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Educational and Psychological Measurement 2007; 67; 833 originally published online Jun 6, 2007;
DOI: 10.1177/0013164406299102

Educational and Psychological Measurement
Volume 67 Number 5
October 2007 833-844
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10.1177/0013164406299102
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A Validity Study of Scores From the Revised School Level Environment Questionnaire

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Scores from a revised version of the School Level Environment Questionnaire (SLEQ) were validated using a sample of teachers from a large school district. An exploratory factor analysis was used with a randomly selected half of the sample. Five school environment factors emerged. A confirmatory factor analysis was run with the remaining half of the sample. Goodness-of-fit indices indicated that the factor structure fit the data reasonably well. Further analyses using structural equation modeling techniques revealed that the Revised SLEQ worked equally well for all samples. Invariance testing showed that the fitted model and the estimated parameter values were statistically equivalent across all samples. Internal consistency estimates provided further evidence of the reliability of factor scores. In addition, an analysis of variance indicated that the instrument discriminated climate differences between schools. Results suggest that the Revised SLEQ provides a good tool for studying teachers' perceptions of school climate.

Keywords: *confirmatory factor analysis; exploratory factor analysis; school climate; School Level Environment Questionnaire (SLEQ); structural equation modeling; teacher perceptions*

School climate has a variety of meanings, including the social system of shared norms and expectations (Brookover et al., 1978), the set of norms and expectations that others have for students (West, 1985), teachers' morale (Brown & Henry, 1992), level of teachers' empowerment (Short & Rinehart, 1992), students' perceptions of the "personality of a school" (W. L. Johnson, Johnson, & Zimmerman, 1996, p. 64), or the environment for students as indicated by the amount of negative

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student behavior in the school (Bernstein, 1992). In the present study, past conceptions of school climate are integrated with the widely used view of school climate as the psychosocial context in which teachers work and teach (Fisher & Fraser, 1990a).

One commonly used instrument for measuring teachers' perceptions is the School Level Environment Questionnaire (SLEQ). First reported in 1982 (Burden & Fraser, 1994; Fraser & Rentoul, 1982), the SLEQ has been used to measure school climate in several studies of schools in Australia (Cresswell & Fisher, 1998; Fisher & Fraser, 1990b; Fisher & Grady, 1998; Fisher, Grady, & Fraser, 1995; Rentoul & Fraser, 1983; Williamson, Tobin, & Fraser, 1986), South Africa (Mailula & Laugksch, 2003), and the United States (Blose & Fisher, 2003; Henson, 2001a; B. Johnson & Stevens, 2000; C. E. Johnson & Templeton, 1998).

The original development of the SLEQ began with a review of existing school environment instruments (Rentoul & Fraser, 1983). The review identified several limitations with the school climate measures utilized by researchers and system stakeholders. First, some of the instruments were developed without a great deal of awareness of relevant literature about school environments. Second, some were developed without checking the applicability and importance of the dimensions to classroom teachers. Third, some were designed for non–school environments and contained items not relevant to schools and teachers. Fourth, many instruments combined school-level and classroom-level environments. Finally, some of the instruments required too much time for teachers to respond adequately to the items. Based on these findings, a set of six criteria were followed in constructing the SLEQ: consistency with literature, coverage of Moos's 1974 general categories of environments (discussed below), salience to practicing teachers, specific relevance to schools, minimal overlap with classroom environment instruments, and economy in administration (Rentoul & Fraser, 1983).

Scales were chosen based on Moos's three general dimensions for all human environments—relationships, personal development, and system maintenance and system change (Rentoul & Fraser, 1983). After initial testing, one of the original scales, Achievement Orientation, was dropped and another, Work Pressure, was added. In addition, the names of two scales were changed; Formalization was changed to Staff Freedom, and Centralization was changed to Participatory Decision Making. The resulting SLEQ consisted of 56 items arranged in eight scales: Student Support, Affiliation, Professional Interest, Staff Freedom, Participatory Decision Making, Innovation, Resource Adequacy, and Work Pressure.

