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Adaptation and Validation of the Inventory of School Climate–Student (ISC-S) Among Secondary School Students in Bangladesh

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Abstract

School climate is globally recognized as a key determinant of students' academic success, psychological well-being, social development, and overall school engagement. But there is no reliable and valid scale in Bangla to measure school climate in Bangladesh. To address this crucial gap, this study aimed to adapt and validate the Bangla Short Form of the School Climate Inventory-Student (BSF ISC-S) in the Bangladeshi context. The translated Bangla version of ISC-S was tested on 1515 secondary school students, selected using a convenience sampling method from various high schools in Bangladesh. Following corrected item-total correlation, item discrimination, and exploratory factor analyses, three items from each of the 10 subscales of ISC-S were retained, establishing the 30-item BSF ICS-S. Then, confirmatory factor analysis confirmed and validated the 10-correlated first-order factor structure of the BSF ICS-S. The BSF ISC-S scale was found to be invariant across gender, developmental period, and educational level. Furthermore, the instrument exhibited acceptable Cronbach's alpha, test-retest reliability, and robust convergent and divergent validity. These strong psychometric properties indicate that researchers and administrators can use the BSF ICS-S as a valid and reliable instrument to measure positive school climate in Bangladesh.

Keywords: ISC-S, Bangla ISC-S, school climate measures, factor structure, invariance analysis

Introduction

School climate is a widely recognized construct that can be defined as the quality of the school environment as perceived by students, teachers, and staff (Brand, 2008). It covers norms, values, mutual relationships, teaching-learning strategies, safety, and the overall

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infrastructure of institutions (Thapa et al., 2013). A positive school climate promotes students' sense of connectedness, school success, motivation, and emotional well-being, while lowering violence, dropout rates, and risky or delinquent behaviors (Thapa et al., 2013; Zullig et al., 2010). In addition, there is a strong association between students' perceptions of the institutional environment and their academic performance in school, as well as their psychological and behavioral adaptation (Brand & Felner, 1996). Commonly known school climate dimensions consist of student-teacher relationships, teacher support, relationships with peers, fairness of rules, consistency and clarity of expectations, teaching practices, school attachment, safety, and cultural diversity (Hanson, n.d.). These dimensions combinedly affect students' motivation, psychological well-being, and overall learning process (Zullig et al., 2010)

There are several assessment tools for measuring school climate (Hanson, n.d.). Most of them are structured inventories that ask participants how much they agree with specific statements about the classroom and the institution (Brand et al., 2003). A systematic review was conducted to identify school climate measures developed and published between 1933 and 2017 (Lenz et al., 2021). Lenz et al. (2021) identified and evaluated 9 school climate measures, which focused on four distinct areas of school climate: organizational structure, safety issues, community involvement, and academic atmosphere. These instruments were "What's Happening In This School? (WHITS) Questionnaire (Aldridge & Ala'I, 2013)," "Georgia Brief School Climate Inventory (White et al., 2014)," "School Climate for Diversity - Secondary Scale (Byrd, 2017)," "School Climate and School Identification Measure Student (Lee et al., 2017)," "Inventory of School Climate-Student (Brand et al., 2003)," "California School Climate and Safety Survey- Short Form (Furlong et al., 2005)," "School Climate Measure (Zullig et al., 2010)," "Delaware School Climate Survey-Student (Bear et al., 2011)," and "Abbreviated School Climate Survey (Ding et al., 2011)." According to Lenz et al. (2021), among them, only 1 assessment tool (Zullig et al., 2010) included all four school climate domains, 3 included three domains (Aldridge and Ala'l 2013; Brand et al., 2003; Ding et al., 2011), 4 included two domains (Bear et al., 2011; Furlong et al., 2005; Lee et al., 2017; White et al., 2014), and 1 included only one domain (Byrd, 2017).

To compare psychometric reliability and validity indices of these 9 measures, Lenz et al. (2021) included 5 parameters (e.g, Cronbach's alpha as internal consistency, test – retest reliability, presence of test content, response process, internal structure, relationships with other constructs, and consequence of testing). 1 point was given for each index. Inventory of school climate – Student (Brand et al., 2003) and Delaware School Climate Survey-Student (Bear et al., 2011) encompassed academic environment, community involvement, safety issues, and organizational structure most comprehensively. However, with its 153 items, it would be less advantageous to apply to a larger campus assessment when compared to the 50-item Inventory of School Climate – Student (Brand et al., 2003), which covers academic atmosphere, community, and safety-related content. Sometimes, shorter measures may be less comprehensive but more useful for some researchers, practitioners, and school-based counselors because of their higher level of validity, representativeness, and parsimony.

Rationale of the study

The term school climate is a globally recognized construct. Students' perception of school climate is a key determinant of academic success (Berkoqitz et al., 2017), prosocial conduct (O'Brennan et al., 2014), resilience and emotional well-being (Aldridge & Ala'I, 2013), as well as psychological and behavioral adjustment (Brand & Felner, 1996). This construct has been widely investigated in Western and some Asian contexts, but there is no systematic evaluation of school climate in Bangladesh. There is no psychometrically sound assessment tool for measuring school climate in our country. That's why this gap underscores the urgent need for a culturally valid and reliable tool to evaluate school climate among Bangladeshi school students.

The Inventory of School Climate – Student (Brand et al., 2003) is one of the most comprehensively used and psychometrically robust instruments. This inventory covered several dimensions of the school environment, such as student commitment to academic achievement, consistency and clarity of rules and expectations, teacher support, peer interaction, instructional innovation, safety, cultural pluralism, and diversity. But this valuable instrument has not previously been adapted and validated in Bangla for Bangladeshi school students.

The education system in Bangladesh is large and diverse across sociocultural and geographical contexts. According to the Bangladesh Bureau of Educational Information and Statistics (2024), there are 21086 secondary schools in Bangladesh. In 2023, the total enrolment in these schools was 9.41 million students. Among them, 3.94 million (45.16%) students were boys, and 5.16 million (54.84%) students were girls. Various significant issues, such as peer interactions, teachers' support, discipline, physical and emotional safety, academic pressure, resource inequities, and infrastructure limitations, are central to students' daily experiences, yet remain understudied due to the lack of a standardized measurement tool. So, a valid and reliable form of ISC-S can help researchers, educators, and policymakers address these burning issues by evaluating school climate across various institutions in Bangladesh.

