding unfavourable judgments (Dweck and Elliott, 1983).

Mastery motivation is multifaceted; its indicators are divided into two types: instrumental and expressive (Morgan, Liao, Nyitrai, & Wang, 2017b). The instrumental aspect motivates an individual to try to solve a problem or master a skill or task that is moderately difficult (Morgan et al., 1990). Expressive aspects involve emotional displays during or following attempts to regulate and/or master tasks or outcomes. Task persistence has been the key indicator of instrumental aspects of mastery motivation, and task pleasure has been the key indicator of expressive aspects of it. Other instrumental aspects of mastery motivation include the preference for one's own physical and/or cognitive control over the environment and preference for moderate challenge or novelty (Morgan et al., 2017b). Other expressive aspects of mastery motivation include responses pertaining to relevant emotions in addition to pleasure—e.g. interest, pride, frustration, anger, sadness, and shame (Jennings et al., 1979).

Mastery motivation remains moderately stable over the toddler years. The quality of the home environment during infancy has been observed to significantly impact on toddler's mastery motivation (Wang et al., 2011). A recent study has shown that mastery motivation plays a vital role in school success, and its predictive power remained strong even after controlling for children's IQ and their parents' education (Józsa et al., 2015). Several other studies reported strong associations between mastery motivation, and both GPA and achievements in school subjects (Józsa, 2007; Józsa and Molnár, 2013; Jozsa and Morgan, 2014).

To assess mastery motivation, individualized structured tasks are available for toddlers and young preschoolers, aged 3–8 years (Józsa et al., 2015; Morgan et al., 1992; Wang et al., 2013); and children, aged 7–10 years (Morgan and Bartholomew, 1998). A questionnaire completed by parents, teachers or caretakers can supplement the typical short observational or behavioural task measures of mastery motivation because such raters have the opportunity to observe the child in other contexts for an extended period. Mastery motivation is a developmental feature that should be used as a key component of a comprehensive evaluation of a child's functioning and capability (Shonkoff and Phillips, 2000).

While searching for a psychometric tool for preschoolers' mastery motivation, the Dimensions of Mastery Questionnaire (DMQ) has appeared. This questionnaire has been evolved over the last four decades with several versions. The early version, which was in English, called MOMM (Mother's Observation of Mastery Motivation) relied on mother's rating on the child (age 1–5 years) mastery motivation (Morgan et al., 1983). This version was validated on preschoolers recruited from Colorado, Denver and Pittsburgh from 1981 to 1983 (Butterfield and Miller, 1984; Morgan et al., 1983). Further development of this questionnaire resulted in several other versions, such as DMQ-G (DMQ-general scale) (Fung, 1984), DMQ-E (The Expanded DMQ) (Morgan et al., 1990), DMQ-ES (DMQ with expanded social scales aka DMQ-16) (Knauf et al., 1998) and DMQ-17 (Morgan et al., 2014). The DMQ-17 was developed and used from 1997 to 2014. After a series of validity and reliability studies across different age groups and cultures, the current version called DMQ-18 has emerged (Józsa and Morgan, 2015; Morgan et al., 2019). This version has been modified to fit with different age groups such as the newborn, preschoolers and school-age children (Wang et al., 2016).

We are particularly concerned about the preschool version of DMQ-18, which has seven sub-scales, four for the instrumental (persistence) aspects of mastery motivation, two for the expressive aspects of mastery

motivation, and one for the assessment of competency or the ability to solve problems. This version has 39 Likert-type items, each rated as 1 (not at all like this child) to 5 (exactly like this child) by an adult for children aged approximately 2 to 6 years (Józsa and Morgan, 2015). Psychometric properties of this version were found satisfactory. Internal consistency (Cronbach's alpha ranged from 0.79 to 0.96), and temporal stability for all sub-scales were adequate to excellent (test-retest reliabilities ranged from 0.79 to .89) (Józsa and Morgan, 2015). Inter-rater reliabilities calculated using intra-class correlation coefficients based on ratings of 133 children by their two preschool teachers were generally satisfactory (Józsa and Morgan, 2015).

