**Structural School Characteristics and Neighborhood Risk Factors: Associations with Student-Reported School Climate in a Large, Urban Public School District in the United States**

**Supplementary File**

**Predictor Selection**

Identification of potential neighborhood and school-building predictors of school climate was guided by (a) theoretical models centering the relations between neighborhood characteristics and individual outcomes, including Social Disorganization Theory (e.g., Shaw & McKay, 1942), (b) a literature search focused on relations between neighborhood factors with educational, behavioral, or and social-emotional outcomes (e.g., Bowen et al., 2000; Laurito et al., 2019; Lenzi et al., 2012; Nieuwenhuis & Hooimeijer, 2016; Ruiz et al., 2018; Williams et al., 2002), (c) theoretical models of school climate, such as a cultural-ecological model of school climate (LaSalle, Meyers, Varjas, & Roach, 2015), and (d) published reviews on school climate (Aldridge & McChesney, 2018; LaSalle et al., 2015; Thapa, Cohen, Guffey, & Higgins-D'Alessandro, 2013; Wang & Degol, 2016). Predictors that were ultimately included in the multi-level model were theoretically aligned and were identified in prior research as significant influences on educational, climate, or related outcomes.

**School Climate Measure Item Review and Factor Analysis**

To validate the internal structure of the district-obtained school climate measure, items were examined for construct representativeness and then evaluated using factor analytic techniques. Table 1S presents all items included on the school climate question prior to factor analysis. Below, we briefly elaborate on the measurement validation process, as described in section 2.2.1 of the manuscript’s main body.

First, the first and senior author independently reviewed all 31 items for alignment with school climate constructs as operationalized by the ED School Climate Model domains and topics (U.S. Department of Education, 2022). These included three domains: *engagement* (e.g., degree to which cultural and linguistic competence is demonstrated and experienced in the school/district, strong relationships with students exist, and students are actively participating in school), *safety* (e.g., degree to which students, instructional and noninstructional staff, and families feel safe from violence, bullying, harassment, and substance use within the school community; emotional and physical safety), and *environment* (e.g., degree to which their school/district has appropriate facilities, well-managed classrooms, available school-based health supports, and a clear, fair disciplinary policy; includes physical and instructional environment). Following consensus discussions, we removed 11 items for non-relevance (e.g., assessing grit, general satisfaction, academic performance; see Table S1).

We then independently reviewed and coded the remaining 20 items as being either representative or not representative of individual school climate constructs (e.g., safety), also as operationalized by the ED School Climate Model domains and topics (U.S. Department of Education, 2022). Final codes for each item were reached via consensus discussions and supported by Wang and Degol’s (2016) review of the school climate construct and its measurement. Terminology for the constructs measured in this study were derived from Wang & Degol and include *academic* climate (overall quality of academic atmosphere, including curricula and teacher training), *community* (quality of interpersonal relationships), *safety* (physical and emotional safety), and *institutional environment* (organizational or structural features of the school). One additional item was removed for non-relevance (i.e., “my teachers can give me extra help with schoolwork when I need it”) and the remaining 19 items were coded into three school climate domains: community (n = 6), institutional environment (n = 6), and safety (n = 7). No items were determined to measure academic climate.

Finally, items were subjected to confirmatory and exploratory factor analyses, as described in text, to further validate the theoretically-aligned internal structure. Items removed during each phase of the measurement model building process are denoted in Table S1 below.

**Table S1**

*School Climate Questionnaire: All Items Prior to Factor Analysis*

|  |
| --- |
| Item |
| I learn a lot at my school. † |
| I like my teachers. † |
| I like my classes. † |
| I like the food at my school. † |
| I like my school. † |
| I would choose to stay at my school even if given the option to change schools. |
| I feel like I belong at this school. |
| I have the chance to do music, art, dance, or plays at my school. |
| I feel safe at my school. |
| I feel safe going to and from my school. |
| Students fighting is a problem at my school.\*\* |
| Students picking on/bullying other students is a problem at my school.\*\* |
| Students are often in the halls during class time at my school.\*\* |
| Students respect each other. |
| Students respect school staff. |
| School staff respect the students. |
| If students break rules, there are fair consequences. |
| My school is clean.\* |
| My school has enough light. |
| It is often too hot at my school.\* |
| It is often too cold at my school.\* |
| My teachers can give me extra help with schoolwork when I need it. † |
| There is someone at my school who I can talk to about my problems. |
| I can take books home from school.\* |
| When I do something good at my school, my parent or guardian hears about it. † |
| When I do something bad at school, my parents or guardian hears about it. † |
| I keep working at schoolwork and homework that is hard until I get it right. † |
| When I’m taught something that I don’t get, I keep working on it until I get it. † |
| I can finish my homework every day. † |
| I can pass all subjects at school. † |
| It is important for me to come to school every day.\* |

