



Perception of School Social Bonding (PSSB) Instrument: Structural and Concurrent Validity

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Abstract

School bonding refers to the connections that students have with their schools and with various aspects of their academic environments, with an emphasis on close affective relationships and investment in doing well at school. The Perception of School Social Bonding (PSSB) instrument is a 10-item, self-report instrument with 3 subscales measuring different aspects of student school bonding: attachment; involvement; and belief. The instrument is grounded in Hirschi's theory of social control and was evaluated for structural and concurrent validity in a sample of 3,507 students from mixed ethnicity, gender, and age groups. The 3-factor structure of the scale was supported; differences across gender and ethnic groups were identified; and some subscale scores related inversely to chronic school absenteeism. The brevity and sensitivity of the PSSB may make it particularly useful as a universal screening measure in multi-tiered systems of support models.

Keywords Perception of school social bonding · School climate · Absenteeism · School characteristics · Validation

School bonding has historically referred to various domains that include a sense of belongingness and pride for an academic institution, attachment to school personnel, feelings of safety, and participation in, and dedication to, school activities (Hirschi, 1969; Krohn & Massey, 1980; Maddox & Prinz, 2003; Simons-Morton et al., 1999). School bonding overlaps to an extent with concepts such as student engagement, school connectedness, and school climate. School engagement broadly refers to student effort, participation, or involvement in learning activities. School connectedness generally refers to sense of competence, perceptions of relationships, and participation in school activities (Hodges et al., 2018). School climate includes wide-ranging relationship, environment, safety/discipline, and academic domains. School bonding is sometimes differentiated from these concepts by its more specific emphasis on close affective relationships and investment in doing well at school.

School bonding was derived from Hirschi's social control theory (Hirschi, 1969, 2004) and its key assumption that individuals tend to fulfill private interests selfishly (e.g., via delinquency) if their connections to vital social groups are weakened. Hirschi argued that attachment to others, commitment to long-term goals, involvement in conventional activities, and belief in morally binding laws tend to reduce delinquency in part due to meaningful and positive connections to others (Costello & Laub, 2020). Hirschi focused on social bonding during adolescence because norm violating behavior peaks during this developmental stage (van Kleef et al., 2015). One important social bond during this stage includes parents who may enhance attachment with an adolescent via strong involvement, commitment, and belief in the importance of social activities that deter the adolescent from deviant behavior (Jensen & Brownfield, 1983; McNeal, 1999). Another important social bond during this stage, school bonding, includes school staff and peers as well as investment in school activities and academic ideals that also enhance attachment, involvement, commitment, and moral beliefs.

Hirschi's (1969, 2004) bonding elements have been found to be closely related to important academic outcomes. *Attachment* to significant others, or positive affectivity between students and important social groups (parents, peers, school officials), relates to an enhanced sense of

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school safety, less likelihood of violating school rules, and greater academic achievement (Bryan et al., 2012; Cernkovich & Giordano, 1992; Keppens & Spruyt, 2017). *Commitment* or investment in learning and academic activities such as homework, classroom participation, and grades relates to positive identity development, enhanced mental health and emotional well-being, and less substance use behavior (e.g., Verhoeven et al., 2019). *Involvement* in school activities, or amount of time spent in these activities, relates to enhanced self-esteem, greater social support, and less delinquent behavior (Hart & Mueller, 2013; Kort-Butler & Hagewen, 2011). *Belief* in the validity of school norms and rules, or conviction in the moral legitimacy of social rules, relates to enhanced behavioral control and sense of school safety (De Leeuw et al., 2015; Thapa et al., 2013).

School bonding in general has been found to be a protective factor against risky and antisocial behavior, whereas weakened school bonding has been found to be a risk factor for truancy, school dropout, substance use, and perilous sexual behavior (Cunningham, 2007; Eith, 2005; Maddox & Prinz, 2003; Terrett et al., 2012). Gender and ethnicity differences have been found with respect to school bonding. Boys generally report lower levels and greater decreases in school bonding than girls (Oelsner et al., 2011), and school bonding has been shown to be inversely associated with African American, Hispanic, and Multiracial status (Bryan et al., 2012).