Results associated with the SLEQ in a previous study (B. Johnson & Stevens, 2001) suggested the feasibility of a shortened, revised version of the SLEQ. Exploratory and confirmatory factor analyses in that study suggested retaining only five (Student Support, Affiliation, Participatory Decision Making, Innovation, and Resource Adequacy) of the original eight factors. Professional Interest, Staff

Freedom, and Work Pressure were dropped from the revised instrument, leaving 35 of the original 56 items. In preparation for the present study, the authors further modified the instrument by renaming the five scales and eliminating an additional 14 items. Scale names were changed to reflect better the items in each scale. In addition, because the Revised SLEQ was to be used as part of a longer survey, items were eliminated to reduce instrument length and minimize item redundancy; the authors attempted to create a school climate instrument that contained only those items that clearly reflected the intent of the scale. The resulting Revised SLEQ consisted of 21 items in five scales: Collaboration (replacing Affiliation) with 6 instead of 11 items, Decision Making (formerly called Participatory Decision Making) with 3 rather than 8 items, Instructional Innovation (formerly called Innovation) with all 4 items retained, Student Relations (formerly called Student Support) with 4 instead of 7 items, and School Resources (formerly called Resource Adequacy) with 4 rather than 5 items. The purpose of the present study was to validate scores from this revised version of the SLEQ.

Method

Participants

The Revised SLEQ was sent to all 4,920 teachers in a large urban school district in the southwestern United States as part of a larger survey. The 21 SLEQ items were interspersed with 21 other items dealing with teachers' perceptions of academic press, leadership, job satisfaction, and school quality. Completed surveys were obtained from 2,558 teachers in 119 schools, a 52% response rate. About half (49.7%) came from 80 elementary schools, with 25.9% from 26 middle schools and 24.3% from 13 high schools. The number of completed surveys from each school ranged from 6 at one small elementary school to 65 from a large high school. After eliminating 9 cases in which there were large numbers of missing items, the responses of 2,549 teachers were analyzed. The majority (81.0%) of the participating teachers were females. Most teachers (72.2%) were Caucasian, while 23.5% were Hispanic, 1.8 % Native American, 1.1% African American, 0.5 % Asian American, and 3.7% Other.

Analyses

An exploratory factor analysis (EFA) was conducted using teacher responses from a randomly chosen half of the sample ($N = 1,275$), and the remaining responses were saved for a confirmatory factor analysis (CFA). For the EFA, principal axis factoring and oblimin rotation ($\delta = 0$) were used. These methods were chosen because an underlying theoretical structure was hypothesized and because

it was assumed that the dimensions or factors describing the structure might be intercorrelated. The CFA was used to determine whether the factor structure obtained using EFA could be confirmed on teacher responses from the remainder of the sample. Structural equation modeling methods (Arbuckle, 1997; Bollen, 1989) were used to estimate the CFA models.

Several further analyses were also conducted. Invariance testing was used to determine if the Revised SLEQ worked equally well for teachers in each of the three school levels (i.e., elementary, middle, and high school). Internal consistency of the scores for the entire Revised SLEQ and of each of its factors was investigated through an α reliability analysis. Finally, analyses of variance (ANOVAs) were run to examine if the instrument as a whole and each of its factors could discriminate climate score differences between schools.

Results

In the initial EFA, five factors with eigenvalues greater than 1.0 were extracted, accounting for 63.0% of the variance of the original items. Collaboration accounted for 33.9% of the variance, Student Relations 10.4%, School Resources 8.0%, Decision Making 5.9%, and Instructional Innovation 4.8%. Interfactor correlations ranged from .29 to .63, sufficient to justify using an oblique rotation and analyzing both pattern and structure matrices (see Tables 1 and 2; Henson & Roberts, 2006). In addition to an examination of the scree plot and the number of factors meeting Kaiser's rule, parallel analysis and Velicer's minimum average partial (MAP) test were conducted (O'Connor, 2000). Results of the MAP test suggested retention of three factors, and a parallel analysis using 1,000 replications suggested the use of six components. Because the MAP test tends to err in the direction of underextraction and the parallel analysis tends to err in the direction of overextraction (O'Connor, 2000), the use of five factors based on Kaiser's rule and conceptual considerations appeared to be well supported. This solution was consistent with the five hypothesized SLEQ factors, and all 21 items fit into their hypothesized factors.

The CFA model used was a hierarchical model in which the 21 SLEQ items were arranged in the five hypothesized factors, each of which was related to an overall second-order general climate factor (see Figure 1). Results of commonly used goodness-of-fit indices indicated that the model fit the data reasonably well. Adjusted goodness-of-fit index (.93) and comparative fit index (CFI; .94) values were close to the oft-recommended criterion value of .95, and root mean square error of approximation (.052) was lower than the recommended level of .06 (Hu & Bentler, 1999). χ^2 was statistically significant, indicating that the model did not fit the data exactly, but with a large sample size as in the present study ($N = 1,274$) even minor differences between the observed and implied covariance matrix may result in statistical significance (Schumacker & Lomax, 1996).