The Inventory of School Climate – Student (Brand et al., 2003) is a large questionnaire comprising 10 dimensions and 50 items. It requires too much time to administer to a large sample. But at the secondary school level in Bangladesh, classes often contain at least 50 – 80 students per section, and 40-50 minutes are allotted for each class. Sometimes, the school authority and students are unwilling to provide information for such a large questionnaire. The study aimed to adapt and validate a short form of the ISC-S in the Bangladeshi cultural context. Moreover, the short form of ISC-S will enable regular assessment of thousands of schools across the country.

Finally, adapting and validating a globally recognized school climate scale in Bangla will enhance its international comparability. It will facilitate cross-cultural research and the significance of Bangladeshi research data to global school climate studies. This contribution will not only promote the national educational system but also global discussion on school climate research in middle- and low-income countries.

Objectives of the Study

The objectives of the study were-

1. To adapt and validate the Bangla short form of the Inventory of School Climate – Student (BSF ISC-S) scale
2. To assess the measurement invariance of the BSF ISC-S scale
3. To assess the reliability and validity of the BSF ISC-S scale

Method

Participants

Initially, 1515 high school students from junior secondary education (grades 6-8) and secondary education (grades 9-10) were selected using convenience sampling technique from different high schools in Bangladesh. Then we checked for missing values and outliers in the sample. We did not detect any missing values, but we found 32 outliers in the dataset using both the descriptive statistics and Mahalanobis distance tests. After excluding outliers, 1483 participants aged 10-18 years (M = 13.81, SD = 1.49) were retained in the final sample. According to the Bangladesh Strategy for Adolescent Health (2017-2030), respondents' developmental periods were categorized into two groups: early adolescents aged 10 to 14 years and late adolescents aged 15 to 18 years. Among them, boys and girls were 777 (52.4%) and 706 (47.6%), respectively. According to Bangladesh Education Statistics (2023), participants' educational levels were divided into two categories: junior secondary education (grades 6-8) and secondary education (grades 9-10). To conduct exploratory and confirmatory factor analysis on independent sample, the total sample was divided into two subsamples: Subsample 1 (n = 767) and Subsample 2 (n = 716). These subsamples were created using SPSS by a random sample of approximately 50% of all cases.

We performed χ^2 analyses for gender, developmental period, and educational level, as these are categorical variables, to test whether the distributions of these categories differ between the two subsamples. But for age (M = 13.81, SD = 1.49), a continuous variable, we used *a t*-test. We did not find significant differences between the two subsamples in terms of age, gender, developmental period, and participants' educational level (Table 1), suggesting that socio-demographic attributes were equally distributed across the two subsamples.

Table 1
Number of Respondents with Percentage by Gender, Developmental Periods, and Level of Education (n = 1483)

variables	Levels	Total sample (n = 1483)	Subsample-1 (n = 767)	Subsample-2 (n = 716)	Differences between the two subsamples
Gender	Boys	777 (52.4)	396 (51.6)	381 (53.2)	χ^2 (1) = 0.37 p = 0.54
	Girls	706 (47.6)	371 (48.4)	335 (46.8)	
Developmental periods	Early adolescent	970 (65.4)	513 (66.9)	457 (63.8)	χ^2 (1) = 1.53 p = 0.21
	Late adolescent	513 (34.6)	254 (33.1)	259 (36.2)	
Education	Junior secondary	991 (66.8)	529 (69.0)	462 (64.5)	χ^2 (1) = 3.30 p = 0.06
	Secondary	492 (33.2)	238 (31.0)	254 (35.5)	
Age M (SD)	13.81 (1.49)		13.74 (1.52)	13.89 (1.47)	t = 1.69, p = .09

Measures

Inventory of School Climate - Student (ISC-S)

Brand et al. (2003) developed the Inventory of School Climate – Student (ISC-S) to measure the social school climate among secondary school students. 10500 secondary school students in grades 6 to 8 were selected from 188 schools for three studies. The initial form of the scale consisted of 125 items. The final form of the ISC-S scale comprised 50 items after various statistical analyses. Findings of the pilot study suggested that students were more flexible in responding to 5-point Likert-type options (1 = never, 2 = hardly ever, 3 = sometimes, 4 = most of the time, 5 = always) than to a dichotomous yes/no option. Moreover, students were more likely to respond to 4-point Likert-type options without a midpoint in the Cultural Pluralism subscale (1 = never, 2 = hardly ever, 3 = sometimes, 4 = often) and Safety Problems subscale (1 = never, 2 = once or twice, 3 = 3 – 5 times, 4 = 6 or more times).

In the first study, Exploratory factor analysis (EFA) suggested 10 dimensions (Teacher Support, Consistency and Clarity of Rules and Expectations, Student Commitment/ Achievement Orientation, Negative Peer Interaction, Positive Peer Interaction, Disciplinary Harshness, Student Input in Decision Making, Instructional Innovation/Relevance, Support for Cultural Pluralism, and Safety Problems) of ISC-S scale and factor loading values of the items were varied from 0.47 to 0.76 (Brand et al., 2003).

In the second study, Brand et al. (2003) found that confirmatory factor analysis confirmed the EFA factor structure and provided good fit indices (CFI = 0.90, NFI = 0.90). The results of the study also suggested measurement invariance, internal consistency, and test–retest reliability of the scale. The range of Cronbach's alpha coefficient values was from 0.63 for Instructional Innovation/Relevance to 0.81 for Student Commitment (median $\alpha = 0.72$). Test–retest reliability was assessed at 1-year and 2-year intervals differently. In a 1-year gap, correlations between ISC-S ratings ranged from 0.67 to 0.91 (median $r = 0.76$). And in a 2-year gap, correlations between ISC-S ratings ranged from 0.25 to 0.87 (median $r = 0.52$).