School bonding approaches dovetail nicely with recent advancements in key academic outcomes such as school achievement and school attendance that increasingly focus on the full ecology of a given student (Darling-Hammond & Cook-Harvey, 2018; Kearney et al., 2022). Hirschi's (1969) social control theory provides an ecological view of the student-school relationship and whether some students are negatively affected by a dysfunctional school system and environment. School bonding not only reflects student attitudes toward school but also helps reveal the impact of the school environment on a student's behavior (Blum, 2005; Bower et al., 2012; McNair & Johnson, 2009). These collective approaches emphasize not only the importance of youth and family relationships but also peer, school, and even community factors that impact student achievement and attendance (Gubbels et al., 2019; Singer et al., 2021).

Despite the importance of school bonding, little consensus is available with respect to how this construct is measured. In particular, little research has focused on the development of a brief and validated instrument to measure school bonding that would have practical and scientific benefits. From a practical standpoint, such an instrument would help key stakeholders assess the degree of school bonding to strengthen Tier 1 preventative strategies to develop stable school support systems. Such an instrument could also help

identify key aspects that may contribute to early school disengagement (Kearney & Graczyk, 2020; Keppens & Spruyt, 2017). From a scientific standpoint, such an instrument would facilitate meaningful comparisons across studies and countries. In addition, some researchers have claimed that two aspects of school bonding, commitment and involvement, may be considered one dimension (Cernkovich & Giordano, 1992; Krohn & Massey, 1980; Maddox & Prinz, 2003). Empirical analysis of a 3-factor structure of school bonding would thus be useful.

Information on school bonding with respect to gender and ethnic groups would also be helpful. This is important given that social relationships at school as well as school connectedness often differ for students of color (Daly et al., 2010; Hebron, 2018). African American and Hispanic students often report less favorable school climate experiences than White students, particularly with respect to student-teacher relationships and opportunities for classroom and other participation (Bottiani et al., 2014; Mitchell et al., 2010). Students with disabilities as well as lesbian, gay, bisexual, and transgender students also commonly experience negative aspects of school bonding and climate via harassment and assault (Espelage et al., 2015; Pizmony-Levy & Kosciw, 2016). Students from marginalized groups also commonly experience mismatches vis-a-vis other students and school officials, which can impact teacher expectations of student success as well as school attendance (Holt & Gershenson, 2019).

The primary aim of the present study was to evaluate the validity of the Perception of School Social Bonding (PSSB) instrument following best practices regarding health, social, and behavioral research scale development (Boateng et al., 2018). An initial pool of 39 PSSB items was developed in unpublished work by the first author based on Hirschi's social bonding theory emphasizing the importance of strong social bonds in attachment, commitment, involvement, and belief. Initial reliability analyses trimmed this number to 10 items across 3 primary factors (attachment, involvement, belief), which are the focus of the present study. Initial reliability analyses revealed Cronbach alpha values of 0.74–0.83 for the 3 factors.

The primary hypothesis was that a 3-factor model of the PSSB would be supported and that PSSB subscale scores would differ across gender and ethnic groups, in accordance with previous analysis. Analyses for this hypothesis included exploratory and confirmatory factor analyses to examine structural validity as well as multilevel linear regression to examine the association between PSSB subscale scores and student gender and ethnic groups. The secondary hypothesis was that PSSB subscale scores would relate inversely to chronic school absenteeism. Analyses for this hypothesis

included multilevel ordered logistic regression to examine concurrent validity.

Method

Participants

Participants included 3,507 students in 12 public schools that were identified via the Indiana Department of Education database. Participants were largely female (53.0%); White (53.6%), Black (26.8%), Hispanic (9.3%), Asian (2.1%), Native American (1.1%), or other (7.1%); and aged 6–10 (2.6%), 11–15 (60.4%), or 16–20 (37.1%) years. Grade levels included 4 (1.2%); 5 (4.3%); 6 (4.2%); 7 (19.9%); 8 (21.4%); 9 (12.0%); 10 (9.6%); 11 (15.7%); 12 (11.7%); and alternative/vocational education (0.1%).