For factorial evidence of DMQ-18, Jozsa and Morgan (2015) used a five-factor principal axis factor analysis (PAF) with Promax (oblique) rotation to see whether the grouping of items fit the theory that there are four distinct persistence dimensions and a distinct mastery pleasure dimension. The results of this 5-factor PAF analysis indicate an excellent fit for the theory and the empirical data because each of the items in the five sub-scales had high factor loadings (0.5 or above) on the appropriate factor, and there were no items that cross-loaded above 0.4 on another sub-scale. Item six did not load above 0.4 on any sub-scale, which may mean that it should be deleted or rewritten (Józsa and Morgan, 2015). On the other hand, evidence for factorial validity is strong for Turkish preschool children that the seven-factor structure of the questionnaire was confirmed after the Confirmatory Factor Analysis (CFA) (Özbeý, 2017).

As the DMQ-18 is a quick and easy-to-use tool with robust psychometric properties, we decided to translate this questionnaire into Bangla and validate it on a sample recruited from Bangladesh. Mastery motivation, as it is found to predict children's success in school, an early assessment of this construct would be essential to support the development of appropriate intervention and education program for preschool children. The translation and validation of the DMQ-18 in different languages: English and Chinese (Morgan et al., 2017b), Spanish and Hungarian (Józsa and Morgan, 2015), Turkish (Özbeý, 2017) and Persian (Salavati et al., 2018), shows its popularity. We, therefore, aim to (i) translate the questionnaire into Bangla; (ii) check factor structure of the questionnaire, and (iii) assess reliability and validity of the questionnaire on a sample of preschoolers recruited from Bangladesh.

2. Material and method

2.1. Sample and sampling

To determine the adequate sample size for the current study, we used the criterion suggested for factor analyses, which is subjects-to-variables (SVs) ratio of 4:1 or 5:1 (Floyd and Widaman, 1995; Streiner, 1994). According to these criteria, we should have recruited at least 156 participants (i.e., $39 \times 4 = 156$) as there were 39 items on the scale. If we take the stricter criterion (5:1), the sample size should have been 195 ($39 \times 5 = 195$). Our sample size ($N = 206$) exceeded this number. We recruited preschool children aged 3 to 6 years (51.5% girls), selected following a stratified random sampling technique. We scrutinized the whole list of 753 primary schools located in the Dhaka City Corporation area and found that only 50 have the pre-primary sections taking students aged 3 to 6 years. We approached all those 50 schools, but only 13 schools granted permission for data collection. From those 13 schools, we randomly selected ten schools for our study from where participants were chosen randomly from preschool sections. Before initiating the study, the Institutional Ethics Committee approval was obtained.

2.2. Instruments

Besides gathering the children's demographic information, such as age, sex and grade, the Bangla version of the DMQ-18 for preschoolers was used. This questionnaire had seven sub-scales containing 39 items,

of which four sub-scales measure the instrumental; two sub-scales measure expressive and one sub-scale measure competence aspects of mastery motivation. The negative items worded in the same direction, negatively, and reverse coded. Internal consistency of the original DMQ-18 for the four instrumental sub-scales, mastery pleasure and general competence was all good (0.72-0.96) (Józsa and Morgan, 2015).

2.3. Study procedure

The validity of the Bangla translation of the questionnaire was checked by following the guidelines prescribed by Sousa and Rojjanasrirat (2011). Two independent translators, one subject matter expert and other knowledgeable in cultural and linguistic nuances in Bangla and English, translated the questionnaire into Bangla (i.e., forward translation). Both translated versions were then given to an “expert review committee”, consisting of four members. This committee finalised the first draft of the Bangla version of the tool. The version was administered to a small group of individuals to get further feedback on the clarity and comprehensiveness of the items. This group was comprised of 15 participants; of which nine were parents who had children aged 2–6 years, and six teachers of Pre-primary level and Grade 1. All parents had at least a master’s level qualification, and all teachers had degrees in Master of Education. Necessary modifications were done based on their feedback, which was later approved by the expert panel.