Table 1
Exploratory Factor Analysis Results—Pattern Matrix

No.	Item	Factor I	II	III	IV	V
	Collaboration					
20.	Classroom instruction is rarely coordinated across teachers.	**.687**	.015	.045	.040	.063
11.	I have regular opportunities to work with other teachers.	**.590**	.014	.084	−.043	.001
6.	There is good communication among teachers.	**.528**	.117	.095	−.085	.061
21.	Good teamwork is not emphasized enough at my school.	**.513**	.050	.068	−.127	.153
16.	I seldom discuss the needs of individual students with other teachers.	**.410**	−.027	−.046	.013	.010
1.	Teachers design instructional programs together.	**.388**	.072	−.022	−.258	.194
	Student Relations					
2.	Most students are well mannered or respectful of the school staff.	−.020	**.903**	−.072	−.030	−.043
12.	Students in this school are well behaved.	−.062	**.822**	.013	−.067	.010
7.	Most students are helpful and cooperative with teachers.	.008	**.800**	−.025	.037	−.001
17.	Most students are motivated to learn.	.064	**.611**	.099	.049	.040
	School Resources					
18.	The supply of equipment and resources is not adequate.	.084	−.018	**.794**	−.054	−.053
3.	Instructional equipment is not consistently accessible.	.124	.031	**.650**	−.105	−.112
13.	Video equipment, tapes, and films are readily available.	.012	.034	**.647**	−.037	−.026
8.	The school library has sufficient resources and materials.	−.100	−.002	**.551**	.063	.161
	Decision Making					
4.	Teachers are frequently asked to participate in decisions.	−.067	.047	.012	**−.772**	.133
14.	I have very little to say in the running of the school.	.068	.017	.045	**−.733**	.037
9.	Decisions about the school are made by the principal.	.023	−.013	.019	**−.613**	−.039
	Instructional Innovation					
15.	We are willing to try new teaching approaches in my school.	.043	−.010	.007	−.045	**.677**
5.	New and different ideas are always being tried out.	.014	−.022	−.025	−.144	**.670**
19.	Teachers in this school are innovative.	.118	.122	.070	.081	**.527**
10.	New courses or curriculum materials are seldom implemented.	.179	.035	.046	−.063	**.486**

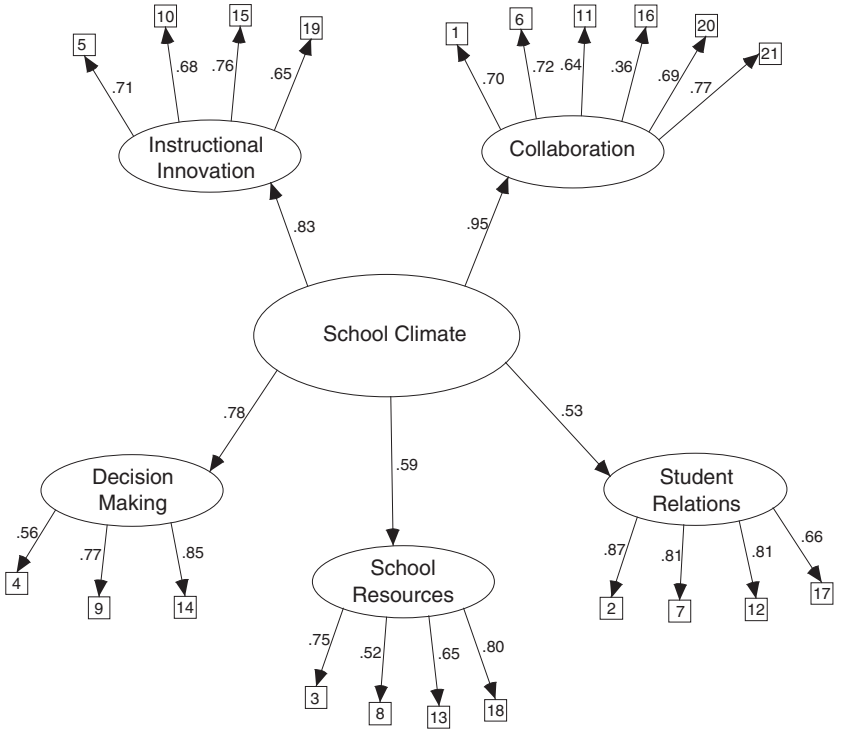
Note: Bold indicates values above .30.