Measures

Perception of School Social Bonding (PSSB) (Gentle-Genitty, 2008). The PSSB is a 10-item, self-report instrument with 3 subscales measuring different aspects of student school bonding: attachment; involvement; and belief. Items are scored on a 5-point Likert scale ranging from 1 (“strongly disagree”) to 5 (“strongly agree”). Higher scores indicate greater level of perceived school bonding. The *attachment* subscale measures student connectiveness with school staff (4 items: When I do something good, adults in my school tell me about it; Adults in my school notice when I do something well; I have adults in my school who I can talk to about important things; Persons in my school encourage me to go further in my education). The *involvement* subscale measures behavioral participation in school activities (3 items: I participated in more than one extracurricular activity in school; I participated in or was a leader in at least one positive school activity, I participated in school activities during school time). The *belief* subscale measures students’ beliefs about personal achievement and school value and norms (3 items: I try my best in school; What I am learning in school is important to my future; I know the punishment for breaking a school rule).

Subscale scores were examined for the present study and extrapolated to a 0–100 scale for easier interpretation in multivariate analyses. Means and standard deviations were calculated for attachment ($M=65.9$, $SD=23.9$), involvement ($M=66.2$, $SD=25.3$), and belief ($M=74.0$, $SD=21.9$). For each of the PSSB items, the number of missing values ranged from 38 to 70. We employed mean imputation to address these missing values. Mean imputation was applied at the item level, where missing values within each subscale

were replaced with the mean value of the non-missing items within the same subscale.

School absenteeism. School absenteeism was measured via student self-report. Chronic school absenteeism was defined as missing at least 9 days of school (15.9% of sample).

Procedure and Data Analysis

Data were collected via online survey with a response rate of approximately 40%. The PSSB takes approximately 3–5 min to complete. The PSSB questions were part of a larger school discipline survey and were based on school bonding categories (attachment, involvement, belief) from the literature. The survey was sent to participating schools via a local child and policy organization. Data were collected during January–March 2018.

Two subsamples were constructed by randomly dividing the dataset into equal parts ($n=1858$ each). The subsamples did not significantly differ with respect to gender, ethnicity, absenteeism, and PSSB scale scores. Subsample 1 was used for exploratory factor analysis (EFA) to uncover underlying structure and subsample 2 was used for confirmatory factor analysis (CFA). The primary objective was to identify the factor model that most accurately represented the relationships among the observed variables (Boateng et al., 2018). As such, various potential factor structures were considered, including a 3-factor model based on the theoretical framework as well as alternative 1-, 2-, and 4-factor models. For the EFA, an orthogonal varimax rotation was chosen under the initial assumption that the factors in the proposed model were uncorrelated. This rotation method is particularly suited for simplifying the factor structure and enhancing interpretability when factors are presumed to be independent. To determine the optimal number of factors to retain, a blend of statistical guidelines was used. This included the Kaiser criterion, which suggests retaining factors with eigenvalues greater than 1, in addition to the Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC). Both the AIC and BIC are critical in assessing the fit of each model against the observed data, considering the complexity of the model. In this context, lower values of AIC and BIC indicate a model with superior balance between data fit and parsimony (Preacher et al., 2013).

Confirmatory factor analysis (CFA) was used on a second random sample to further validate the hypothetical structure of the scale items and their underlying relationships (Boateng et al., 2018). Model fit was assessed via the comparative fit index (CFI), root mean-square error of approximation (RMSEA), and standardized root mean squared residual (SRMR). CFI values of 0.90+, RMSEA values of <0.06, and SRMR values of <0.08 were considered