In the final study (study 3), convergent and divergent validity of ISC-S was determined with Grades, Academic Aspirations, Academic Efficacy, Self-Expectations, Teacher Expectations, Self-respect, Depression, and Anxiety (Brand et al., 2003).

Bangla Bridge – PYD

Bangla Bridge Positive Youth Development (Bangla Bridge-PYD) scale was translated by Hossain and Islam (2025), which was originally developed by Lopez et al. (2015). This scale consisted of 5 subscales (5Cs: Competence, Confidence, Connection, Character, Caring/Compassion) and 22 items. Each item used a 4-point Likert-type scale without a midpoint (1 = strongly disagree, 2 = disagree, 3 = agree, and 4 = strongly agree). Bangla Bridge-PYD had good internal consistency (Cronbach's alpha = 0.91 and split-half reliability = 0.75) and test–retest reliability ($r = 0.90$). The findings suggested sufficient convergent validity indices with its 5 subscales and the Stirling Children's Wellbeing Bangla Scale. The Bangla Bridge-PYD could explain 4.7% of the total variance in students' Grade Point Average (GPA), suggesting the measure's predictive validity.

Procedure

Bangla translation of the ISC-S: The Bangla translation of the ISC-S was prepared from the original English version, following the standard rules and guidelines suggested by the International Test Commission (ITC, 2017). Initially, available literature on the school climate scales published in different scientific journals was reviewed to ensure the ISC-S had the same meaning in Bangladeshi culture. Experts' opinions were obtained to determine the invariance of the constructs across cultures. The literature review and experts' opinions concluded that the scale was similarly suitable for Bangladeshi culture and had the same definitions and meanings.

Before the translation began, we sent an email requesting permission from Robert Felner, one of the authors of the original ISC-S scale. To carry out the translation process, after obtaining permission, we formed a seven-member expert panel that included two assistant professors of English, one assistant professor from the Bangla Department, and four researchers from the Department of Psychology.

After that, the expert panel evaluated whether the translated items were suitable and consistent with the original English items. The expert panel created a final draft of the

Bangla ISC-S after evaluating both forward and backward translations. After that, a focus group discussion (FGD) with eight students was conducted to gather necessary input on the scale. The expert panel made a few word changes in response to the FGD's feedback and finalized the scale. This final version of the Bangla ISC-S scale was then used for a pilot test with 40 participants. Except for items 10, 47, 48, 49, and 50, every item on the scale had positive corrected item total correlations (value ≥.20). All of the items were kept in the final version of the scale for the main study, which had a large sample size (n = 1515), even though few items failed to show recommended corrected item total correlations, at least 0.20 (Hobart & Cano, 2009), in the pilot study.

Data Collection

To ensure accurate data collection, we used a conventional survey approach rather than an online survey. With the help of research assistants (graduates in psychology), we collected data from students in classes/grades six through ten. Each person received an informed consent form (ICF), instructions, and a questionnaire. First, they were asked to sign the informed consent form after carefully reading the ICF and the instructions. They were asked to complete the questionnaire after verifying their signature on the ICF. They were informed that the questionnaire did not include any option for them to provide their name, class roll/identity number, or contact information, which could compromise the study's validity. Completing the questionnaire takes 15 to 20 minutes. At the end of data collection, the research assistant thanked every participant in the study.

Data Analysis

The IBM SPSS version 23.0, IBM AMOS version 22.0, and R 4.5.2 were used to analyze the data. Items' characteristics were evaluated using descriptive statistics, including means, standard deviations, skewness, and kurtosis. The skewness and kurtosis findings were used to assess the data's normality. For a large sample (n > 300), a skewness score of more than 2 and a kurtosis value greater than 7 indicated that the data were not normal (Kim, 2013).

Corrected item-total correlations (r) and item discrimination power (a) were analyzed before the main analyses. The item does not correlate well with the total scale score if the item-total correlation value is less than 0.3 (Field, 2017). A moderate item discrimination value is ≥ 0.65, while values between 1.35 and 1.69 indicate high, and a value above 1.7 is very high and gives a lot of information near their thresholds (Baker, 2011).

The present study used both EFA and CFA to confirm the factor structure of the translated Bangla form of the ISC-S scale. A significant loading value of 0.40 may be the most widely used cutoff for "good" factor loadings onto a primary factor (Howard, 2016). To ensure that the CFA model fit for the BSF ISC-S scale, we took into consideration the following cutoff values: $\chi^2/df \leq 5$, Goodness of Fit Index (GFI) ≥ .90, Comparative Fit Index (CFI) ≥ .90, and Root Mean Square Residual (RMSR) and Root Mean Square Error of Approximation (RMSEA) ≤ .08 (Schermelleh-Engel et al., 2003)

To evaluate the measurement invariance of the BSF ISC-S scale across respondents' gender, developmental stage, and educational level, a multigroup CFA was conducted. Measurement invariance indicates whether a measure has the same psychometric characteristics across independent groups. Cheung and Rensvold (2002) proposed the use of ΔCFI for invariance decision making. Chen (2007) suggested that ΔCFI ≤.01 and ΔRMSEA ≤.015 can be used as indicators of measurement invariance.

To assess the internal consistency reliability of the BSF ISC-S scale, Cronbach's alpha ($\alpha \geq 0.7$; Nunnally, 1978) was computed. And test–retest reliability ($r = 0.7$) was minimally satisfactory (Kline, 2015). Correlation among 10 subscales of BSF ISC-S and the Bangla Bridge – PYD scale was assessed to determine the convergent and divergent validity of the BSF ISC-S scale.

