Int. J. School. Health. 2020; 7(2)

Published online 2020 April.

Research Article

Construct Validity of Maryland Safe and Supportive Schools Climate Survey in Iran: A Validation Study

Maysam Rezapour[1,2], Narges Khanjani[3*], Moghaddameh Mirzaee[4]

[1]Assistant Professor, School of Nursing and Midwifery Amol, Mazandaran University of Medical Sciences, Sari, Iran
[2]Psychiatry and Behavioral Sciences Research Center, Addiction Institute, Mazandaran University of Medical Sciences
[3]Professor, Neurology Research Center, Kerman University of Medical Sciences, Kerman, Iran
[4]Associate Professor, Modeling in Health Research Center, Institute for Futures Studies in Health, Kerman University of Medical Sciences, Kerman, Iran

Corresponding author:* Narges Khanjani, Department of Epidemiology and Biostatistics, School of Public Health, Kerman University of Medical Sciences, Haft Bagh Alavi Highway, Postal Code: 76169-13555, Kerman, Iran. **Tel/Fax: +98-34-31325102; **Email:** n_khanjani@kmu.ac.ir

Received January 12, 2020; **Revised** February 1, 2020; **Accepted** February 9, 2020

Abstract

Background: The lack of a comprehensive instrument to measure school climate with good psychometric properties in Iran is strongly felt. This study aimed to examine the construct validity of the multidimensional structure of the Maryland Safe and Supportive Schools Climate Survey (MDS3) among Iranian pupils.
Methods: This validation study was peformed on a sample of 1540 pupils from 42 schools in Mazandran province in 2017. Confirmatory factor analyses (CFA) and exploratory structural equation modeling (ESEM) were employed to evaluate the construct validity of each of the three scales of the questionnaire (Safety, Engagement, and Environment). The current study tested measurement invariance across gender, school type, and grade levels.
Results: Our findings confirmed the factor structures and measurement invariance across gender, school types, and grade levels regarding Safety, Engagement, and Environment scales of the Persian version of the MDS3 Climate Survey. This study revealed a conceptual overlap between the dimensions of school climate which can be well shown by ESEM (CFI=0.975, TLI=0.945, RMSEA=0.053, SRMR=0.029 for Safety scale; CFI=0.987, TLI=0.961, RMSEA=0.027, SRMR=0.018 regarding Engagement scale; CFI=0.960, TLI=0.926, RMSEA=0.036, SRMR=0.025 concerning Environment scale). Furthermore, the Pearson correlations of all school climate sub-scales were significant (P<0.05) with the exception of correlations between disorder sub-scale and connection to teachers (r=0.03, P=0.239), academic engagement (r=0.04, P=0.116), and culture of equity (r=0.02, P=0.432).
Conclusions: The Persian version of MDS3 Climate Survey can be used to measure the three key domains of school climate (Safety, Engagement, and Environment) in Iranian context and the epidemiological studies associated with student health and behaviors.

Keywords: Aggression; Environment; Factor analysis; Safety; Iran

How to Cite: Rezapour M, Khanjani N, Mirzaee M. Construct Validity of Maryland Safe and Supportive Schools Climate Survey in Iran: A Validation Study. Int. J. School. Health. 2020;7(2):1-13.

1. Introduction

School climate may have a major influence on youth development, learning, and achievement (1). Moreover, according to socio-ecological models, a positive school climate plays a critical role in reducing mental and physical health problems (2), dropout rates, drug use, violence (3), and bullying (4) and increasing students' life satisfaction (5). Therefore, accurate assessment of school climate is a fundamental step to determine the school problems, plan interventions, and test the efficiency of programs.

Accurate measurement of school climate requires understanding its definitions and dimensions. However, there are various definitions for school climate and its dimensions (2) because it is based on different people's experiences (administrators, teachers, staff, and students) regarding school life (6, 7). Cohen and colleagues (8) suggest that school climate refers to "the quality and character of school life and reflects norms, goals, values, interpersonal relationships, teachings, learning practices, and organizational structures".

On the other hand, there are various instruments and different approaches to measure school climate, including the perceptual measurement of climate by students, teachers, administrators, or parents (self-report), classroom/school observations, and teacher or administrative records (9-11). It is difficult to select an appropriate tool from the various available instruments although the students' perceptions of school climate are the most common instruments (10).

The US Department of Education (USDOE) endorses a comprehensive framework of school climate with three domains, namely safety, engagement, and environment (12). Safety is an important domain in

most school climate instruments (9). Previous studies have shown that positive perceptions regarding safety in school are related to school connectedness, student connectedness, and higher academic performance (13). "Safety in School" is measured by exposure to aggressive and risky behaviors such as bullying, drug use, alcohol drinking, and smoking and also by the programs available for preventing harassment and bullying in schools and feeling safe in school (14).

Engagement in school is a pivotal and wide domain of school climate, comprising relationships, respect for diversity, and academic and parental engagement. Student connectedness, connection to teachers, and school connectedness are the most important aspects of relationships in school. In schools with positive relationships, students participate more in making school a better place, help others, and volunteer in the community and have a stronger sense of school belonging (10). Whole-school connectedness is defined by the CDC's (Centers for Disease Control) Division of Adolescent and School Health as "the students' belief that adults and peers in school care about their learning and each other as individuals"(15). Among students, respect for diversity, particularly racial diversity is one of the sub-domains of engagement that shows the presence of equity in school or the effort to establish it. Positive academic engagement, as an important aim of all schools, and parental engagement in school activities can indicate a mature school, meaning that the school and its stakeholders use external sources for improving the school climate.

School environment includes the physical environment of the whole school and its classes, social support of peers, teachers, and other staff, and the clarity and consistency of the rules (14). Moreover, disorder in school reflects the lack of physical and social wellbeing and the existence of vandalism and broken windows, doors, or desks indicates the severity of disorder (14).

Although there are various valid and reliable instruments for evaluating each domain of school climate, the USDOE suggests that the Maryland Safe and Supportive Schools Climate Survey is a comprehensive instrument for measuring different aspects of school climate. This questionnaire is a 3-scale model comprising safety, engagement, and environment. The psychometric properties of the MDS3 Climate Survey were confirmed by Confirmatory Factor Analysis and measurement invariance across sex, race, and grade level for each of the three scales (14).