Table 1 Comparison of model fit via exploratory factor analysis

	1-Factor	2-factor	3-factor	4-factor
AIC	1038.05	270.71	73.83	70.37
BIC	1087.12	363.40	204.69	233.95

acceptable fit (Boateng et al., 2018). In addition, 3 different models of measurement invariance (configural, metric, and scalar) were examined regarding whether item loadings varied as a function of student ethnicity (White or Non-White) and gender (male or female). Configural invariance tests whether the same CFA demonstrates validity for each group (i.e., all parameters are allowed to vary freely). Metric invariance tests whether the meaning of the levels of the underlying items (i.e., intercepts) are equal in both groups. Scalar invariance tests whether groups can be compared on their scores on the latent variable by investigating if the meaning of the construct (factor loadings), and the levels of the underlying items (intercepts), are equal in both groups. Listwise deletion was used for item-mean substitution.

Differences between fit indices of nested models were used to evaluate invariance. A decrease in CFI of at least 0.01 and an increase in RMSEA of at least 0.02, or an increase in SRMR of at least 0.03, were used to indicate non-invariance. A decrease in CFI of at least 0.01 and an increase in RMSEA of at least 0.02 or an increase in SRMR of at least 0.01 were used as criteria for scalar invariance (Chen, 2007). Linear multilevel regression analysis was conducted to further examine the association of the PSSB scales with student gender and ethnicity. Finally, logistic multilevel regression analysis was conducted to assess the association of the PSSB subscale scores with chronic school absenteeism (concurrent validity). Mean-imputed latent variable (for the PSSB scales) were used as observed variables in these regression models. Analyses were conducted via Stata 17.

Results

Structural Validity

EFA revealed the 3-factor model to best fit the observed data among the models considered (Table 1). The 3-factor model had the lowest Akaike Information Criterion (AIC) value of 73.83, compared to the 1-factor (1038.05), 2-factor (270.71), and 4-factor (70.37) models. Similarly, the Bayesian Information Criterion (BIC) for the 3-factor model was 204.69, which, while not the lowest, indicated a better balance between model fit and complexity compared to the 1-factor (1087.12), 2-factor (363.40), and 4-factor (233.95) models. The 3-factor model was thus the one most optimized to replicate the observed data patterns while avoiding unnecessary complexity. Eigenvalues also indicated that 3 factors were the best fit. To further elaborate on the EFA results, factor loadings for the 3-factor model were examined to assess the simple structure (Table 2). The 3-factor model captures key aspects of students' attachment to school, involvement in activities, and commitment and beliefs about education. Most items loaded significantly on their respective factors, indicating a strong association with the underlying constructs. However, several items cross-loaded moderately on multiple factors, suggesting they may relate to more than one underlying construct (e.g., "My teachers care if I succeed;" "Persons, in my school, encourage me to go further in my education").

CFA on the other random sample also revealed adequate fit (RMSEA=0.06, CFI=0.96, SRMR=0.04). Cronbach alpha estimates were calculated for attachment (0.83), involvement (0.74), and belief (0.71) subscales. McDonald's Omega coefficients were calculated for each subsample for attachment (0.84/0.83), involvement (0.75/0.74), and belief (0.71/0.72) subscales. Standardized loadings for the 3-factor CFA of the PSSB are in Table 2.

Measurement invariance was examined for gender and ethnicity. Tests of configural invariance of the 3-factor

Table 2 Standardized loadings for three-factor confirmatory model of perception of school social bonding (PSSB) instrument (n sample EFA=1858; n sample CFA=1858)

Item	Attachment	Involvement	Commitment & Beliefs
My teachers care if I succeed	0.77 /.80 ^b	0.16	0.31
I have adults, in my school, who I can talk to about important things.	0.69 /.71 ^b	0.20	0.12
Adults in my school notice when I do something well.	0.73 / .74 ^b	0.15	0.13
Persons, in my school, encourage me to go further in my education.	0.70 /.72 ^b	0.23	0.23
I participated in more than one extracurricular activity in school.	0.19	0.68 /.73 ^b	0.13
I participated in or was a leader in at least one positive school activity.	0.12	0.70 /.77 ^b	0.08
I participated in school activities during school time.	0.30	0.59 /.60 ^b	0.16
I try my best in school.	0.35	0.23	0.69 /.79 ^b
What I am learning in school is important to my future.	0.35	0.08	0.62 /.64 ^b
I knew the punishment for breaking a school rule.	0.30	0.21	0.60 /.61 ^b

^b = calculated based on subsample CFA.