Results

Descriptive Statistics of the Translated Bangla form of ISC-S

Initially, descriptive statistics (e.g., mean, standard deviation, skewness, and kurtosis), corrected item-total correlations (*r*), and item discrimination power (*a*) were assessed for each item of the translated Bangla form of ISC-S (Table 2). The values of skewness and kurtosis indicated that the data were normally distributed. All scale items, except items 7, 8, 14, 41, 45, 46, 47, 48, and 50, showed acceptable skewness and kurtosis values (Kim, 2013). Table 2 presents corrected item-total correlation values for each item, ranging from 0.29 (item 42) to 0.70 (item 34). These results showed that item number 42 did not correlate well with the total scale score (values were less than 0.30; Field, 2017). However, all the items showed moderate to very high discrimination values, ranging from 1.06 (item 10) to 3.10 (item 50).

Table 2

Descriptive Statistics, Corrected Item Total Correlation (r), and Item Discrimination (a) for Each Item of the Translated Bangla form of the ISC-S Scale

Sub scales	Items	*M*		*SD*	Skewness		Kurtosis		*r*	*a*
		Statistic	*SE*	*Statistic*	*Statistic*	*SE*	*Statistic*	*SE*		
TS	SC1	4.56	.02	.76	-1.85	.06	3.32	.12	.57	1.97
	SC2	4.40	.02	.83	-1.45	.06	1.91	.12	.60	1.93
	SC3	4.26	.02	.94	-1.32	.06	1.40	.12	.62	2.07
	SC4	4.11	.02	.96	-.94	.06	.29	.12	.61	1.85
	SC5	3.56	.03	1.31	-.52	.06	-.89	.12	.61	1.92
	SC6	4.23	.02	.97	-1.32	.06	.88	.12	.66	2.25

Sub scales	Items	*M*		*SD*	Skewness		Kurtosis		*r*	*a*
		Statistic	*SE*	*Statistic*	*Statistic*	*SE*	*Statistic*	*SE*		
CCRE	SC7	4.61	.01	.70	-2.13	.06	5.08	.12	.46	1.75
	SC8	4.66	.01	.66	-2.29	.06	5.66	.12	.48	2.21
	SC9	4.49	.02	.79	-1.72	.06	2.97	.12	.44	1.64
	SC10	4.33	.02	.98	-1.67	.06	2.40	.12	.38	1.06
	SC11	4.44	.02	.90	-1.79	.06	2.98	.12	.39	1.19
SC/ AO	SC12	4.42	.02	.82	-1.49	.06	1.95	.12	.62	2.50
	SC13	4.53	.02	.77	-1.81	.06	3.12	.12	.61	2.61
	SC14	4.71	.01	.64	-2.72	.06	8.76	.12	.46	1.53
	SC15	4.34	.02	.87	-1.41	.06	1.75	.12	.58	1.89
	SC16	4.20	.02	.89	-1.09	.06	.94	.12	.56	1.83
NPI	SC17	4.00	.03	1.25	-1.01	.06	-.18	.12	.53	1.73
	SC18	4.15	.02	1.10	-1.19	.06	.52	.12	.69	2.91
	SC19	4.20	.02	1.13	-1.34	.06	.85	.12	.65	2.53
	SC20	3.50	.03	1.33	-.52	.06	-.85	.12	.59	1.74
	SC21	3.96	.03	1.21	-.95	.06	-.14	.12	.62	1.98
PPI	SC22	4.07	.02	1.01	-1.09	.06	.74	.12	.56	1.80
	SC23	4.21	.02	.99	-1.30	.06	1.31	.12	.60	2.22
	SC24	4.36	.02	.86	-1.50	.06	2.30	.12	.62	2.26
	SC25	4.26	.02	.93	-1.29	.06	1.32	.12	..65	2.73
	SC26	4.22	.02	1.00	-1.33	.06	1.26	.12	.50	1.42
DH	SC27	2.46	.03	1.41	.54	.06	-1.03	.12	.55	1.91
	SC28	3.59	.03	1.34	-.56	.06	-.86	.12	.46	1.19
	SC29	2.96	.03	1.26	-.05	.06	-.97	.12	.60	1.75
	SC30	2.62	.03	1.38	.37	.06	-1.10	.12	.64	2.66
	SC31	2.03	.02	1.08	.75	.06	-.33	.12	.46	1.31
SIDM	SC32	3.67	.03	1.27	-.67	.06	-.59	.12	.62	2.18
	SC33	2.99	.03	1.44	-.00	.06	-1.32	.12	.69	2.85
	SC34	3.17	.03	1.35	-.20	.06	-1.13	.12	.70	2.88
	SC35	3.63	.03	1.24	-.61	.06	-.59	.12	.59	1.64
	SC36	2.93	.03	1.37	-.00	.06	-1.21	.12	.56	1.46

Sub scales	Items	*M*		*SD*	Skewness		Kurtosis		*r*	*a*
		Statistic	*SE*	*Statistic*	*Statistic*	*SE*	*Statistic*	*SE*		
II/R	SC37	4.11	.02	1.01	-1.09	.06	.65	.12	.61	2.52
	SC38	3.95	.02	1.06	-.88	.06	.23	.12	.61	2.59
	SC39	4.08	.02	1.11	-1.17	.06	.61	.12	.49	1.60
	SC40	3.85	.03	1.20	-.82	.06	-.27	.12	.50	1.43
SCP	SC41	3.85	.01	.45	-3.34	.06	12.06	.12	.33	1.78
	SC42	3.58	.02	.75	-1.97	.06	3.4	.12	.29	1.10
	SC43	3.40	.01	.74	-1.02	.06	.29	.12	.39	1.39
	SC44	3.59	.01	.70	-1.75	.06	2.52	.12	.36	1.66
SP	SC45	3.84	.01	.54	-3.87	.06	15.32	.12	.53	2.47
	SC46	3.71	.01	.67	-2.66	.06	6.89	.12	.57	2.30
	SC47	3.87	.01	.53	-4.43	.06	19.32	.12	.42	1.67
	SC48	3.62	.02	.75	-2.18	.06	4.18	.12	.47	1.76
	SC49	3.48	.02	.84	-1.64	.06	1.89	.12	.43	1.26
	SC50	3.93	.01	.41	-6.20	.06	36.47	.12	.50	3.10