Exploratory factor analytic (EFA) and confirmatory factor analysis are the most common methods for evaluating the construct validity of school climate instruments such as MDS3 (14, 16); however, this scale may be unrealistic in certain contexts such as school climate as these scales have multiple items and are multidimensional. Marsh and colleagues (17) state that the confirmatory factor analyses (CFA) approach is typically not able to provide an acceptable fit to complex multidimensional instruments because in CFA, each item is allowed to load on only one factor, and all cross loadings are fixed to zero. Therefore, this practice might lead to over-estimated factor correlations and result in multicollinearity in the estimation of relations with outcomes (18, 19). However, exploratory structural equation modeling (ESEM), as an evolving and increasingly popular method, combines the features of CFA and EFA (17). ESEM provides a more accurate and realistic representation of the data, with substantially deflated factor correlations since it allows for cross-loadings between target and non-target items. ESEM provides the same information as typical structural equation modeling (SEM) parameters, such as standard errors, multiple indices of goodness of fit, and many statistical advances normally associated with CFA and SEMs. There are several studies, which show the details of ESEM (19-22).

2. Objective

The purpose of the present study was to assess the psychometric properties of the Maryland Safe and Supportive Schools Climate Survey in Iranian schools and theirs students. This study was carried out for several reasons. First, no comprehensive Persian standardized instrument exists for measuring school climate subscales in Iran. Second, it is necessary to accurately assess school climate and provide evidence for decision makers intending to examine its association with students' health and behavior. Third, this study provides a valid questionnaire that can be ubiquitously used to compare research findings. Ultimately, Iranian schools have a special context including gender segregation and Islamic Hijab for girls due to Islamic beliefs (23); also there are different school types in Iran, including public (governmental), private (non-governmental), and gifted schools as the most important types (23). In this study, we examined the invariance of the factor structure of the school climate sub-scales across gender, school types (public, gifted, and private), and grade levels (8^{th}, 9^{th}, and 10^{th}).

3. Method

3.1. Procedure

This was a cross-sectional study. In order to validate these scales in an Iranian population, we followed forward, backward translation as a standard procedure (24), assessed the content validity index (CVI) for content validity with regards to the cultural context of Iranian schools (25), and confirmed construct validity. Items "I like this school" and "Boys and girls are treated equally well" from the engagement scale were not approved by the content validity index, hence excluded. Therefore, a modified version of the MDS3 school climate survey with 54 items was prepared for assessing the construct validity.

Data were collected from January 25 to March 12, 2017. Students completed paper-and-pencil surveys in their classroom during normal school hours and under the supervision of their teachers or school staff. A researcher briefly explained the study objectives and procedure and answered the students' questions prior to distributing the questionnaires. This study was approved by the Ethics Committee of Kerman University of Medical Sciences (Ethics Code: IR.KMU.AH.REC.1395.89) and the Security Office of the Educational Authority of Mazandaran Province, Iran. Informed consent was obtained from the students, parents, and teachers of the selected schools.

3.2. Participants

1540 students (700 boys and 840 girls) aged 14 to 17 years old (674 8th graders, 602 9th graders, and 264 10th graders) from 42 schools located in seven cities in the north of Iran participated in this study. The sample was drawn from three school types (628 from public schools, 512 from gifted schools, and 400 from private schools).

3.3. Instrument

The Maryland Safe and Supportive Schools Climate Survey (the MDS3 Climate Survey) is a self-report, multidimensional measure of school climate developed by the Johns Hopkins Center for Youth Violence Prevention and is originally written in English (14). The MDS3 Climate Survey includes three scales: Safety, Engagement in school, and Environment.

The Safety scale includes three factors, namely perceived safety, aggression, and general drug use, and its Cronbach's alpha (α) was reported to be 0.81 (14). Four items measure "perceived safety" in schools. These items included students' feelings concerning safety at school, commuting to school, and carrying weapons at school. Students are asked whether their school has a plan to deal with a conflict (α=0.64). Four items measure students' perceptions about the existence of "aggression" in school and determine whether students have witnessed another student being bullied and also individuals' perceptions about the students in their school would intervene to stop bullying (α=0.63). Students' concerns about "general drug use" are measured using three items. Students are asked whether alcohol, tobacco, and drug use exist in their school (α=0.87).

The Engagement in school scale includes six factors: connection to teachers, student connectedness, academic engagement, school connectedness, equity, and parent engagement; its Cronbach's alpha was reported to be 0.94. Six items are used to measure the students' feelings of "connection to teachers" in their school, including both the perception of teachers' behavior (such as "My teachers listen when I have something to say" and "My teachers tell me when I do a good job"), as well as student-teacher relationships (such as "Students trust the teachers" and "teachers respect the students") (α=0.86).

Five items are used to measure students' perception about their relationships with other students and staff; being respectful, trusting, supportive, and caring (α=0.87). Academic engagement is measured by four items which assess the perception of academic success ("I believe I can do well in school") and one item, which evaluates academic values ("It is important to finish high school") (α=0.79). Whole-school connectedness is assessed with four items, measuring students' sense of belonging to school such as liking to come to school and taking pride in their school (α=0.82).

Four items are used to measure equity in schools: two of these items assess students' perception about being equally treated regardless of their socioeconomic status and one item evaluates the cultural representativeness of educational material (α=0.83). Students' perception about the amount of "parent engagement" in their school is assessed with five items. Two items assess the general perception of parent involvement ("My parents often come to my school to help me out") in support of the children, improving students learning, and working with schools for decision making. The other three assess the students' personal experiences with the

engagement of their own parents (α=0.74).

The Environment scale includes four factors: rules and consequences, physical comfort, support, and disorder. The Cronbach's alpha of this scale was reported to be 0.85. Five items assess rules and consequences, including the existence of and awareness towards rules and teachers' classroom management ability (α=0.73). Four items assess physical comfort, including the overall cleanliness of the school and bathrooms, having comfortable room temperature, and the pleasant appearance of the school (α=0.79). Students' perception of "support" is assessed by three items, including whether someone (teacher or other students) is available to help students with their problems (α=0.76).

Five items assess the existence of disorder in school, including the level of behavioral disruption ("Students disobey the rules") and students' perception regarding the existence of broken windows, doors, or desks, and school vandalism (α=0.58). The MDS3 has 56 items and is known as a comprehensive measure of school climate (14).

In the original MDS3 school climate survey, items in the current study were measured on a four-point Likert scale, 1=strongly disagree, 2=disagree, 3=agree and 4=strongly agree. A higher sub-scale score of the MDS3 school climate survey indicates a more favorable school climate with the exception of aggression, general drug use, and disorder sub-scales.

3.4. Data Analysis

Confirmatory factor analyses (CFA) was conducted to separately examine the three sub-scales (Engagement, Safety, and Environment) of school climate. Afterwards, we conducted exploratory structural equation modeling (ESEM) on each scale and compared it with the CFA results.