Table 2
Exploratory Factor Analysis Results—Structure Matrix

No.	Item	Factor I	II	III	IV	V
	Collaboration					
20.	Classroom instruction is rarely coordinated across teachers.	**.726**	.256	**.305**	**−.380**	**.499**
11.	I have regular opportunities to work with other teachers.	**.649**	.241	**.317**	**−.397**	**.427**
6.	There is good communication among teachers.	**.683**	**.362**	**.379**	**−.467**	**.508**
21.	Good teamwork is not emphasized enough at my school.	**.718**	**.325**	**.371**	**−.513**	**.575**
16.	I seldom discuss the needs of individual students with other teachers.	**.385**	.084	.091	−.189	.237
1.	Teachers design instructional programs together.	**.665**	**.329**	**.307**	**−.569**	**.574**
	Student Relations					
2.	Most students are well mannered or respectful of the school staff.	.225	**.864**	.240	−.235	.256
12.	Students in this school are well behaved.	.241	**.830**	**.313**	−.280	.299
7.	Most students are helpful and cooperative with teachers.	.228	**.783**	.250	−.189	.265
17.	Most students are motivated to learn.	.288	**.666**	**.336**	−.216	.311
	School Resources					
18.	The supply of equipment and resources is not adequate.	**.359**	.288	**.818**	**−.361**	.297
3.	Instructional equipment is not consistently accessible.	**.353**	.293	**.704**	**−.368**	.253
13.	Video equipment, tapes, and films are readily available.	.258	.270	**.668**	−.278	.238
8.	The school library has sufficient resources and materials.	.165	.204	**.548**	−.157	.263
	Decision Making					
4.	Teachers are frequently asked to participate in decisions.	**.452**	**.301**	**.334**	**−.813**	**.460**
14.	I have very little to say in the running of the school.	**.508**	.279	**.357**	**−.808**	**.432**
9.	Decisions about the school are made by the principal.	**.332**	.164	.234	**−.611**	.254
	Instructional Innovation					
15.	We are willing to try new teaching approaches in my school.	**.494**	.261	.274	**−.374**	**.724**
5.	New and different ideas are always being tried out.	**.498**	.255	.260	**−.438**	**.727**
19.	Teachers in this school are innovative.	**.470**	**.349**	**.312**	−.282	**.633**
10.	New courses or curriculum materials are seldom implemented.	**.547**	.299	**.317**	**−.406**	**.656**

Note: Bold indicates values above .30.

Figure 1
Revised School Level Environment Questionnaire
Confirmatory Factor Analysis Model



Note: The coefficients are standardized regression weights.

Invariance Testing

To determine if the fitted model worked equally well for each of the three school levels, a series of invariance hypotheses were tested (see Table 2). The first model tested applied the same structural form of the CFA model to all three groups but left all parameters unconstrained so that each group had parameters freely estimated. This model served as the baseline for comparison with a series of increasingly constrained invariance tests. The second model involved imposing the elementary school regression weights from each first-order latent variable to its respective items on the middle school and high school samples. These constraints resulted in

Table 3
Invariance Tests Across Three School Levels

Model	χ^2	*df*	CFI	χ^2_Δ	df_Δ	*p*	CFIΔ
1. Unconstrained	1,248.30	441	.955	—	—	—	—
2. Measurement weights				47.94	28	.011	.001
3. Latent weights				70.02	36	.001	.002
4. Latent variances				75.75	38	< .001	.002
5. Latent residuals				139.88	48	< .001	.005
6. Measurement residuals				330.61	86	< .001	.013

an increase in χ^2 of 47.94, $p = .011$. Although statistically significant, the change in fitted variance as indicated by the difference in the CFI index was about .001. Cheung and Rensvold (2002) recommend a cutoff of 2% (.02) in incremental fit indices such as the CFI as an indication of the presence of differences between groups in testing measurement invariance.

To the constraints imposed in Model 2, Model 3 added constraints on the path coefficients from the second-order general school climate factor to the five first-order factors. Model 4 constrained the variance of the second-order factor to be equal across groups, and Model 5 constrained the residuals of the first-order latent variables to be equal across groups. Model 6 constrained the residuals of the measured items to be equal across the three groups. Inspection of the changes in CFI for each model shows that there were only minor changes in fit across the hierarchy of invariance tests (see Table 3). For the last model (measurement residuals), the change in CFI compared to the first model was about a 1.3% increase in unfitted variance. In addition, the overall CFI value remained at a high level (.937) even after all parameters were constrained across the three groups. These results indicate that the CFA model was essentially invariant across elementary, middle, and high school teachers.