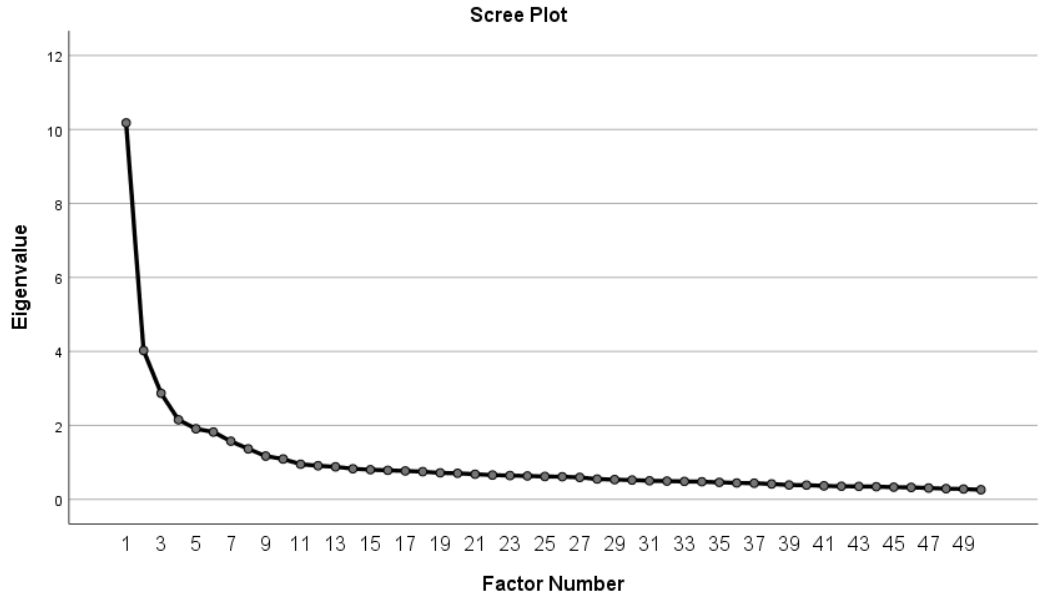
Note. TS = Teacher Support, CCRE = Consistency and Clarity of Rules and Expectations, SC/AO = Student Commitment/Achievement Orientation, NPI = Negative Peer Interaction, PPI = Positive Peer Interaction, DH = Disciplinary Harshness, SIDM = Student Input in Decision Making, II/R = Instructional Innovation/Relevance, SCP = Support for Cultural Pluralism, SP = Safety Problems

Exploratory Factor Analysis (EFA) of the translated Bangla form of ISC-S

To explore the number of factors in the translated Bangla version of the ISC-S scale, we conducted an exploratory factor analysis (EFA) on Subsample 1 (n = 767). Based on the principal axis factoring approach, the varimax rotation method, and eigenvalues greater than 1, we found a 10-factor structure for the translated Bangla form of the ISC-S scale (Figure 1).

Figure 1

Scree Plot for Factor Representation of Translated Bangla form of ISC-S (Subsample 1, n = 767)



With a significant test of sphericity and an acceptable Kaiser-Meyer-Olkin value (KMO = 0.906), the 10-factor structure of the Bangla form of ISC-S explained 56.30% of the total variance (Table 3). The following were the scale items that loaded into the 10 factors: F_1 (items 32 to 36), F_2 (items 1 to 6), F_3 (items 17 to 21), F_4 (items 12 to 16), F_5 (items 22 to 26), F_6 (items 45 to 50), F_7 (items 27 to 31), F_8 (items 7 to 11), F_9 (items 37 to 40), and F_{10} (items 41 to 44).

The structural fit of the scale items led us to figure out the 10 factors of the Bangla ISC-S scale as follows: F_1 (Student Input in Decision Making), F_2 (Teacher Support), F_3 (Negative Peer Interaction), F_4 (Student Commitment/Achievement Orientation), F_5 (Positive Peer Interaction), F_6 (Safety Problems), F_7 (Disciplinary Harshness), F_8 (Consistency and Clarity of Rules and Expectations), F_9 (Instructional Innovation/Relevance), and F_{10} (Support for Cultural Pluralism).

Table 3

The Factor Structures of the Translated Bangla form of ISC-S and the Original ISC-S by EFA

			Translated Bangla ISC-S	Original ISC-S
Factor	Subscale	Item	Item loading	
F2	TS	SC1	.61	.68
		SC2	.61	.63
		SC3	.62	.62
		SC4	.55	.56
		SC5	.52	.57
		SC6	.55	.48
F8	CCRE	SC7	.45	.64
		SC8	.53	.62
		SC9	.41	.61
		SC10	.45	.59
		SC11	.41	.54
F4	SC/AO	SC12	.72	.76
		SC13	.69	.74
		SC14	.44	.71
		SC15	.58	.64
		SC16	.52	.53
F3	NPI	SC17	.58	.69
		SC18	.75	.64
		SC19	.69	.57
		SC20	.63	.56
		SC21	.66	.53
F5	PPI	SC22	.60	.60
		SC23	.62	.59
		SC24	.58	.58
		SC25	.68	.52
		SC26	.42	.52
F7	DH	SC27	.63	.58
		SC28	.52	.57
		SC29	.68	.54
		SC30	.75	.53
		SC31	.56	.50

			Translated Bangla ISC-S	Original ISC-S
Factor	Subscale	Item	Item loading	
F1	SIDM	SC32	.65	.71
		SC33	.79	.50
		SC34	.76	.55
		SC35	.58	.55
		SC36	.60	.50
F9	II/R	SC37	.60	.64
		SC38	.56	.56
		SC39	.51	.51
		SC40	.40	.51
F10	SCP	SC41	.49	.64
		SC42	.44	.61
		SC43	.43	.57
		SC44	.44	.55
F6	SP	SC45	.64	.69
		SC46	.68	.67
		SC47	.50	.54
		SC48	.55	.49
		SC49	.46	.48
		SC50	.60	.47