In order to evaluate the goodness-of-fit of the models in the CFA and ESEM approach, we employed a combination of fit indices including the Comparative Fit Index (CFI), the Tucker Lewis Index (TLI), the Standardized Root Mean Square Residual (SRMR), the Root Mean Square Error of Approximation (RMSEA), and relative chi-square (the ratio of chi-square to its degrees of freedom). CFI and TLI with values exceeding 0.95 and SRMR and RMSEA with values less than or equal to 0.06 are generally indicative of an excellent model fit (26); structures with CFIs and TLIs higher than or equal to 0.90 and an RMSEA less than or equal to 0.08 are considered adequate fits (26). These analyses were performed using the Mplus 7.4's (27) robust maximum likelihood (MLR) estimator, which is robust to non-normality and the pooled within-group covariance matrix modeling (28) to account for the clustering of students within schools (with the TYPE=COMPLEX and CLUSTER command in Mplus) (27) (N=42 schools ranged between 35 to 435 students, Mean=228). In order to conduct ESEM, we used an oblique geomin rotation (the default shown in the Mplus) with an epsilon value of 0.001 for the Safety scale (with three factors) and 0.01 for the Engagement and Environment scales (with four or more factors) (27).

In the second step, Cronbach's alpha was calculated for the sub-domains of each of the three scales and the correlation of the sub-domains with each other was estimated. In the third step, factorial invariance of each of the three scales of school climate across different groups (gender school types, and grades) was performed in three stages (configural, metric, and scalar) using the MODEL=CONFIGURAL METRIC SCALAR command in the MODEL option of the ANALYSIS command in Mplus 7.4 by MLR estimator (27) for both ESEM and CFA. The clustered data structure was considered by use of pooled within-group covariance matrix modeling (28).

Configural invariance is established when the groups have the same number of factors. In the configural step, all model parameters (such as factor loadings, intercepts, factor variances) are freely estimated in each group (29). The baseline fit indices of the configural step were used to detect invariance, by comparing them with the fit statistics of succeeding, more restrictive models in the next step. In the second step, we examined metric invariance with constrained equal factor loadings across groups. Metric (or weak) invariance indicates that the factor loadings of the scale are equivalent across groups while latent variances are allowed to vary among groups. In the next step, we examined the scalar invariance, in which factor loadings and intercepts of items are equally constrained across groups; however, residuals and variances were free across groups. These constraints were further applied in ESEM, resulting in the equality of all factor loadings including the cross-loadings. The invariance in each scale was specified by comparing the changes in the comparative fit indices (ΔCFI) and root-mean-square error of approximation (ΔRMSEA) between models with increasing constraints. A change of less than or equal to 0.01 in CFI and less than or equal to 0.015 in RMSEA is considered as invariance

(30). Since the χ^2 statistic strongly depends on the sample size, $\Delta\chi^2$ is not considered in interpreting the fit of nested models (31).

4. Result

4.1. Factor structures of the three school climate scales

Tables 1, 2, and 3 show the factor structures of the three school climate scales (Safety, Engagement, and Environment), correlations among the factors, goodness-of-fit indices for both ESEM and CFA, and Cronbach's alpha of the factors .

In all three scales, both CFA and ESEM showed an acceptable fit, and all indices were excellent for the ESEM. As shown in Tables 1, 2, and 3, although factor loadings of CFA and ESEM solutions had a very similar pattern, ESEM models provided a better goodness of fit. The evaluation of the factor correlations showed the critical advantage of the ESEM approach over the CFA approach. The patterns of factor correlations were similar between ESEM and CFA; however, ESEM factor correlations were substantially less than the CFA factor correlations in all scales. In each of the three scales, regarding both CFA and ESEM, standardized target factor loadings for items were close to each other; also, the profile similarity index (PSI: the correlation between the set of ESEM factor loadings and the corresponding CFA factor loadings) was 0.988, 0.797, and 0.745 for Safety, Engagement, and Environment scales, respectively. The target factor loadings of the ESEM solution ranged between -0.01 and 0.91, averaging 0.60 in the Safety Scale, varied from 0.08 to 0.95, averaging 0.71 in the Engagement Scale, and ranged from 0.18 to 0.84, averaging 0.56 in the Environment Scale. Moreover, concerning CFA solution, the range of target factor loadings was from -0.15 to 0.92, averaging 0.57 in the Safety Scale, between 0.57 and 0.93, averaging 0.61 in the Engagement Scale, and from 0.18 to 0.85,

Table 1: Comparison of Exploratory Structural Equation Modeling (ESEM) and Conventional Confirmatory Factor Analysis For School Safety (on 11 items)

Factor/model	ESEM factor solution				Conventional CFA solution	
	Factor loading					
	Perceived safety	Aggression	General drug use	R^2	Factor loading	R^2
Perceived safety						
I feel safe at this school	0.88*	-0.01	0.00	0.78*	0.84*	0.70*
I feel safe going to and from school	0.65*	0.02	-0.01	0.42*	0.67*	0.45*
Programs for violence and conflict	0.31*	-0.01	0.03	0.09*	0.30*	0.08*
Students carrying knives	-0.01	0.37*	0.38*	0.41*	-0.29*	0.08*
Aggression						
Physical fighting between students	-0.01	0.73*	0.09*	0.59*	0.76*	0.58*
Harassment or bullying of students	0.00	0.91*	-0.01	0.83*	0.91*	0.84*
Seen someone else being bullied	0.03	0.84*	-0.01	0.68*	0.82*	0.68*
Students at this school try to stop bullying	0.24*	-0.06	-0.02	0.07*	-0.15*	0.02
General drug use						
Students' drug use (such as ecstasy)	0.04	0.01	0.84*	0.69*	0.83*	0.68*
Students' tobacco use	-0.01	-0.03	0.86*	0.73*	0.85*	0.73*
Students alcohol use	-0.01	0.10*	0.69*	0.55*	0.74*	0.55*
Factor correlations (C-CFA above diagonal, ESEM below)						
	F1	F2	F3	Cronbach's alpha		
F1: Perceived safety	--	-0.36*	-0.28*	0.51		
F2: Aggression	-0.31*	--	0.47*	0.74		
F3 General drug use	-0.24*	0.44*	--	0.84		
Goodness-of-Fit Indices for Models_ SCHOOL SAFETY						
	χ^2	df	CFI	TLI	RMSEA	SRMR
Conventional CFA solution	592.18	41	0.871	0.827	0.093 (0.087-0.100)	0.118
ESEM factor solution	131.31	25	0.975	0.945	0.053 (0.044-0.062)	0.029

*P value <0.05, R^2=R-squared of multiple correlations, CFI=comparative fit index; TLI=Tucker-Lewis index; RMSEA=root-mean-square error of approximation; SRMR=the standardised root mean square residual; CFA=confirmatory factory analysis; ESEM=exploratory structural equation modeling.