Table 3 Goodness-of-fit indicators of three factor CFA model testing measurement invariance across gender and ethnicity

3 Factor Model	χ^2	df	RMSEA	CFI	SRMR
Overall model	359.170	32	0.077	0.949	0.059
Gender					
Model 1	283.997	64	0.065	0.961	0.043
Model 2	300.287	73	0.062	0.959	0.047
Model 3	342.907	83	0.061	0.954	0.048
Ethnicity					
Model 1	254.212	64	0.060	0.966	0.042
Model 2	286.966	73	0.060	0.962	0.068
Model 3	385.895	82	0.066	0.946	0.069

model for boys and girls revealed adequate fit (Table 3). The difference between the configural (model 1) and metric (model 2) models indicated that there was metric equivalence across gender (Δ CFI = -0.002; Δ RMSEA = -0.003; Δ SRMR = -0.004). With respect to the difference between metric and scalar equivalence (model 3), these results provided evidence of scalar equivalence (Δ CFI = -0.005; Δ RMSEA = -0.001; Δ SRMR = -0.001).

Tests of configural invariance of the 3-factor model for White and Non-white students revealed adequate fit (Table 3). The difference between the configural (model 1) and metric (model 2) models indicated that there was metric equivalence across race (Δ CFI = -0.004; Δ RMSEA = 0.000; Δ SRMR = -0.026). With respect to the difference between metric and scalar equivalence (model 3), these results provided no evidence of full scalar equivalence. However, partial scalar invariance was obtained by constraining the intercept and loading of the item ('I participated in school activities during school time').

With respect to between-group PSSB subscale score comparisons, girls displayed higher scores on involvement ($\gamma = 2.49$; $p = .003$) and belief ($\gamma = 2.95$; $p < .001$) but not attachment ($\gamma = 1.14$; $p = .132$) compared to boys. White students displayed higher scores on involvement ($\gamma = 3.79$;

$p < .001$) but not on attachment ($\gamma = 1.28$; $p = .200$) or belief ($\gamma = -1.07$; $p = .170$) compared to Black students. With respect to within-group PSSB subscale score comparisons, Hispanic students displayed higher scores on attachment ($\gamma = 6.00$; $p < .001$) than on belief ($\gamma = 1.06$; $p = .340$) and involvement ($\gamma = -1.28$; $p = .420$). Asian students displayed higher scores on involvement ($\gamma = 11.54$; $p < .001$) and belief ($\gamma = 4.38$; $p = .037$) than on attachment ($\gamma = 3.08$; $p = .260$). Students from other ethnic groups (Black, Native American, other) had within-group differences with respect to belief ($\gamma = -3.27$; $p = .008$), but not with respect to attachment ($\gamma = -2.19$; $p = .165$) and involvement ($\gamma = 1.99$; $p = .250$) PSSB subscale scores.

Concurrent Validity

PSSB involvement (OR = 0.992; $p < .001$) and belief (OR = 0.993; $p = .023$) subscale scores were inversely associated with chronic absenteeism. However, PSSB attachment subscale scores were unrelated to chronic absenteeism (OR = 0.997, $p = .266$) (Table 4).

Discussion

The present study examined the psychometric characteristics of the Perception of School Social Bonding (PSSB) instrument that measures attachment, involvement, and belief dimensions of school bonding. Results indicated strong support for structural and concurrent validity of the scale. The 3-factor solution of the PSSB matches affective, cognitive, and behavioral components of school bonding that include emotional connection or attachment to school, student self-perceptions vis-à-vis the school environment, and student acceptance and espousal of their school's ideals and goals (Jimerson et al., 2003). The PSSB demonstrated

Table 4 Logistic multilevel regression analysis: PSSB scales and chronic absenteeism