For the back translation of the questionnaire, two independent bilingual translators were employed, who had not seen the English version of the DMQ-18 before. The same expert review committee examined the back translation of the questionnaire and approved it. A pilot study was then conducted with this pre-final version on teachers and parents of the 15 preschoolers to check the item suitability - their meaning and difficulty. During data collection, the teachers and parents could ask questions about words or concepts which they could not understand. Their feedback was noted to check whether it was necessary to modify any item. No item was, however, required to be modified after the pilot study. Teachers and parents were also interviewed after data collection for any word, concept, or expression that they found confusing, complicated, unacceptable or offensive. Eighty-six percent of them indicated that they had easily understood the language of the questionnaire. This version of the questionnaire was then approved for the field study.

Three research assistants, all holding Master level qualifications in psychology, assisted in data collection, thus maintaining the uniformity in test administration. During data collection, the research assistants read out the items to the teachers and recorded the responses. There were 46 teachers in total who rated 206 children from ten schools.

A subsample of 30 children, randomly selected from the primary sample, was rated by their parents to ascertain inter-rater reliability of the questionnaire. Two weeks later, another subsample of 50 children, again randomly selected from the main sample, was rated by their teachers for the second time to assess the questionnaire’s test-retest reliability. The calculation of test-retest and inter-rater reliability involved examining Intra-class correlation coefficients (ICC). For an 80% power with alpha fixed at 0.05, a minimum sample size of 22 is recommended to detect the ICC value 0.50 (Bujang and Baharum, 2017). In case of possible drop-out during the re-test, a further twenty percent of the minimum sample size is recommended for inclusion, which gives the number of the sample size required would be inflated to 28 (i.e. $22/0.8 = 27.5$). Our sample size of 30 (for inter-rater reliability) and 50 (for test-retest) exceeded this number.

A third subsample of 20 children, picked from the main sample, was also rated in a gap of one day using the English version of the DMQ-18 to establish the concurrent validity of the Bangla version of the questionnaire. For test-retest reliability, the same research assistants collected the data for the same child two weeks apart. Similarly, for inter-rater reliability, the same research assistants administered the scale to

both teachers and parents. Before commencing data collection, all teachers and parents signed the informed consent form.

2.4. Data analysis

Data were processed using the computer program IBM SPSS, version 23. All accumulated data were checked for missing values and outliers. Inter-item correlations and item-total correlations were assessed for item analysis. Reliability of the questionnaire was estimated by internal consistency (Cronbach’s alpha). Concurrent validity was checked through a correlational analysis between Bangla and English version of the DMQ-18. The test-retest reliability was established through intra-class correlation coefficients (ICC). The factor structure of the Bangla DMQ-18 was determined by conducting item analysis and exploratory factor analysis (EFA). We conducted Principal Axis Factoring (PFA) with Promax (oblique) rotation to identify clusters of variables or factor structure of the questionnaire (Field, 2017).

3. Results

3.1. Descriptive statistics

The DMQ-18 had seven sub-scales. Table 1 presents the number of items for each sub-scale and average scores as rated by class teachers of the children. The mean scores varied from 3.41 (SD = 0.64) to 4.28 (SD = 0.48).

3.2. Reliability

3.2.1. Internal consistency

According to Cronbach (1951), if a scale has sub-scales, internal consistency should be calculated separately for those sub-scales. Table 2 shows the corrected item-total correlation coefficients, which are all above 0.30. The reliability coefficients of the seven sub-scales were calculated by Cronbach’s alpha, which varies between 0.83 and .94. The internal consistency of the whole DMQ-18 was 0.87. The internal consistency of the Bangla DMQ-18 has been quite similar to the DMQ-18 translated in other languages (Table 3).

3.2.2. Test-retest and inter-rater reliability

The test-retest reliability for the whole questionnaire and the seven sub-scales were calculated from the two ratings, given two weeks apart, by class teachers of a subsample of 50 children. The ICC ranged from 0.79 to 0.89 for all sub-scales, indicating good test-retest reliability (Table 4). The test-retest reliability for the whole questionnaire was also adequate (ICC = 0.89). The inter-rater reliability of the questionnaire was checked through calculating correlation coefficients between ratings given by parents and class teachers of a subsample of 30 children. The ICC ranged from 0.79 to 0.88 for all the sub-scales, indicating their high reliability (Table 4). The inter-rater reliability of the whole questionnaire was also high (ICC = 0.88).