Table 2: Comparison of Exploratory Structural Equation Modeling (ESEM) and Conventional Confirmatory Factor Analysis For School Engagement (on 26 items)

	ESEM factor solution							Conventional CFA solution	
	Factor loading								
	F1	F2	F3	F4	F5	F6	R^2	Factor loading	R^2
F1: Connection to teachers									
My teachers listen to me when I have something to say	0.59*	-0.01	0.15*	-0.03	0.05	0.00	0.48*	0.69*	0.47*
My teachers care about me	0.54*	0.02	-0.06	0.05	-0.01	0.01	0.30*	0.53*	0.28*
Teachers respect the students	0.68*	0.01	0.03	0.04	0.10*	-0.09	0.54*	0.72*	0.52*
My teachers tell me when I do a good job	0.68*	-0.03	0.07	0.03	-0.03	0.07	0.57*	0.74*	0.55*
My teachers notice when I am not there	0.53*	0.04	0.02	-0.01	-0.01	0.12*	0.34*	0.58*	0.34*
Students trust the teachers	0.57*	0.19*	0.01	0.04	-0.01	0.05	0.53*	0.73*	0.53*
F2: Student connectedness									
I feel like I belong	0.15*	0.08*	-0.01	0.73*	-0.01	-0.02	0.69*	0.57*	0.32*
Students help one another	0.04	0.72*	0.07	0.08	-0.01	-0.04	0.63*	0.80*	0.64*
Students respect one another	-0.01	0.83*	-0.01	-0.03	0.06*	0.06	0.73*	0.83*	0.69*
Students like one another	0.02	0.81*	0.05	-0.02	-0.02	-0.01	0.68*	0.80*	0.64*
Students trust one another	-0.01	0.65*	-0.02	0.06	0.05	0.01	0.48*	0.69*	0.47*
F3: Academic engagement									
My teachers believe that I can do well in school	0.10	0.01	0.69*	0.02	-0.02	0.01	0.59*	0.73*	0.53*
I believe I can do well in school	-0.06	0.06	0.59*	0.01	-0.01	0.14	0.43*	0.61*	0.37*
My teachers always want me to do my best	0.30*	0.02	0.54*	-0.01	0.03	0.00	0.59*	0.79*	0.62*
It is important to finish high school	0.13	0.06	0.40*	0.09*	0.05	0.03	0.38*	0.64*	0.40*
F4: Whole-school connectedness									
Students and staff feel pride in this school	0.22*	0.02	-0.01	0.39*	0.16*	0.03	0.44*	0.62*	0.39*
I enjoy learning at this school	-0.03	-0.01	0.02	0.95*	0.01	0.03	0.90*	0.93*	0.86*
I like coming to school	0.00	-0.01	0.02	0.89*	0.02	0.02	0.83*	0.93*	0.86*
F5: Culture of equity									
Students of all races are treated the same	0.03	-0.03	0.09	0.01	0.82*	-0.05	0.72*	0.79*	0.63*
All students are treated the same, regardless of whether their parents are rich or poor	-0.02	0.05	-0.03	-0.01	0.74*	0.12	0.62*	0.78*	0.61*
The school provides instructional materials that reflect my culture, ethnicity, and identity	0.17*	0.05	-0.03	0.10*	0.29*	0.25*	0.41*	0.62*	0.38*
F6:Parent engagement									
My parent(s) feels welcome at this school	-0.08	0.04	0.10	0.07	0.04	0.65*	0.52*	0.69*	0.47*
If I do something bad at school, my parent(s) or guardian(s) hears about it	0.05	-0.04	0.17	-0.05	-0.01	0.56*	0.43*	0.65*	0.42*
When I do something good at school, my parent(s) usually hears about it	0.01	-0.09	0.16	0.06	0.00	0.58*	0.47*	0.68*	0.46*
The school tries to involve parents	0.29*	-0.02	0.01	0.02	0.05	0.40*	0.40*	0.63*	0.40*
Parents often come to my school to help out	0.13	0.08	-0.09	-0.02	-0.03	0.63*	0.44*	0.63*	0.39*
Factor correlations (C-CFA above diagonal, ESEM below)									
	F1	F2	F3	F4	F5	F6	Cronbach's alpha		
F1: Connection to teachers	--	0.61*	0.76*	0.54*	0.59*	0.63*	0.82		
F2: Student connectedness	0.47*	--	0.58*	0.57*	0.57*	0.47*	0.85		
F3: Academic engagement	0.57*	0.42*	--	0.52*	0.47*	0.68*	0.78		
F4: Whole-school connectedness	0.49*	0.47*	0.44*	--	0.57*	0.54*	0.85		
F5: Culture of equity	0.48*	0.49*	0.33*	0.53*	--	0.52*	0.77		
F6: Parent engagement	0.49*	0.29*	0.48*	0.42*	0.34*	--	0.78		
Goodness-of-Fit Indices for Models School Engagement									
	χ^2	df	CFI	TLI	RMSEA		SRMR		
Conventional CFA solution	1270.4	284	0.893	0.877	0.047 (0.045 -0.050)		0.067		
ESEM factor solution	385.54	184	0.987	0.961	0.027 (0.023 -0.030)		0.018		

*P value <0.05

Table 3: Comparison of Exploratory Structural Equation Modeling (ESEM) and Conventional Confirmatory Factor Analysis For School Environment (on 17 items)