Note. TS = Teacher Support, CCRE = Consistency and Clarity of Rules and Expectations, SC/AO = Student Commitment/Achievement Orientation, NPI = Negative Peer Interaction, PPI = Positive Peer Interaction, DH = Disciplinary Harshness, SIDM = Student Input in Decision Making, II/R = Instructional Innovation/Relevance, SCP = Support for Cultural Pluralism, SP = Safety Problems

Validation of Bangla Short Form of School Climate Inventory – Student (BSF ISC – S)

While validating the Bangla short form of ISC-S, the authors were careful about the meaning of the original construct. That is, special attention was given to ensure that the Bangla short form and the original form of the ISC-S measured the same construct equivalently. And this is why the authors kept all the dimensions of the original scale in the Bangla short form. However, they reduced the number of items in the Bangla short form of the ISC-S scale. While deleting the items, they considered the meaning of the items (whether more than one item expresses a similar meaning) and statistical criteria, such as corrected item-total correlation, item discrimination power (Table 2), and item loading (Table 3) for each item. Three items from each subscale of the translated Bangla ISC-S were suggested for the final BSF ISC-S scale.

The psychometric scale development literature suggests that each subscale should contain at least 3 items to ensure adequate identification, reliability, and construct validity. However, four to five items per subscale are generally preferred for greater stability and measurement precision (Robinson, 2018).

Items 1, 2, and 3 were selected for the Teacher Support (TS) subscale because of their high item discrimination and factor loadings. Items 7, 8, and 9 were included in the Consistency and Clarity of Rules and Expectations (CCRE) subscale. Although item 10 had a slightly higher factor loading than item 9, it did not discriminate respondents as well as item 9 (a = 1.64). Items 12, 13, and 15 were retained in the Student Commitment/ Achievement Orientation (SC/AO) subscale, as they demonstrated high item discrimination and factor loadings. Items 18, 19, and 20 were included in the Negative Peer Interaction (NPI) subscale. Item no 18 ("*Students in this school are mean to each other"*) and item no 21 ("*Students in this school feel students are too mean to them*.") had almost similar meaning. That's why item 21 was excluded from the NPI subscale to avoid repetition. Items 23, 24, and 25 were included in the Positive Peer Interaction (PPI) subscale. Item no 22 ("*Students get to know each other well in classes*") and item no 25 ("*Students in this school get to know each other really well*") also had similar meaning. Again, to avoid repetition of items, item no 22 was deleted from the PPI subscale. Items number 27, 29, and 30 were retained in the Disciplinary Harshness (DH) subscale. Items 32, 33, and 34 were retained in the Student Input in Decision Making (SIDM) subscale due to their high item discrimination and factor loadings. Similarly, items 37, 38, and 39 were included in the Instructional Innovation/Relevance (II/R) subscale. Items 41, 43, and 44 were considered for the Support for Cultural Pluralism (SCP) subscale. Item no 43 was suggested for SCP instead of item no 42, because item 43 can highly discriminate the respondents (a = 1.10) and give a lot of information near the thresholds. In addition, the corrected item-total correlation for item no. 42 was 0.29, which did not correlate well with the total scale score (Field, 2017). Then, items 45, 46, and 50 were retained in the Safety Problems (SP) subscale, given their high item discrimination and factor loadings.

In conclusion, we finalized 3 items from each of the 10 subscales to adapt the Bangla short form of ISC-S based on item discrimination power and item loading. Moreover, most of the selected items also had high factor loading values in the original ISC-S scale (Table 3). Therefore, the Bangla Short Form of ISC-S (BSF ISC-S) consisted of 10 subscales and 30 items.

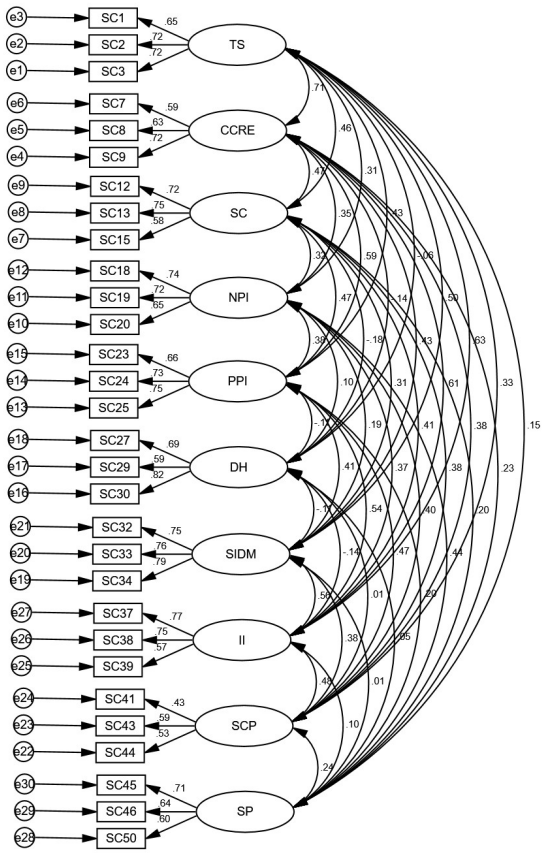
Confirmatory Factor Analysis (CFA) of BSF ISC-S

After adapting the Bangla short form of ISC-S (BSF ISC-S), it is essential to confirm the structural fit of the BSF ISC-S scale on a different subsample. So, we performed a confirmatory factor analysis (CFA) for BSF ISC-S on subsample 2 (n = 716). We developed a model in AMOS for the 10-factor correlated structure of this scale before conducting CFA. The 10-factor first-order correlated model of the BSF ISC-S had a satisfactory fit index (χ^2 = 765.06; df = 360; χ^2/df = 2.12; RMR = .04, GFI = .93; CFI = .93; and RMSEA

= .04). Moreover, the standardized regression weights were also significant ($p < .001$) for every item on the scale (Figure 2).

