A Cluster-Randomized Controlled Trial of the CharacterStrong SERVE Model: Effects on Student-Reported and Teacher-Reported Outcomes

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Abstract

Middle school is an opportune developmental period for school-based prevention. Teacher relationship-focused practices have significant potential to influence critical enablers to school success, such as belonging and academic engagement. However, there are few programs that operationalize relationship practices teachers implement to promote students' sense of belonging and academic engagement. The purpose of this experimental study was to evaluate the effects of CharacterStrong's SERVE Model of Adult Relationship Practices on middle school students' sense of belonging, academic engagement, and behavior. This study took place in two large urban middle schools serving a diverse population of students. Thirty teachers were randomly assigned to either intervention (SERVE Model; n_{treatment teacher}= 15) or attention control condition (n_{control teacher}= 15). An average of 6 to 8 students were randomly recruited from each teacher's classroom (n_{student total}= 185). Four student outcomes assessed at baseline and posttest: belongingness, academic engaged time, truancies, and behavior discipline. Three-level general and generalized linear mixed models were used to estimate the effects of SERVE Model on student outcomes and to probe treatment effect heterogeneity across student subgroups based on baseline status on each outcome. The SERVE Model was associated with significant improvements in belongingness, academic engaged time, behavior discipline, and truancies.

Keywords: Tier 1 PBIS, social emotional learning, character building, universal prevention, school belonging

Introduction

Sense of belonging and connection are core human needs that are important protective factors for positive youth development. Sense of belonging in school is a critical indicator of school climate and a necessary component of academic engagement and life success (Pendergast et al., 2018). Sense of belonging is linked to (a) positive mental health and well-being, (b) academic engagement, persistence, and performance, and (c) future life success (Cook et al., 2018).

Positive teacher–student relationships have long been considered a foundational aspect of a positive school experience (Kincade, Cook, & Gerber, 2020). The importance of the teacher-student relationship is widely established; three separate meta-analyses that collectively included hundreds of studies (Cornelius-White, 2007; Quin, 2016; Roorda et al., 2011) indicated that relationships have the following effects on student outcomes: (a) small-to-large effect sizes and a positive association with academic achievement (English, math, social studies, science, and reading; Cornelius-White, 2007; Quin, 2017; Roorda et al., 2011); (b) medium-to-large effect sizes and a positive relationship on engagement and school adjustment (Quin, 2017; Roorda et al., 2011); and (c) a negative relationship with disruptive behavior, suspension, and school dropout (Quin, 2017).

Research has also shown that positive teacher–student relationships have protective effects for students with learning and behavioral difficulties (McGrath et al., 2015) and students who have been exposed to trauma (Jennings, 2019). Poor teacher-student relationships are a causal factor leading students to experience problems with attendance, behavior, and grades (Quin, 2017). In addition to the magnitude of their effect, relationships between teacher-student relationships and student outcomes are established across numerous demographic groups and

contexts including early childhood (e.g., Pianta, & Stuhlman, 2004) through older adolescence (Roorda et al., 2011; Wang, Brinkworth, & Eccles, 2013). When students feel like they are accepted, wanted, and respected by their teacher, they are more likely to engage and respond to feedback (Korpershoek et al., 2019). Considering the strength and reach of the impact of teacher-student relationships, there is a need to validate and scale effective practices that act on the malleable root causes of positive teacher-student relationships and interactions in order for all learners in educational systems to achieve academic, social, and life success. Despite recognition of this need, there remain gaps in specific practices that educators implement on a consistent basis to establish, maintain, and restore relationships with students.

CharacterStrong SERVE Model

The SERVE Model for Adult Relationship Practices is based on findings from research, years of practical experience as educators, and input from students. It is based on two core beliefs: (1) the belief that the ability to influence students comes through serving students to meet their needs and (2) the belief that when it comes to creating a supportive and inclusive classroom, it is all about relationships. SERVE is an acronym that organizes low-burden, high impact practices to help educators increase their intentionality and impact on critical student outcomes like belonging, wellbeing, and engagement, knowing that these outcomes enable learning and life success. The SERVE Model provides a framework for improving teacher-student relationships. Together, the SERVE Model provides common language and a dedicated set of relationship-focused and behavior support practices that educators can implement and continuously improve over time through collaboration and reflection to work toward ensuring every student accesses supportive relationships that lead to a sense of belonging, emotional well-

being and engagement in learning. A detailed description of the SERVE model is provided in Supplemental file 1.