	ESEM factor solution					Conventional CFA solution	
	Factor loading						
	Rules	Physical comfort	Support	Disorder	R^2	Factor loading	R^2
Rules							
Students listen to the teachers	0.64*	0.03	0.04	-0.04	0.46*	0.63*	0.39*
Teachers can handle students who disrupt class	0.77*	0.01	-0.01	0.02	0.60*	0.69*	0.47*
There are clear rules about student behavior	0.56*	0.08	0.07	-0.01	0.42*	0.67*	0.45*
Students are rewarded for positive behavior	0.17*	0.26*	0.26*	0.09*	0.35*	0.61*	0.37*
Everyone knows what the school rules are	0.36*	0.26*	0.07	-0.01	0.36*	0.64*	0.40*
Physical comfort							
The lavatories in this school are clean	0.04	0.84*	-0.08*	0.02	0.68*	0.79*	0.62*
The school is usually clean and well maintained	0.07	0.80*	0.00	-0.05	0.72*	0.85*	0.72*
The temperature in this school is comfortable all year	-0.03	0.45*	0.26*	-0.01	0.36*	0.59*	0.35*
This school has a bright and pleasant appearance	-0.05	0.46*	0.30*	-0.02	0.39*	0.62*	0.38*
Support							
Teachers at my school help students with their problems	0.20*	-0.03	0.68*	0.01	0.62*	0.80*	0.64*
Students who need help for their problems are able to get it through school	0.05	0.00	0.84*	-0.02	0.74*	0.84*	0.71*
There is someone at school who I can talk to about personal problems	0.02	0.06	0.51*	0.05	0.32*	0.57*	0.32*
Disorder							
Students disobey the rules	-0.34*	0.04	0.07	0.41*	0.24*	0.40*	0.16*
Disruptions by other students can get in the way of my learning	-0.04	0.17	0.10	0.39*	0.20*	0.31*	0.10*
Misbehaving students get away with it	0.19*	0.14*	0.09*	0.27*	0.20*	0.18*	0.03*
There are often broken windows, doors, or desks in this school	0.02	-0.12*	-0.17*	0.67*	0.50*	0.69*	0.48*
Vandalism of school property is a problem at this school	-0.01	-0.03	-0.03	0.66*	0.44*	0.68*	0.46*
Factor correlations (C-CFA above diagonal, ESEM below)							
	F1	F2	F3	F4	Cronbach's alpha		
F1: Rules	--	0.72*	0.74*	-0.08	0.79		
F2:Physicalcomfort	0.54*	--	0.60*	-0.22*	0.82		
F3: Support	0.57*	0.51*	--	-0.03	0.77		
F4: Disorder	0.06	-0.08	0.12*	--	0.62		
Goodness-of-Fit Indices for Models School Environment							
	χ^2	Df	CFI	TLI	RMSEA(90% CI)		SRMR
Conventional CFA solution	548.1	113	0.880	0.855	0.050 (0.046 -0.054)		0.091
ESEM solution	219.2	74	0.960	0.926	0.036 (0.030 -0.041)		0.025

*P value <0.05, R^2=R-squared of multiple correlations, CFI=comparative fit index; TLI=Tucker-Lewis index; RMSEA=root-mean-square error of approximation; SRMR=the standardized root mean square residual; CFA=confirmatory factory analysis; ESEM=exploratory structural equation modeling.

averaging 0.59 in the Environment Scale. Furthermore, the R-squared of multiple correlations calculated for each item was higher in the ESEM solutions compared with the CFA approach.

The results of Cronbach's alpha are shown in Tables 1, 2, and 3. In the Safety scale, coefficient alphas ranged from 0.51 (for physical safety) to 0.84 (for general drug use) and was 0.80 at full Safety scale. Regarding the Engagement scale, coefficient alphas were acceptable, varying from 0.77 (for Equity) to 0.85 (for Student connectedness and Whole-school connectedness) and 0.93 at full Engagement scale. In the Environment scale, coefficient alphas ranged from 0.64 (for disorder) to 0.82 (for physical comfort/cleanliness) and 0.84 at full Environment scale.

4.2. The Associations between school climate sub-scales

Table 4 shows the correlation between the sub-domains of school safety, engagement in school, and school environment . The correlations of safety

Table 4: Associations of school climate sub-scales

	School Safety		
	Perceived safety	**Aggression**	**General drug use**
Engagement in School			
Connection to teachers	0.44*	-0.19*	-0.24*
Student connectedness	0.42*	-0.34*	-0.23*
Academic engagement	0.38*	-0.14*	-0.25*
Whole-school connectedness	0.40*	-0.17*	-0.18*
Culture of equity	-0.19*	0.06*	0.15*
Parent Engagement	0.35*	-0.09*	-0.16*
School Environment			
Rules	0.41*	-0.28*	-0.24*
Physical comfort	0.39*	-0.29*	-0.23*
Support	0.38*	-0.16*	-0.22*
Disorder	-0.09*	0.34*	0.17*

	School Environment			
	Rules	**Physical comfort**	**Support**	**Disorder**
Engagement in School				
Connection to teachers	0.61*	0.52*	0.67*	0.03
Student connectedness	0.55*	0.48*	0.49*	-0.06*
Academic engagement	0.48*	0.39*	0.51*	0.04
Whole-school connectedness	0.51*	0.56*	0.51*	-0.06*
Culture of equity	-0.27*	-0.24*	-0.29*	0.02
Parent Engagement	0.50*	0.42*	0.50*	0.11*

*P value<0.05

factors with engagement and environment factors are shown in the top section and the relationship between environment and engagement factors are presented in the bottom section of Table 4. The correlation of perceived safety with the sub-domains of engagement in school was significantly positive and moderate (ranging from 0.35 to 0.44), with the exception of equity that was -0.19. Also, there was a significantly positive and moderate correlation between perceived safety and school environment sub-domains (varying from 0.38 to 0.41), except for the disorder sub-domain that was -0.09. The correlation of the sub-domains of engagement in school with aggression and general drug use sub-domain of school safety was significantly negative, ranging between -0.09 and -0.34 for aggression and -0.16 to -0.25 for general drug use; the exception was equity which was positive and significant (0.06 with aggression and 0.15 with general drug use). Also, the association of the sub-domains of school environment with aggression and general drug use sub-domains of school safety was significantly negative, varying from -0.09 to -0.34 for aggression and -0.16 to -0.25 for general drug use; the exception was the disorder sub-domain that was positive and significant (0.34 with aggression and 0.17 with general drug use). There was a significantly positive relationship between the sub-domains of engagement in school and sub-domains of school environment (ranging from 0.48 to 0.61 for rule, 0.39 to 0.56 regarding physical comfort, and 0.49 to 0.67 concerning support), except for the equity sub-domain that was negative and significant (-0.27 with rules and -0.24 with physical comfort, and -0.29 with support). However, there was no significant correlation between the disorder subdomain of school environment and the sub-domains of connection to teachers, academic engagement, and equity. On the other hand, the correlation of the disorder sub-domain with parent engagement, student connectedness, and whole-school connectedness was 0.11, -0.06, and -0.06, respectively.