†*Item removed during preliminary review and coding due to non-relevance*

*\*Item removed during factor analysis process*

*\*\*Item reverse coded*

**Multilevel Model Equation:**

$$Level 1 \left(student\right):Y\_{ij}=γ\_{0j}+γ\_{1j}sex\_{ij}+γ\_{2j}age\_{ij}+ϵ\_{ij}$$

$$Level 2 \left(school\right): γ\_{0j}=β\_{00}+β\_{01}STR\_{j}+β\_{02}texp\_{j}+b\_{0j}; γ\_{1j}=β\_{10} , γ\_{2j}=β\_{20}$$

**Combined Model**: $Y\_{ij}=β\_{00}+β\_{01}stratio\_{j}+β\_{02}texp\_{j}+β\_{03}cert\_{j}+β\_{04}enroll\_{j}+β\_{05}attend\_{j}+β\_{06}mobility\_{j}+β\_{07}FARM\_{j}+β\_{08}sped\_{j}+β\_{09}shoot\_{j}+β\_{10}arrest\_{j}+β\_{11}dirtyst\_{j}+β\_{12}clogged\_{j}+β\_{13}femhhs\_{j}+β\_{14}pmhhi\_{j}+β\_{15}narc\_{j}+β\_{16}viol\_{j}+β\_{17}vacant\_{j}+β\_{18}empl\_{j}+b\_{0j}+β\_{10}sex\_{ij}+β\_{20j}age\_{ij}+ϵ\_{ij}$

$Y\_{j}\~MVN (μ\_{j},Σ\_{j}$) , $Σ\_{j}=G+R\_{ij}=σ\_{b\_{0j}}^{2}+σ\_{ϵ\_{ij}}^{2}$, where $Y\_{j} is a vector of responses Y\_{ij}$ and $μ\_{j} is a vector of subject means μ\_{ij}$

**SPSS code:**

MIXED Overallclimate with Grade Sex XGSSTRatio XGSSYrsTeachExp XGSCertTeach

XEnrollment\_2017 XAttendanceRate\_2017 XMobility\_2016 XFARMS\_2017 XSPED\_2017 Xshoot16 Xarrest16 Xdirtyst16 Xclogged16 Xfemhhs16 Xmhhi16 Xnarc16 Xviol16 Xvacant16 Xempl16

 /METHODS = REML

 /PRINT SOLUTION TESTCOV

 /FIXED Grade Sex XGSSTRatio XGSSYrsTeachExp XGSCertTeach XEnrollment\_2017

XAttendanceRate\_2017 XMobility\_2016 XFARMS\_2017 XSPED\_2017 Xshoot16 Xarrest16 Xdirtyst16 Xclogged16 Xfemhhs16 Xmhhi16 Xnarc16 Xviol16 Xvacant16 Xempl16 | SSTYPE(3)

 /RANDOM = INTERCEPT | subject(SchoolNumber) COVTYPE(UN).