Table 1
Mean and standard deviation of the Bangla version of DMQ-18 (N = 206).

Sub-scales	Items	M	SD
Cognitive Persistence	5	4.12	.74
Gross motor Persistence	5	3.52	.96
Social persistence with adult	5	3.71	.72
Social persistence with peer	6	3.98	.76
Mastery pleasure	5	4.28	.48
Negative Reactions to Failure	8	3.41	.64
General Competence	5	3.49	.65
Total	39	3.76	.36

Table 2
Internal consistency of items and sub-scales of DMQ-18 Bangla version.

Subscale	Items	Inter-item correlation range	Corrected item-total correlation	Cronbach's alpha	Alfa if item deleted	
Cognitive persistence	1	.45 to .78	.62	.89	.898	
	14		.79		.860	
	17		.73		.877	
	23		.83		.853	
	29		.76		.869	
Gross motor persistence	3	.64 to .85	.78	.94	.937	
	12		.87		.922	
	26		.82		.931	
	36		.86		.922	
	38		.85		.925	
Social persistence with adult	8	.49 to .77	.79	.89	.856	
	15		.68		.883	
	22		.70		.877	
	33		.73		.872	
	37		.78		.858	
Social persistence with peer	6	.37 to .74	.72	.88	.853	
	7		.56		.883	
	25		.73		.851	
	28		.78		.844	
	32		.74		.853	
	35		.64		.864	
	30		.87		.829	
Mastery pleasure	2	.38 to .67	.67	.85	.829	
	11		.64		.837	
	18		.69		.827	
	21		.82		.789	
	30		.87		.853	
Negative reactions to failure	<i>Sadness/shame reaction</i>	.20 to .70	5	.83	.803	
			24		.57	.814
			34		.48	.825
			39		.55	.816
	<i>Frustration/anger reaction</i>		9		.46	.829
			13		.63	.808
			16		.69	.796
			19		.50	.823
General competence	4	.41 to .78	.70	.86	.833	
	10		.74		.825	
	20		.59		.866	
	27		.69		.838	
	31		.74		.824	
Total α (.87)						

Table 3
Cronbach's alpha of the Bangla DMQ-18 and its other language versions.

Study	Language	N	Sub-scales						
			1	2	3	4	5	6	7
Present Study	Bangla	206	.89	.94	.89	.88	.85	.83	.86
Józsa and Morgan (2015)	Hungarian	211	.93	.96	.91	.90	.90	.79	.94
Özbey (2017)	Turkish	207	.86	.84	.88	.87	.88	.84	.91
Salavati et al. (2018)	Persian	230	.76	.74	.61	.62	.68	.65 ^a .41 ^a	.80

^aThe two-part of Negative Reaction sub-scale.

Table 4
Inter-rater and test-retest reliability of the Bangla version of DMQ-18.

Sub-scales	Items	Inter-rater ICC	Test-retest ICC
<i>n</i>		30	50
Cognitive Persistence	5	.85	.84
Gross Motor Persistence	5	.86	.88
Social Persistence with Adult	5	.80	.86
Social Persistence with Peer	6	.83	.88
Mastery Pleasure	5	.88	.79
Negative Reactions	8	.85	.89
General Competence	5	.79	.85
Total	39	.88	.89

***p* < .01 Note. ICC = Intra-class correlation coefficient.

3.3. Validity

3.3.1. Concurrent validity

Concurrent validity of the Bangla DMQ-18 was calculated through the rating data produced by the class teachers using both Bangla and English version of the questionnaire. The data appeared from a sub-sample of 20 children were used for this purpose. As can be seen in Table 5, the two versions of the questionnaire highly correlated with each other ($r = 0.85$, $N = 20$, $p < 0.01$), revealing strong concurrent validity. Adequate concurrent validity was also observed for all seven sub-scales (Table 6).

Table 5
Correlations between the English and Bangla version of DMQ-18.