4.3. Measurement invariance

Multiple group confirmatory factor analysis (MG-CFA) and multiple group explanatory structural equation modeling (MG-ESEM) were performed across gender groups (boys and girls), school types (public, gifted, private), and grades (levels 8th, 9th, and 10th) and the fit indices of each of the three scales are presented in Table 5. Results showed that each scale presented the same number of common factors across groups. Although in MG-CFA, the configural invariance of the Environment, Engagement, and Safety scales for gender, school type, and grade levels showed a moderate

Table 5: Fit indices for CFA Models Testing Measurement Invariance across gender, school type, and grade

Conventional CFA solution									
Model	**χ^2**	**Df**	**$\Delta\chi^2$**	**df**	**P value**	**RMSEA**	**ΔRMSEA**	**CFI**	**ΔCFI**
Safety school									
Gender (Boy & Girl)									
Configural	522.6	82	-	-		0.084	-	0.846	-
Metric	495.7	90	3.10	8	0.926	0.077	0.007	0.858	-0.012
Scalar	680.8	98	151.4	8	<0.001	0.088	-0.011	0.796	0.062
School type (Public, Gifted, Private)									
Configural	776.3	123				0.102		0.865	
Metric	750.9	139	10.5	16	0.836	0.093	0.009	0.874	-0.009
Scalar	760.4	155	47.3	16	<0.001	0.087	0.006	0.875	-0.001
Grade (8^{th} , 9^{th}, and 10^{th})									
Configural	771.9	123				0.101		0.835	
Metric	752.1	139	11.4	16	0.785	0.093	0.008	0.844	-0.009
Scalar	740.7	155	26.6	16	0.046	0.086	0.007	0.851	-0.007
Engagement school									
Gender (Girls & Boys)									
Configural	1806.2	568				0.053		0.881	
Metric	1862.4	588	55.6	20	<0.001	0.053	0.000	0.878	0.003
Scalar	1897.2	608	40.9	20	0.003	0.052	0.001	0.876	0.002
School type (Public, Gifted, Private)									
Configural	2453.7	852				0.061		0.864	
Metric	2548.3	892	95.4	40	<0.001	0.060	-0.001	0.859	0.005
Scalar	2705.7	932	152.0	40	<0.001	0.060	0.000	0.849	0.010
Grade (8^{th} , 9^{th}, and 10^{th})									
Configural	2282.6	852				0.057		0.876	
Metric	2311.5	892	39.6	40	0.0456	0.056	0.001	0.877	-0.001
Scalar	2392.0	932	82.4	40	0.0001	0.055	0.001	0.874	0.003
Environment school									
Gender (Girls & Boys)									
Configural	762.7	226				0.056		0.873	
Metric	761.7	239	9.1	13	0.771	0.053	0.003	0.876	-0.003
Scalar	834.1	252	61.4	13	<0.001	0.055	-0.002	0.862	0.014
School type (Public, Gifted, Private)									
Configural	1028.4	339				0.063		0.853	
Metric	1053.8	365	39.4	26	0.044	0.061	0.002	0.853	0.000
Scalar	1043.6	391	32.8	26	0.166	0.057	0.004	0.861	-0.008
Grade (8^{th} , 9^{th}, and 10^{th})									
Configural	928.5	339				0.058		0.879	
Metric	950.4	365	33.3	26	0.152	0.056	0.002	0.880	-0.001
Scalar	1062.3	391	104.4	26	<0.001	0.058	-0.002	0.862	0.018
ESEM solution									
Model	**χ^2**	**df**	**$\Delta\chi^2$**	**df**	P value	RMSEA	ΔRMSEA	CFI	ΔCFI
Safety school									
Gender (Girls & Boys)									
Configural	150.0	50				0.051		0.965	
Metric	198.3	74	51.4	24	<0.001	0.047	0.004	0.956	-0.001
Scalar	275.3	82	61.2	8	<0.001	0.055	-0.008	0.932	0.024
School type (Public, Gifted, Private)									
Configural	242.4	75				0.066		0.970	
Metric	265.6	123	40.8	48	0.760	0.048	0.018	0.974	-0.004
Scalar	318.5	139	47.2	16	<0.001	0.050	-0.002	0.968	0.006
Grade (8th , 9th, and 10th)									
Configural	244.1	75				0.066		0.969	

Metric	293.3	123	57.9	48	0.155	0.052	0.014	0.969	0.000
Scalar	324.5	139	32.6	16	0.008	0.051	0.001	0.966	0.003
Engagement school									
Gender (Girls & Boys)									
Configural	759.6	368				0.037		0.962	
Metric	866.3	488	139.6	120	0.106	0.032	0.005	0.964	-0.002
Scalar	913.1	508	45.7	20	0.001	0.032	0.000	0.961	0.003
School type (Public, Gifted, Private)									
Configural	1343.8	552				0.040		0.945	
Metric	1451.6	792	109.6	240	0.876	0.040	0.000	0.944	0.001
Scalar	1592.1	832	139.4	40	<0.001	0.042	-0.002	0.935	0.009
Grade (8th , 9th, and 10th)									
Configural	1025.3	552				0.041		0.967	
Metric	1203.6	792	239.1	240	0.504	0.032	0.009	0.972	-0.005
Scalar	1273.9	832	70.1	40	0.002	0.032	0.000	0.969	0.003
Environment school									
Gender (Girls & Boys)									
Configural	372.2	148				0.044		0.947	
Metric	385.8	200	40.1	52	0.886	0.035	0.009	0.956	-0.009
Scalar	492.2	213	121.1	13	<0.001	0.041	-0.006	0.934	0.022
School type (Public, Gifted, Private)									
Configural	509.4	222				0.050		0.958	0.003
Metric	633.5	326	140.7	104	0.01	0.043	0.007	0.955	-0.004
Scalar	629.9	352	24.3	26	0.557	0.039	0.004	0.959	0.003
Grade (8th , 9th, and 10th)									
Configural	495.3	222				0.049		0.958	
Metric	574.3	326	106.9	104	0.402	0.039	0.010	0.962	-0.004
Scalar	647.6	352	65.7	26	<0.001	0.040	-0.001	0.955	0.007

CFI: comparative fit index; RMSEA: root mean square error of approximation; – =ΔRMSEA; –=ΔCFI; ESEM: exploratory structural equation modelling; CFA: confirmatory factor analysis.

fit, succeeding invariance models (metric and scalar) presented acceptable fits. A minimal change in model fit for each succeeding model, shown by the change in RMSEA and CFI between the two models, confirmed the measurement invariance (such as RMSEA baseline–RMSEA constrained=ΔRMSEA; ΔRMSEA<0.015 and CFI baseline–CFI constrained=ΔCFI; ΔCFI<0.01 supported metric/scalar invariance). Therefore, with regard to the differences between the scalar invariance model and metric invariance model, the results supported measurement invariance models for all scales. In ESEM, the configural invariance of the Environment, Engagement, and Safety scales for gender, school type, and grade levels showed an acceptable fit. Furthermore, with regard to the differences in succeeding invariance models, the results provided evidence of measurement invariance in each scale.

5. Discussion

In this study, we assessed the psychmetric properties of the revised Persian version of the MDS3 Climate Survey using both confirmatory factor analysis (CFA) and exploratory structural equation modeling (ESEM) approaches to evaluate the construct validity. The patterns and even the sizes of factor loadings of the two approaches were almost similar for the two approaches. However, the ESEM solution fitted the data significantly better than the CFA model without cross-loadings, resulting in substantially less correlated factors.