**Table S2**

*Correlation Matrix of Level-2 School and Neighborhood Predictors*

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  ST Ratio  |  Teacher  Experience |  Certified  Teachers | Enrollment | Attendance | Mobility | FARMS | SPED | Shootings | Arrests | Dirty streets | Clogged drains | F-headed households | Med Household Income | Narcotics calls | Violent crime | Properties vacant/ abandoned | Employed adults |
| ST Ratio | 1 | .190\*\* | .099\*\* | .129\*\* | -.063\*\* | .107\*\* | .058\*\* | -.201\*\* | -.071\*\* | -.131\*\* | -.183\*\* | -.108\*\* | -.032\*\* | .088\*\* | -.020\* | -.204\*\* | -.024\*\* | -.087\*\* |
| Teacher Experience |  | 1 | .759\*\* | .179\*\* | .176\*\* | -.350\*\* | -.349\*\* | -.043\*\* | -.233\*\* | -.299\*\* | -.302\*\* | -.116\*\* | -.140\*\* | .177\*\* | -.210\*\* | -.358\*\* | -.194\*\* | .123\*\* |
| Certified Teachers |  |  | 1 | .043\*\* | .162\*\* | -.290\*\* | -.218\*\* | .106\*\* | -.148\*\* | -.228\*\* | -.242\*\* | -.090\*\* | -.025\*\* | .081\*\* | -.132\*\* | -.250\*\* | -.150\*\* | .068\*\* |
| Enrollment |  |  |  | 1 | .271\*\* | -.343\*\* | -.426\*\* | -.278\*\* | -.189\*\* | -.213\*\* | -.124\*\* | .052\*\* | -.193\*\* | .294\*\* | -.292\*\* | -.131\*\* | -.243\*\* | .213\*\* |
| Attendance |  |  |  |  | 1 | -.620\*\* | -.583\*\* | -.077\*\* | -.273\*\* | -.301\*\* | -.061\*\* | .266\*\* | -.361\*\* | .418\*\* | -.308\*\* | -.226\*\* | -.361\*\* | .423\*\* |
| Mobility |  |  |  |  |  | 1 | .727\*\* | .080\*\* | .367\*\* | .362\*\* | .141\*\* | -.200\*\* | .424\*\* | -.474\*\* | .327\*\* | .287\*\* | .367\*\* | -.438\*\* |
| FARMS |  |  |  |  |  |  | 1 | .127\*\* | .609\*\* | .579\*\* | .266\*\* | -.113\*\* | .676\*\* | -.703\*\* | .527\*\* | .533\*\* | .575\*\* | -.655\*\* |
| SPED |  |  |  |  |  |  |  | 1 | -.059\*\* | 0.004 | -.054\*\* | .047\*\* | -.051\*\* | .030\*\* | 0.012 | 0.004 | -.034\*\* | .019\* |
| Shootings |  |  |  |  |  |  |  |  | 1 | .823\*\* | .341\*\* | .063\*\* | .768\*\* | -.734\*\* | .683\*\* | .736\*\* | .794\*\* | -.752\*\* |
| Arrests |  |  |  |  |  |  |  |  |  | 1 | .601\*\* | .171\*\* | .555\*\* | -.592\*\* | .862\*\* | .830\*\* | .768\*\* | -.583\*\* |
| Dirty streets |  |  |  |  |  |  |  |  |  |  | 1 | .520\*\* | .109\*\* | -.155\*\* | .466\*\* | .621\*\* | .423\*\* | -.118\*\* |
| Clogged drains |  |  |  |  |  |  |  |  |  |  |  | 1 | -.194\*\* | .321\*\* | .103\*\* | .359\*\* | -.031\*\* | .255\*\* |
| F-headed households |  |  |  |  |  |  |  |  |  |  |  |  | 1 | -.831\*\* | .495\*\* | .519\*\* | .656\*\* | -.786\*\* |
| Med house income |  |  |  |  |  |  |  |  |  |  |  |  |  | 1 | -.535\*\* | -.552\*\* | -.609\*\* | .780\*\* |
| Narcotics calls |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 1 | .660\*\* | .766\*\* | -.548\*\* |
| Violent crime |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 1 | .574\*\* | -.462\*\* |
| Properties vacant |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 1 | -.710\*\* |
| Employed adults |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 1 |
| \*\*. Correlation is significant at the 0.01 level (2-tailed). |
| \*. Correlation is significant at the 0.05 level (2-tailed). |

**Table S3**

*Correlation Matrix of Overall School Climate and School Climate Subdomains*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Overall Climate | Community | Institution | Sense of Safety | Physical Safety |
| Overall Climate | 1 | .840\*\* | .645\*\* | .709\*\* | .524\*\* |
| Community |  | 1 | .425\*\* | .487\*\* | .230\*\* |
| Institution |  |  | 1 | .382\*\* | .137\*\* |
| Sense of Safety |  |  |  | 1 | .096\*\* |
| Physical Safety |  |  |  |  | 1 |

|  |
| --- |
| \*\*. Correlation is significant at the 0.01 level (2-tailed). |