	Chronic absenteeism (OR)				
Fixed effects					
Intercept				0.120**	(.026)
Attachment (grand mean centered)				0.997	(.003)
Involvement (grand mean centered)				0.992***	(.003)
Belief (grand mean centered)				0.993*	(.003)
Random effects					
Variance individual level				/	
Variance school level				0.465	
2 years behind the normal track	1.74	0.094	1.566	1.933	0
3 or more years behind the normal track	2.62	0.296	2.01	3.27	0
Random effects					
Variance individual level	/	/	/	/	/
Variance school level	0.485	0.038	0.416	0.565	

* $p < .05$, ** $p < .01$, *** $p < .001$

Note. Number of students = 62,841, number of schools = 715. CI = confidence interval; LL = lower limit; UL = upper limit. OR = odds ratio

general equivalence across gender and race, though specific subscale differences may help inform decision-making processes as described below. Finally, components of the PSSB related to less chronic school absenteeism, as expected.

A key advantage of the PSSB is its brevity for assessing school bonding. Such brevity, in addition to its sensitivity for detecting racial/ethnic differences, means that the measure may be particularly useful for Tier 1 preventative strategies designed to improve school bonding and climate. School psychologists working within multi-tiered systems of support frameworks depend heavily on universal screening measures that are culturally responsive and cost-effective to administer and score (Speltt et al., 2018). As such, the PSSB could be used by school psychologists at Tier 1 to identify students becoming disengaged from the educational process, to better assign limited early intervention resources (e.g., individual problem-solving), and to collect large-scale data sets for sophisticated analytic strategies to discover key differences among student groups for more targeted interventions.

School psychologists could also utilize the PSSB to inform the need for Tier 2 interventions. Additional research would be useful for determining whether the PSSB has cut-off scores that can indicate problems in school bonding that could require Tier 2 interventions such as mentoring or tutoring (Sterrett et al., 2020). The PSSB could also be used as part of data-based individualization, or an iterative process of collecting and analyzing progress monitoring information to identify when a particular student should move from Tier 1 to Tier 2 or 3 supports (Sussman et al., 2022). Academic partnerships could also be leveraged to create an information dashboard that includes PSSB and other readily available school-based data (e.g., grades, attendance, disciplinary referrals, screening measures) to develop an early warning system and enhance efficient data-based decision making by a school psychologist-led team (Levenson et al., 2016).

The PSSB also contributes to a burgeoning literature outlining the need to consider the whole child and his/her ecology when conducting research or developing educational policy, especially with respect to school absenteeism. Stakeholders often focus more on student and family factors that contribute to school absenteeism, or place substantial burden on these parties to remediate school absenteeism, without considering school- and community-based factors that present substantial barriers to school attendance (Childs & Scanlon, 2022). The PSSB may help identify students who feel disenfranchised from the school experience, perhaps because of a lack of trust, safety, and universality in their school environment (Belsler et al., 2016).

Limitations of the present study should be noted. First, school absenteeism was measured via student self-report,

though the overall prevalence of chronic absenteeism in the present study (15.9%) matches what is commonly found in many school districts (Garcia & Weiss, 2018). Second, the study was restricted to one state, though the sample size was large and diverse. Third, younger children were included to improve the power of the analyses. However, reading level, possible assistance, and comprehension were not directly assessed. Further work will also be needed with respect to age invariance of the PSSB.

Despite these limitations, the PSSB may be a structurally sound and useful brief measure of school bonding for students of different developmental levels. Researchers are encouraged to further validate the scale in other student populations, such as those with disabilities, and explore the scale's concurrent validity with measures of school climate and related constructs. The practical aspect of the PSSB can be explored as well, particularly with respect to universal screening and linkage to supportive and restorative interventions, particularly those designed to improve school attendance. School psychologists in particular could integrate the PSSB into assessment and intervention procedures to help augment cultural competence and responsiveness (Sullivan et al., 2022).

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Data Availability Data is available upon request.

Declarations

Conflict of Interest All authors (Gentle-Genitty, Keppens, and Kearney) declare no conflict of interest.

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