Sub-scales	Items	Concurrent validity (<i>r</i>)
<i>n</i>		20
Cognitive Persistence	5	.87
Gross Motor Persistence	5	.86
Social Persistence with Adult	5	.74
Social Persistence with Peer	6	.85
Mastery Pleasure	5	.78
Negative Reactions	8	.72
General Competence	5	.80
Total	39	.85

***p* < .01.

Table 6
Principal Axis Factoring of the items from DMQ-18 for 206 Bangladeshi Preschool children.

Sub-scales and Items	Gross motor persistence	Cognitive persistence	Social persistent w. peer	Social persistent w. adult	Negative reactions to failure	General competence	Mastery pleasure	Uniqueness	Communality
Gross motor persistence									
26. Repeats jumping/running skills until can do them	.93							.216	.784
12. Tries to do well in physical activities	.91							.135	.865
38. Tries hard to improve throwing or kicking	.88							.178	.822
36. Tries hard to get better at physical skills	.86							.144	.856
3. Tries to do well at motor activities	.79							.247	.753
Cognitive persistence									
23. Works for a long time trying something challenging		.90						.203	.797
29. Works for a long time trying to put something together		.82						.353	.647
14. Tries to complete tasks, even if it takes time to finish		.81						.270	.730
17. Tries to complete puzzles even if it takes hard work		.77						.309	.691
1. Repeats a new skill until he or she can do it		.60						.547	.453
Social persistent with peer									
32. Tries to get included when other children are playing			.87					.250	.750
28. Tries hard to make friends with other kids			.79					.245	.755
35. Tries to keep play with other kids going for a long time			.75					.441	.559
25. Tries to understand other children			.71					.344	.656
6. Tries hard to make other children feel better			.67					.364	.636
7. Tries to do and say things that keep children interested			.39					.431	.569
Social persistent with adult									
8. When talking with adults, tries to keep them interested				.85				.239	.761
15. Tries hard to interest adults in playing with him or her				.80				.436	.564
22. Tries hard to get adults to understand him or her				.79				.389	.611
33. Tries to figure out what adults like and don't like				.78				.369	.631
37. Tries hard to understand my feelings and other adults				.77				.275	.725
Negative reactions to failure									
34. Looks away when tries but cannot do something					.86			.305	.695
5. Seems sad when doesn't accomplish a goal					.75			.384	.616
24. Won't look people's eye when cannot do something					.74			.444	.556
9. Gets upset when not able to complete a challenging task					.68			.482	.518
16. Protests after failing at something					.60			.456	.544
39. Withdraws after trying but not succeeding					.51			.530	.470
19. Gets angry if cannot do something after trying hard					.48			.598	.402
13. Gets frustrated when does not do well at something					.45			.639	.361
General competence									

(continued on next page)

Table 6 (continued)

Sub-scales and Items	Gross motor persistence	Cognitive persistence	Social persistent w. peer	Social persistent w. adult	Negative reactions to failure	General competence	Mastery pleasure	Uniqueness	Communality
31. Understandings things well						.90		.265	.735
10. Is very good at doing most things						.84		.268	.732
4. Solves problems quickly						.72		.321	.679
27. Does things better than other children of his/her age						.67		.451	.549
20. Does things that are difficult for children for his/her age						.49		.432	.568
Mastery pleasure									
21. Is pleased when solves a challenging problem							.96	.126	.874
2. Smiles broadly after finishing something							.70	.401	.599
11. Shows excitement when he or she is successful							.67	.362	.638
30. Smiles when he or she makes something happen							.58	.587	.413
18. Gets excited when he or she figures something out							.54	.379	.621
Eigen values	8.477	5.355	4.103	2.991	2.344	2.203	1.327		

3.3.2. Factor structure

The internal structure of DMQ-18 was tested by EFA, using PAF with Promax (oblique) rotation. Eighty-five per cent of the total 741 inter-item correlations were significant, and a substantial number of coefficients was 0.30 and above. The Kaiser–Meyer–Olkin (KMO) index was 0.733, exceeding the recommended value of 0.6 (Kaiser, 1970) and Bartlett’s Test of Sphericity (Bartlett, 1954) attained statistical significance ($\chi^2 = 6460.29, p < 0.0001$), indicating that the data were suitable for factor analysis (Field, 2017). The pattern matrix showed seven factors with Eigenvalues over one explain 68.72% of the variance. The scree plot was ambiguous and showed inflexions that would justify retaining all seven factors. Table 5 shows the results of the factor loadings after rotation of this seven-factor PAF analysis that no item loads below 0.30. Additionally, no item has cross-loaded (above .40) on another sub-scale.