Internal Consistency

Internal consistency was estimated by calculating α reliability coefficients. Results are shown in Table 4. Scores for the instrument as a whole, measuring overall school climate, had a relatively strong reliability coefficient in this sample (.90; Henson, 2001b; Nunnally & Bernstein, 1994). Scores for each of the five factors also had acceptable reliability coefficients, from .77 to .86. These coefficients are in the same range as those reported in previous studies of the SLEQ (Fisher & Fraser, 1990a; Fraser, Williamson, & Tobin, 1987).

Table 4
Internal Consistency (Reliability) Results for the Revised SLEQ

Present Study				Previous Studies	
		95% Confidence Interval			
Factor	α	Lower	Upper	Factor	α
Overall School Climate	.90	.894	.905	Overall School Climate	.90
Collaboration	.82	.807	.829	Affiliation	.87, .85, .84, .78
Decision Making	.78	.765	.794	Participatory Decision Making	.80, .69, .82, .78
Instructional Innovation	.79	.773	.800	Innovation	.84, .78, .81, .68
Student Relations	.86	.849	.867	Student Support	.70, .79, .85
School Resources	.77	.759	.788	Resource Adequacy	.81, .80, .65, .68

Note: Coefficients from previous studies are taken from Johnson & Stevens (2001).

Differentiation Between Schools

Following the approach of other researchers using the SLEQ (see Fisher et al., 1995; Fisher & Fraser, 1990b; Fisher & Grady, 1998), ANOVAs were used to investigate the ability of the Revised SLEQ to differentiate between schools (see Table 5). These analyses are done because in order for the SLEQ to be useful for most applications, it must be able to detect differences between schools. If the instrument cannot do so, either there are no differences in climate among schools and teachers' perceptions of those climates, which is extremely unlikely, or the instrument is not sensitive enough to pick up those differences. Significant differences between schools on each of the five climate factor scores as well as on the overall climate factor score were found (all p values $< .001$). Strength of association as measured by η^2 also showed that from 22% to 31% of the variation in climate factor scores was associated with school affiliation.

Discussion

Results from the current study demonstrated the factorial validity of the 21-item Revised SLEQ. Five hypothesized factors emerged in the EFA, and this structure was supported in the CFA. The factor analyses also confirmed the association of items with their hypothesized factors. In addition, the structure and measurement properties of the Revised SLEQ were found to apply equivalently for elementary, middle, and high school teachers.

There are important limitations to this study. Participants were volunteers, and it is not known if their perceptions of their schools' climates were the same as those of nonrespondents. Although there were no statistically significant differences

Table 5
Analysis of Variance (ANOVA) Tests of Ability to Discriminate Between Schools

Between-Schools Factor	*F*	*df*	*MSE*	*p*	η^2
Overall School Climate	8.900	118, 2430	56.681	.001	.31
Collaboration	6.497	118, 2430	2.994	.001	.24
Decision Making	5.613	118, 2430	4.040	.001	.22
Instructional Innovation	5.494	118, 2430	2.570	.001	.22
Student Relations	8.004	118, 2430	3.997	.001	.29
School Resources	8.522	118, 2430	5.029	.001	.30

between respondents and nonrespondents in ethnicity, years of teaching experience, or educational level, it is possible those who responded chose to do so for a particular reason—that is, they felt particularly strongly about their schools' climate—that was different for nonrespondents. In addition, these results were from one school district in a southwestern U.S. city. Results may be different for schools in other places.

The Revised SLEQ can be an important tool for other researchers interested in investigating issues related to teachers' perceptions of school climate. For those interested in examining the relationships between this construct and other factors, it is relatively easy to use with large numbers of teachers. For example, recent work (Goddard, LoGerfo, & Hoy, 2004) has shown the link between teachers' perceived collective efficacy and student achievement. The SLEQ could be used to investigate the relationship between school climate and collective efficacy. For more in-depth studies of schools, the Revised SLEQ might be used, along with interviews and observations, to assess how teachers' perceptions of school climate change over time. The Revised SLEQ is currently being used by the authors as part of a longitudinal study of teachers' perceptions of school climate and other factors such as job satisfaction, school quality, professional development, and student achievement. The longitudinal nature of the larger study will provide an opportunity to examine several important questions regarding school climate including the stability of teachers' perceptions of their schools' climate over time; the relationships between school climate and other factors such as satisfaction, school quality, academic press, and leadership; and the relationship between all of these factors and student achievement. The instrument can also be useful to those at a particular school, providing data helpful to the teachers themselves in identifying elements of school climate they wish to change (Fraser, 1999). The study of school climate is a complicated endeavor. The Revised SLEQ is a tool that can help us in our attempts to unravel its mysteries.

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