Purpose of the Study

To address extant gaps in the literature, we conducted a cluster-randomized trial to evaluate the efficacy of the SERVE Model on student social, emotional, and behavioral outcomes. In addition, this study explored *for whom* the SERVE Model was effective. Four research questions guided the study design, data collection, and analyses:

- (1) Compared to the control condition, did the SERVE Model condition lead to improved student outcomes (academic engaged time, belongingness, number of truancies, and behavioral discipline) from pre- to post-test?
- (2) To what extent do student demographics moderate the effect of the SERVE Model on student SEB outcomes?
- (3) To what extent do students' baseline status on outcomes moderate the effect of the SERVE Model on their outcomes at posttest?
- (4) To what extent does belongingness predict the effects of the SERVE Model on other student outcomes (academic engaged time, number of truancies, and behavioral discipline)?

Materials and Methods

Setting and Participants

Two middle schools from an urban school district in the Midwest Region of the United States were recruited as part of an existing research-practice partnership with the district. The two schools differed with regard to school-wide demographics regarding race and socioeconomic status (Table 2). Thirty teachers were recruited from these schools to participate in the study. A

random sample of approximately 6 to 10 middle school students (grades 6, 7, 8) were recruited to participate from each of the 30 classrooms for a total of 185 student participants. Teacher and student level demographics are displayed in Table 1 and were consistent with urban demographics of the Midwest of the US (Tipton & Miller, 2022). The participant recruitment process led to a 3-level nested data structure: 185 students were nested within the classes of 16 teachers from 2 schools (Treweek et al., 2018). Demographics of teacher and student samples Pre-intervention data was collected Fall of 2022 and post-intervention data was collected Spring of 2022.

Procedures

This study used a participatory action research approach to evaluation, in which a collaborative partnership was established between a school system and CharacterStrong research department. The principals and teachers from the participating schools were involved in the research process from the initial design of the study through data gathering and analysis to inform future actions for the school district (Nastasi et al., 2000). Given the participatory action research nature of this study, principals and teachers opted into the pool of potential teachers who were then randomly selected to participate in the study. From this pool, 30 teachers were randomly assigned to condition.

A randomized-block longitudinal design was used to evaluate the efficacy of the SERVE Model. Classes were matched and placed into five pairs according to baseline estimates of student reports of belonging and percent of students receiving FRL to increase the likelihood of comparable groups at baseline. Each class within the matched pair was then randomly assigned to either the intervention or attention control condition.

Implementation Supports

Intervention Condition. Teachers who were randomly assigned to the intervention conditions received training, protected time using a structured protocol, and implementation scripts to support the implementation. The training was delivered by a CharacterStrong professional development specialist and consisted of a 3-hour interactive experience that involved a tell-show-do approach with brief implementation planning for the final 20 minutes of the training. The tell-show-do part of the training focused on the core practices of each of the components of the SERVE Model (e.g., Start Intentionally with 4 at the Door Plus 1 More, Engage Relationally through Temperature Checks). Teachers were provided with opportunities to rehearse the practices by engaging in scenarios to think through how they would implement the practice as part of their daily workflow and routines. The implementation plan included both an action plan to detail how and when each of the practices would be implemented in addition to a problem-solving plan that anticipated barriers to implementation and generated solutions to overcome those barriers if they happened. The protocol was used by groups of teachers to reflect on implementation and identify areas for continuous improvement to reach high-fidelity delivery of the core SERVE Model practices. Last, the implementation scripts provided information on how to implement each of the core SERVE Model practices with a section on examples and nonexamples of what quality delivery of the practices looks like.

Attention Control Condition. Teachers who were randomly assigned to the control condition received the same amount of time receiving attention and exposure to information as teachers in the intervention condition. This was important to control for time and attention across both conditions. Instead of the SERVE Model training, teachers in the attention control condition received a 3-hour training organized by the principal on a topic deemed of relevance to academic instruction. Instead of the SERVE Model protocol, teachers in this condition met using the

DuFour guiding questions (Dufour & DuFour, 2011) to reflect on students in their class and instructional needs. Last, teachers in this condition received generic practice profiles on classroom instructional practices.

Instruments

Sense of Belonging. Student sense of belonging represents student perceptions of the degree to which they feel like a welcomed, valued, and respected member of a given place. Three items were selected and adapted from the Psychology Sense of School Membership Scale (Goodenow, 1993), to reflect belonging to the classroom setting specifically. Internal consistency estimates indicated that the Belonging Scale possessed adequate reliability in the present sample at both pretest ($\alpha = .92$) and posttest ($\alpha = .93$).

Academic Engaged Time. Academic engaged time was the primary academic-related outcome assessed in this study. The operational definition of AET was: Paying attention to and participating in instruction and/or learning activities during class time (e.g., ask and answer questions, work with others in small group activities, stay on-task for independent work). The Direct Behavior Rating: Single-Item Scale (DBR-SIS; Chafouleas et al., 2012) was used by the participating teachers to assess the AET of the participating students in their classrooms.