This result is in line with a number of studies who examined the dimensionality of the school climate measures, and corroborates the argumentation that the construct is multidimensional (9, 32, 33). The correlations among sub-scales were notably different in the ESEM and CFA solutions. The findings of the current study support the claim by Marsh and co-workers (17) that CFA apparently systematically inflates the size of correlations among the latent factors. The ESEM solution for the Engagement and Environment scales (with substantially deflated factor correlations) was a better fit compared to the Safety scale owing to their multidimensional nature was more than Safety scale (and with multiple-items).

Large factor loadings in both solutions (CFA and ESEM) support convergent validity while the ESEM

solution provided a better discriminant validity compared with the CFA solution for latent factors because theoretically, distinct constructs are not highly inter-correlated. In addition, the correlation between the sub-domains of school environment and engagement in school was higher than the association between the sub-domains of school environment and school safety. However, the relationship between the sub-domains of school safety and engagement in school was similar to the correlations between the sub-domains of school environment and school safety. Consistent with Bachman and colleagues (13), our study showed a highly positive correlation between perceived safety and whole-school connectedness, connection to teachers, student connectedness, and academic engagement. Moreover, our findings revealed a highly positive relationship between perceived safety and rules; probably because strong school rules may control unsafe behaviors among students.

In addition, all alpha coefficients, except for perceived safety for other sub-domains of school climate, were acceptable and almost similar with the original study (14). Also, regarding all the three scales (Safety, Engagement, and Environment), alpha coefficients were appropriate and close to the original study (14).

Consistent with a previous study (14), multi-group CFA and ESEM showed evidence of measurement invariance across gender and grade levels in all three scales of school climate. Particularly, the baseline model of multi-group ESEM provided an excellent model fit for each of the three scales across gender, grade level, and school types, confirming the configural invariance. The second model (equal constrained factor loadings across groups) fitted the data well and in comparison with the configural model, there was improvement in the goodness of fit indices. A weak invariance (metric) was established for each of the three scales across gender, grade level, and school types. The third model (equally constrained factor loadings and intercepts across groups) also fitted the data well; in comparison with the metric model, the improvement in the goodness of fit indices indicated strong invariance (scalar invariance) across grade levels and school types for all three scales and across gender for the engagement scale. In addition, although multi-group CFA did not provide an excellent model fit for each scale across gender, grade level, and school type, subsequent MG-CFA analyses supported measurement invariance for all the three scales of school climate. In our study, the findings of measurement invariance across gender, school types, and grade levels provided significant information to develop interventional programs.

This study relied exclusively on the students' perception of school climate. Therefore, there is a need for a more comprehensive assessment using multiple sources of information, including the perceptions of teachers, administrators, and school demographic variables to name a few. Second, the sample belonged to only one province (state) in northern Iran, and these results were limited to students in grades 8, 9, and 10; thus, future research should be extended to other grades and across other provinces. Finally, we used the pooled within-group covariance matrix modeling (28) to account for the clustering of students within schools; however, further studies are needed for more extensive multilevel analysis to understand if the measurement model for the three scales (Safety, Engagement, and Environment) is invariant between student and school levels.

The availability of a comprehensive instrument to evaluate school climate and its psychometric properties is an important goal to improve the quality of schools and student outcomes. Recent research has indicated wide variations in the context and dimensions of school climate associated with effective risk prevention and health promotion efforts (8). Accordingly, it is necessary to appropriately measure these constructs with a particular emphasis on their dimensionality and invariances across gender, school types, and grade levels in developing and developed countries.

6. Conclusion

In addition to verifying the construct validity of the MDS3 Climate Survey in Iranian school context, the current study compared the CFA and ESEM solutions for construct validity. ESEM showed a better fit and deflated inter-factor correlations which subsequently enhanced the discriminant validity of the factors and provided a more realistic representation of each scale. In other words, the conceptual overlap between the dimensions of each subscale of school climate was well shown by ESEM. In addition, establishing measurement invariance for each of the three scales provided the possibility of an unbiased comparison of the scale scores across gender, school types, and grade levels; it also helped plan interventions to promote school climate with less complexity. The Persian version of the MDS3 Climate Survey can be used to measure the three key domains of school climate (safety, engagement, and environment) in the Iranian social context and in epidemiological studies associated with student health and behaviors.

Acknowledgements

This study is part of a PhD dissertation in Epidemiology by Mr. Maysam Rezapour and was funded by Kerman University of Medical Sciences, Kerman, Iran (Grant number: 95000607). We are thankful to all schools, staff, and students who participated in this study; we are especially grateful to the Security Office of the Education Department at Mazandaran province.

Ethical Approval: This study was approved by the Ethics Committee of Kerman University of Medical Sciences (Ethics Code: IR.KMU. AH.REC.1395.89) and the Security Office of the Educational Authority of Mazandaran Province, Iran. Informed consent was obtained from the students, parents, and teachers of the selected schools.

Conflicts of Interest

The authors declared no conflict of interest.