Figure 2

First-order Correlated Factor Model of the BSF ISC-S



Measurement Invariance Analysis of BSF ISC-S

The multigroup measurement invariance analysis assessed whether the BSF ISC-S functions equivalently across gender, developmental period, and level of education. To determine whether our assessment tool was invariant across gender, developmental period, and level of education, we conducted three multigroup invariance studies independently. Four increasingly restrictive models were tested: M1 (configural invariance) – same factor structure, M2 (metric invariance) – equal factor loadings, M3 (structural covariances) – equal covariances, M4 (residual invariance) – equal error variances. According to Chen (2007), model fit was evaluated using CFI, RMSEA, and their changes ($\Delta CFI \leq .01$ and $\Delta RMSEA \leq .015$ generally indicate invariance).

Table 4

Test of Measurement Invariance of the BSF ISC-S by Gender, Developmental Period, and Level of Education (n = 1483)

Variable	Model fit						Model comparison		
	Model	χ^2	*df*	χ^2/df	CFI	RMSEA		ΔCFI	ΔRMSEA
Gender	M_1	1583.29	720	2.19	.934	.028			
	M_2	1656.28	740	2.23	.930	.029	M_1-M_2	.004	-.001
	M_3	1853.28	795	2.33	.920	.030	M_2-M_3	.010	-.001
	M_4	2311.07	825	2.80	.887	.035	M_3-M_4	.033	-.005
Developmental Period	M_1	1492.09	720	2.07	.941	.027			
	M_2	1547.29	740	2.09	.938	.027	M_1-M_2	.003	.000
	M_3	1634.57	795	2.05	.936	.027	M_2-M_3	.002	.000
	M_4	1709.73	825	2.07	.932	.027	M_3-M_4	.004	.000
Education	M_1	1535.77	720	2.13	.937	.028			
	M_2	1607.72	740	2.17	.934	.028	M_1-M_2	.003	.000
	M_3	1704.40	795	2.14	.930	.028	M_2-M_3	.004	.000
	M_4	1848.38	825	2.24	.922	.029	M_3-M_4	.008	-.001

Note. *df* = degree of freedom; CFI = Comparative Fit Index; RMSEA = Root Mean Square Error of Approximation; M_1 = configurational invariance; M_2 = metric invariance; M_3 = structural covariances; M_4 = residual invariance.

The BSF ISC-S demonstrated configural, metric, and partial structural invariance across gender, but residual invariance was not supported. This suggested that while the construct was measured similarly across genders, item error variances differed (Table 4). Moreover, Table 4 showed there was full measurement invariance (configural, metric, structural, and residual) across developmental periods. This indicated that the scale operated consistently across early and late adolescent groups. Again, the BSF ISC-S demonstrated full invariance across educational levels, indicating that the construct was interpreted similarly across educational levels (Table 4).

Therefore, the BSF ISC-S is a robust and stable measurement tool across developmental stages and educational levels, and largely comparable across gender, although some caution is needed when interpreting item-level error differences between males and females.

Reliability Analysis of BSF ISC-S

Internal Consistency Reliability

Cronbach's alpha of Bangla Short Form of ISC-S and its subscales were good (BSF ISC-S: 0.83, 95% CI [0.74, 0.80]; Teacher Support: 0.73, 95% CI [0.69, 0.75]; Consistency and

Clarity of Rules and Expectations: 0.64, 95% CI [0.60, 0.67]; Student Commitment/ Achievement Orientation: 0.74, 95% CI [0.71, 0.76]; Negative Peer Interaction: 0.75, 95% CI [0.62, 0.77]; Positive Peer Interaction: 0.75, 95% CI [0.73, 0.77]; Disciplinary Harshness: 0.74, 95% CI [0.69, 0.76]; Student Input in Decision Making: 0.82, 95% CI [0.73, 0.83]; Instructional Innovation/Relevance: 0.73, 95% CI [0.70, 0.75]; Support for Cultural Pluralism: 0.52, 95% CI [0.39, 0.56]; and Safety Problems: 0.66, 95% CI [0.61, 0.69]).

Test – Retest Reliability

Test–retest reliability was analyzed in a sample of 84 students over a 1-month interval. Test – retest reliability of the BSF ISC-S and its subscales were also adequate (BSF ISC-S: 0.89, 95% CI [0.83, 0.93]; Teacher Support: 0.79, 95% CI [0.69, 0.87]; Consistency and Clarity of Rules and Expectations: 0.91, 95% CI [0.86, 0.94]; Student Commitment/Achievement Orientation: 0.78, 95% CI [0.66, 0.85]; Negative Peer Interaction: 0.76, 95% CI [0.63, 0.84]; Positive Peer Interaction: 0.77, 95% CI [0.64, 0.85]; Disciplinary Harshness: 0.90, 95% CI [0.82, 0.93]; Student Input in Decision Making: 0.81, 95% CI [0.67, 0.87]; Instructional Innovation/Relevance: 0.80, 95% CI [0.69, 0.87]; Support for Cultural Pluralism: 0.76, 95% CI [0.61, 0.84]; and Safety Problems: 0.88, 95% CI [0.21, 0.92]).

Validity Analysis of BSF ISC-S

Convergent and Divergent Validity

Convergent validity means that measures (or subscales) are supposed to be related and actually show strong positive correlations with each other, while Divergent validity refers to measures (or subscales) that are supposed to be negatively related to one another. Table 5 shows the convergent and divergent validity of the Bangla Short Form of the ISC-S scale. The result demonstrated that seven positive subscales (teacher support, consistency and clarity of rules and expectations, student commitment/achievement orientation, positive peer interaction, student input in decision making, instructional innovation/relevance, and support for cultural pluralism) are significantly positively correlated with positive youth development. While three negative subscales (negative peer interaction, disciplinary harshness, and safety problem) are negatively correlated with positive youth development. Moreover, all of the positive subscales of BSF ISC-S are positively correlated with each other and negatively correlated with negative subscales (Table 5), which also demonstrates the convergent and divergent validity of the BSF ISC-S scale.

Table 5

Correlation Coefficients among the 10 Subscales of BSF ISC-S, Positive Youth Development (PYD).