4. Discussion

This study describes the adaptation and initial psychometric properties of the Bangla version of the DMQ-18 for preschoolers. The DMQ-18 comprises 39 items and seven sub-scales: cognitive persistence, gross motor persistence, social persistence with an adult, social persistence with peer, mastery pleasure, negative reactions to failure, and general competence. Reliability, temporal stability and validity evidence indicate that the overall Bangla DMQ-18 and its sub-scales possess robust psychometric properties.

No item from the original questionnaire was dropped following item analysis and factor analysis. The results of the factor analysis revealed seven factors that no item loads below 0.30, which indicates an excellent fit for the theory and empirical data because each of the items in the seven sub-scales had high factor loadings on the appropriate factor. There were no items that cross-loaded (above 0.40) on another sub-scale. Item six (Tries hard to make other children feel better if they cry or seem sad) loaded on the social persistent with peers sub-scale, which was not the case in the Józsa and Morgan (2015)’s study. Overall, the seven factors that have been extracted from the Bangla DMQ-18 is consistent with the results of the Turkish version of the same questionnaire (Özbey, 2017).

In item-total correlation for 39 items, the negative items had lower correlation, but alpha-value did not change if those items were deleted. The reliability of the Bangla DMQ-18 has been excellent. The alpha reliability coefficients of the sub-scales varied between 0.71 and 0.94. The criterion for evaluating alpha coefficients were derived from George and Mallery (2003) who provided the following rules of thumb: Excellent ($\alpha \geq 0.9$), Good ($0.9 > \alpha \geq 0.8$), Acceptable ($0.8 > \alpha \geq 0.7$), Questionable ($0.7 > \alpha \geq 0.6$), Poor ($0.6 > \alpha \geq 0.5$) and Unacceptable ($\alpha < 0.5$). It is noteworthy that the coefficient of alpha of the Bangla DMQ-18 is 0.87, meaning “good”. The findings of internal consistency were consistent with the original questionnaire and other adaptations (Józsa and Morgan, 2015; Özbey, 2017; Salavati et al., 2018). The results of all reliability measures showed the Bangla version of DMQ-18 for preschoolers as highly reliable.

Although the adaptation of the DMQ-18 into Bangla was considered appropriate and that the questionnaire has appeared to be psychometrically sound, it would still require further improvement. Several recommendations could be made: (i) as data were only taken from the Dhaka metropolitan area, future study should consider gathering data from other parts of the country; (ii) effort should be made to administer the questionnaire on intellectually challenged children for further validation; (iii) the psychometric properties of DMQ-18 is known to vary with reference to the age and sex of the children, and the education level of the parents (see, Gilmore et al., 2017; Morgan et al., 2017b), which has not been explored in the current study and warranted for further investigation, and (iii) large scale research should be conducted to establish a norm for the questionnaire.

Financial disclosure

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Authorship

(1) Conception and design of the study: Salowa Salam Shaoli and Shaheen Islam (2) Acquisition of data, or analysis and interpretation of data: Salowa Salam Shaoli (3) Drafting the article or revising it critically for important intellectual content: Salowa Salam Shaoli, Azharul Islam and Shamsul Haque

(4) Final approval of the version to be submitted: Salowa Salam Shaoli, Shaheen Islam, Azharul Islam, and Shamsul Haque

Declaration of competing interest

All authors have no conflict of interest.

Acknowledgement

The authors thank to all the teachers and parents participated in this study. They also acknowledge Monash University Malaysia for offering a Graduate Research Merit Scholarship to Azharul Islam. The authors would like to thank the anonymous reviewers of this paper.

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