References

1. Konold T, Cornell D, Huang F, Meyer P, Lacey A, Nekvasil E, et al. Multilevel multi-informant structure of the Authoritative School Climate Survey. *Sch Psychol Q*. 2014;**29**(3):238-55. doi: 10.1037/spq0000062. [PubMed: 24884448].
2. Thapa A, Cohen J, Guffey S, Higgins-D'Alessandro A. A review of school climate research. *Rev Educ Res*. 2013;**83**(3):357-85. doi: 10.3102/0034654313483907.
3. Benbenishty R, Astor RA, Roziner I, Wrabel SL. Testing the causal links between school climate, school violence, and school academic performance: A cross-lagged panel autoregressive model. *Educ Res*. 2016;**45**(3):197-206. doi:10.3102/0013189X16644603.
4. Rezapour M, Khanjani N, Mirzai M. Exploring associations between school environment and bullying in Iran: Multilevel contextual effects modeling. *Child Youth Serv Rev*. 2019;**99**:54-63. doi: 10.1016/j.childyouth.2019.01.036.
5. Rezapour M, Khanjani N, Soori H. The Types of Bullying Behaviors and Its Association with General Life Satisfaction and Self-Rated Health among Iranian Pupils. *J Res Health Sci*. 2019;**19**(1):e00436. doi: 10.15171/jrhs.2019.03. [PubMed: 31133626].
6. Waasdorp TE, Pas ET, O'Brennan LM, Bradshaw CP. A Multilevel Perspective on the Climate of Bullying: Discrepancies Among Students, School Staff, and Parents. *J Sch Violence*. 2011;**10**(2):115-32. doi: 10.1080/15388220.2010.539164. [PubMed: 21552337]. [PubMed Central: PMC3088118].
7. Ramsey CM, Spira AP, Parisi JM, Rebok GW. School climate: perceptual differences between students, parents, and school staff. *Sch Eff Sch Improv*. 2016;**27**(4):629-41. doi: 10.1080/09243453.2016.1199436. [PubMed: 28642631]. [PubMed Central: PMC5473611].
8. Cohen J, McCabe L, Michelli NM, Pickeral T. School climate: Research, policy, practice, and teacher education. *Teach Coll Rec*. 2009;**111**(1):180-213.
9. Kohl D, Recchia S, Steffgen G. Measuring school climate: an overview of measurement scales. *Educ Res*. 2013;**55**(4):411-26. doi: 10.1080/00131881.2013.844944.
10. Voight A, Nation M. Practices for Improving Secondary School Climate: A Systematic Review of the Research Literature. *Am J Community Psychol*. 2016;**58**(1-2):174-91. doi: 10.1002/ajcp.12074. [PubMed: 27535489].
11. Rezapour M, Khanjani N, Mirzai M, Mohebbi M. Comparison of Self-Report, Peer-Report, and Principal-Report in Bullying Victimization and Perpetration Among Iranian Students. *Int J School Health*. 2019;**6**(2):e89882. doi: 10.5812/intjsh.89882.
12. School climate survey compendia: The National Center on Safe Supportive Learning Environments (NCSSLE) [Internet]; 2017. Available from: https://safesupportivelearning.ed.gov/topic-research/school-climate-measurement/school-climate-survey-compendium.
13. Bachman R, Randolph A, Brown BL. Predicting Perceptions of Fear at School and Going to and From School for African American and White Students: The Effects of School Security Measures. *Youth Soc*. 2011;**43**(2):705-26. doi: 10.1177/0044118x10366674.
14. Bradshaw CP, Waasdorp TE, Debnam KJ, Johnson SL. Measuring school climate in high schools: A focus on safety, engagement, and the environment. *J Sch Health*. 2014;**84**(9):593-604. doi: 10.1111/josh.12186. [PubMed: 25117894].
15. Centers for Disease Control and Prevention. School Connectedness: Strategies for Increasing Protective Factors Among Youth. Atlanta, GA: U.S. Department of Health and Human Services; 2009.
16. Johnson B, Stevens JJ, Zvoch K. Teachers' Perceptions of School Climate:A Validity Study of Scores From the Revised School Level Environment Questionnaire. *Educ Psychol Meas*. 2007;**67**(5):833-44. doi: 10.1177/0013164406299102.
17. Marsh HW, Morin AJ, Parker PD, Kaur G. Exploratory structural equation modeling: An integration of the best features of exploratory and confirmatory factor analysis. *Annu Rev Clin Psychol*. 2014;**10**:85-110. doi: 10.1146/annurev-clinpsy-032813-153700. [PubMed: 24313568].
18. Morin AJS, Marsh HW, Nagengast B. Exploratory Structural Equation Modeling. In: Gregory R. Hancock,

Mueller RO, editors. Structural equation modeling : a second course. 2nd ed; 2013. p. 395-437.
19. Marsh HW, Lüdtke O, Muthén B, Asparouhov T, Morin AJ, Trautwein U, et al. A new look at the big five factor structure through exploratory structural equation modeling. *Psychol Assess*. 2010;**22**(3):471-91. doi: 10.1037/a0019227. [PubMed: 20822261].
20. Tsigilis N, Gregoriadis A, Grammatikopoulos V, Zachopoulou E. Applying Exploratory Structural Equation Modeling to Examine the Student-Teacher Relationship Scale in a Representative Greek Sample. *Front Psychol*. 2018;**9**:733. doi: 10.3389/fpsyg.2018.00733. [PubMed: 29867688]. [PubMed Central: PMC5967347].
21. Pan J, Zaff JF. The Measurement Structure of School Engagement Among Youth in China: An Exploratory Structural Equation Modeling Study. *Journal of Psychoeducational Assessment*. 2019;**37**(3):280-92. doi: 10.1177/0734282917733652.
22. Marsh HW, Guo J, Dicke T, Parker PD, Craven RG. Confirmatory Factor Analysis (CFA), Exploratory Structural Equation Modeling (ESEM), and Set-ESEM: Optimal Balance Between Goodness of Fit and Parsimony. *Multivariate Behavioral Research*. 2020;**55**(1):102-19. doi: 10.1080/00273171.2019.1602503.
23. Rezapour M, Khanjani N, Mirzai M. Testing measurement invariance and multilevel factor structures of bullying among Iranian adolescents. *International Journal of School & Educational Psychology*. 2019;1-17. doi: 10.1080/21683603.2019.1605952 .
24. Brislin RW. Back-Translation for Cross-Cultural Research. *J Cross Cult Psychol*. 1970;**1**(3):185-216. doi: 10.1177/135910457000100301.
25. Rutherford-Hemming T. Determining Content Validity and Reporting a Content Validity Index for Simulation Scenarios. *Nurs Educ Perspect*. 2015;**36**(6):389-93. doi: 10.5480/15-1640. [PubMed: 26753299].
26. Hu Lt, Bentler PM. Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Struct Equ Modeling*. 1999;**6**(1):1-55.
27. Muthen LK, Muthen BO. Mplus user's guide. 7th ed. Los Angeles: CA: Muthén & Muthén; 2015.
28. Stapleton LM. Multilevel structural equation modeling techniques with complex sample data. In: Hancock GR, Mueller RO, editors. Structural equation modeling: A second course: Iap; 2013. p. 521-62.
29. Cheung GW, Rensvold RB. Evaluating goodness-of-fit indexes for testing measurement invariance. *Structural Equation Modeling*. 2002;**9**(2):233-55. doi: 10.1207/S15328007SEM0902_5.
30. Byrne BM, Van de Vijver FJR. Testing for measurement and structural equivalence in large-scale cross-cultural studies: Addressing the issue of nonequivalence. *International Journal of Testing*. 2010;**10**(2):107-32. doi: 10.1080/15305051003637306.
31. Meade AW, Johnson EC, Braddy PW. Power and sensitivity of alternative fit indices in tests of measurement invariance. *J Appl Psychol*. 2008;**93**(3):568-92. doi: 10.1037/0021-9010.93.3.568. [PubMed: 18457487].
32. Muñoz PE, Casas JA, Del Rey R, Ortega-Ruiz R, Cerda G, Pérez C. Validation and cross-cultural robustness of the School-wide Climate Scale (SCS) across Spanish and Chilean students. *Studies in Educational Evaluation*. 2018;**56**:182-8. doi: 10.1016/j.stueduc.2018.01.002.
33. Wang M-T, Degol JL. School Climate: a Review of the Construct, Measurement, and Impact on Student Outcomes. *Educational Psychology Review*. 2016;**28**(2):315-52. doi: 10.1007/s10648-015-9319-1.