Variables	PYD	TS	CCRE	SC/AO	NPI	PPI	DH	SIDM	II/R	SCP
TS	.44*									
CCRE	.41*	.72*								
SC/AO	.44*	.59*	.55*							
NPI	-.11*	-.11*	-.14*	-.05						
PPI	.47*	.51*	.44*	.55*	-.03					
DH	-.41*	-.82*	-.89*	-.59*	.12*	-.47*				
SIDM	.34*	.49*	.42*	.44*	-.01	.47*	-.45*			
II/R	.34*	.52*	.47*	.45*	-.05	.46*	-.52*	.53*		
SCP	.34*	.41*	.36*	.39*	-.05	.39*	-.41*	.35*	.43*	
SP	-.31*	-.57*	-.70*	-.38*	.55*	-.30*	.71*	-.28*	-.34*	-.30*

Note. TS = Teacher Support, CCRE = Consistency and Clarity of Rules and Expectations, SC/AO = Student Commitment/Achievement Orientation, NPI = Negative Peer Interaction, PPI = Positive Peer Interaction, DH = Disciplinary Harshness, SIDM = Student Input in Decision Making, II/R = Instructional Innovation/Relevance, SCP = Support for Cultural Pluralism, SP = Safety Problems. *p<.01.

Discussion

School climate is a globally recognized construct that influences students' academic, behavioral, and psychological outcomes. Substantial research findings suggested that students' positive experience of school climate is associated with academic success, greater school engagement, reduced absenteeism, bullying, and violent behaviors, and increased psychosocial functioning, while negative experiences, conversely, correlated with disengagement, conduct problems, and poor achievement (Brand et al., 2003; Thapa et al., 2013). But there is no valid and reliable instrument to assess school climate in Bangladesh. The study aimed to adapt and validate a short form of the Inventory of School Climate – Student (ISC-S) in Bangla.

That is why, firstly, descriptive statistics, corrected item-total correlations, and item discrimination power were analyzed for each item of the translated Bangla form of ISC-S (Table 2). The findings demonstrated that, except for item 42, all items in the scale had acceptable corrected item-total correlations, ranging from 0.29 (item 42) to 0.70 (item 34) ($r \geq 0.3$; Field, 2017). And all items could discriminate the respondents moderately ($a > .65$) to very high ($a > 1.7$) (Baker, 2011). Then, an exploratory factor analysis (EFA) was performed on subsample 1 (n = 767) to identify the factor structure of the translated Bangla version of the ISC-S. EFA results suggested a 10-factor structure similar to the original ISC-S scale (Brand et al., 2003). However, to adapt and validate the Bangla Short Form

of ISC-S (BSF ISC-S), three items from each of the ten subscales of the translated Bangla form of ISC-S were selected based on their highest EFA factor loadings and discrimination power. And this is how, a total of 30 items for 10 subscales of ISC-S (Teacher Support, Consistency and Clarity of Rules and Expectations, Student Commitment/Achievement Orientation, Negative Peer Interaction, Positive Peer Interaction, Disciplinary Harshness, Student Input in Decision Making, Instructional Innovation/Relevance, Support for Cultural Pluralism, and Safety Problems) were finalized for confirmatory factor analysis (CFA), measurement invariance, reliability and validity analyses.

Ten-correlated confirmatory factor analysis (CFA) was applied to a different sample (subsample – 2, $n = 716$) to ensure the factor structure of BSF ISC-S. CFA findings indicated a 10-factor first-order correlated model of BSF ISC-S that fit the data as well as the original study (Brand et al., 2003). Furthermore, it is important to examine whether different factors of a measurement scale function similarly across various demographics (e.g., age, sex, education, culture, and community). The results of the present study (Table 4) revealed measurement invariance of the BSF ISC-S by gender (boys and girls), developmental period (early adolescents and late adolescents), and level of education (junior secondary education and secondary education). The findings of invariances across gender and education were supported by the original study (Brand et al., 2003). The invariance results across the developmental period enriched the successful adaptation and validation of the present study.

To test the scale's reliability, internal consistency, and test–retest reliability, analyses were conducted. The result of the reliability analysis demonstrated that Cronbach's alpha (α) of BSF ISC-S was 0.83, which was sufficient and good for a reliable measure (Kline, 1999). And the test–retest reliability of the scale was also found to be good, 0.89 (Kline, 2015). To test the convergent and divergent validity of the scale, a correlation analysis was conducted between the 10 subscales of the BSF ISC-S and the Bangla Bridge Positive Youth Development (Bangla Bridge-PYD) scale. All subscales of the BSF ISC-S were significantly correlated with the positive youth development construct, demonstrating the scale's convergent and divergent validity.

Limitations and Future Research Directions

There are a few notable limitations of the research. Firstly, this scale is brief and a self-reported measure for assessing 10 distinct areas of school climate. So, research practitioners and administrators should be careful when collecting data from young participants, as they may not provide genuine responses. Secondly, the current research used convenience sampling, which is a major obstacle to generalizing the findings to all school students in the country.

Although the psychometric characteristics of the BSF ISC-S demonstrated robust reliability, validity, and applicability in both research and practice, more studies are needed to confirm its 10-factor structure across different samples, such as college students, madrasa students, and vocational institution students in Bangladesh.

Conclusion

The Bangla Short Form of the School Climate Inventory – Student (BSF ISC-S) is a brief, relatively easy-to-administer measure that can be completed in approximately 15 minutes. It is a valid and appropriate tool covering a wide range of school factors. It consists of 10 dimensions/subscales: teacher support, consistency and clarity of rules and expectations, student commitment/achievement orientation, negative peer interaction, positive peer interaction, disciplinary harshness, student input in decision making, instructional innovation/relevance, support for cultural pluralism, and safety problems. It has a total of 30 items, with 3 items per subscale. It might be crucial for assessing students' perceptions of school climate across different secondary schools in Bangladesh. In addition, the instrument's utility suggested that practitioners and administrators do not need lengthy or separate questionnaires to assess several factors of school climate in the Bangladeshi cultural context.

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