Specifically, a teacher rated the AET of each student based on a scale of "0%" through "100% of the observed time." The outcome variable of a student's AET was the average score of three DBR-SIS from three different core instruction times pre-determined by the teachers. Existing literature has established the good reliability and validity of DBR-SIS as a pragmatic tool to assess AET (Smith et al., 2018).

School Administrative Data. School administrative data, truancies and behavior discipline, were extracted from existing school administrative data to assess behavior. Truancy

data reflected the number of truancies recorded over the previous two months while behavior discipline data were recorded as a binary outcome variable (yes vs. no), indicating whether a student had at least one office discipline referral in the past two-months.

Data Analytic Approach

Prior to analyses, baseline equivalence tests (independent-sample *t*-tests) were conducted to examine differences in student demographics (race, gender, and socio-economic status) and baseline levels of response variables (*belongingness*, *academic engaged time* (AET), *truancies*, and *behavioral discipline*) between study conditions. None of these variables were significantly different at *a*=.05, indicating probabilistically equivalent groups through randomization to conditions.

Given that randomization occurred at the classroom-level, intraclass correlation coefficients (ICCs) were calculated to assess design effects (i.e., whether scores were nested within classrooms; Raudenbush & Bryk, 2002). Given that the study employed a cluster randomization at the classroom level, we planned to use mixed-linear modeling, testing the intervention at the unit of randomization (Bland, 1997). Reduced maximum likelihood (REML) was used in reported results, and full maximum likelihood was used to compare the fit of nested models (Fox, 2015). All analyses were run in *R* (R Core Team, 2021).

To answer research question 1, main intervention effects models were built using condition as the independent variable predicting the change in each outcome from pre-post. The dependent variable was modeled as the difference in pre-post test score (i.e., post minus pre) (Model 1). A model building process, guided by comparison of fit indices (AIC, BIC) and by conducting deviance tests (X^2) between models, was used to determine best fitting models associated with each outcome variable. To answer research question 2, the following predictors

were included to determine whether changes in outcomes were moderated by the following level-1 covariates: Free or reduced-price lunch (FRL), race (dummy coded across all categories with white as the reference) and gender (dummy coded with female as the reference) (Model 2). If multiple predictors were significant in Model 2, interaction terms were created (Model 2a). To answer research question 3, a cross-level interaction was conducted between Treatment group and pre-assessment score, predicting the difference in pre-post assessment (Model 3). Any significant predictors from model 2 were also included, and if still significant, were also included as an interaction term (Model 3a). Grand mean centering was used for main effects variables involved in an interaction. All outcome variables were standardized, and beta-values (β) can be interpreted in standard deviation units.

To answer research question 4, cross-lagged panel modeling (CLPM) was used to analyze the relationships between change in *belongingness* in relation to *AET, Truancy*, and *behavioral discipline*. CLPM using structural equation modeling (Kline, 2023) is appropriate when data for multiple variables are repeatedly collected at the same time points. This allows for analysis of the directional relationships between two variables measured at multiple time points and identification of potential mechanisms of change, while controlling for temporal stability (Falkenstrom et al., 2022; Selig & Little, 2012). All CLPMs were built using the *lavaan* package in *R* (Rosseel, 2012) and followed procedures in MacKinnon et al., 2021. Maximum likelihood estimation was used, and fit indices are reported; namely, the comparative fit index (CFI), the Tucker-Lewis Index (TLI), the root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR). Descriptions of each of these fit indices can be found elsewhere (Cangur & Ercan, 2015). All model coefficients were standardized and can be interpreted as standard deviation units.

Effect sizes appropriate for mixed-linear modeling were calculated using a delta score, which accounts for relative change over time between the intervention and control group $delta = (M_{change-T} / SD_{pre-T}) - (M_{change-C} / SD_{pre-C})$ (Feingold, 2009). This effect size can be interpreted similar to Cohen's d (Cohen, 1988).

Results

A total of 185 student data points were modeled at Level 1 across 30 classrooms modeled at Level 2. Student demographics are displayed in Table 1. Unconditional, baseline models were created to produce ICCs, which ranged from .026–.315 supporting the use of multilevel models. The model-building process for each of the four measured outcomes is displayed separately in their own table (i.e., Table 2 includes models for belongingness, Table 3 includes models for AET, Table 4 includes models for behavioral discipline, and Table 5 includes models for truancies). Missing data accounted for <1% of data and were assumed to be missing at random.

Research Question 1

The main effect models (Model 1) for each measured outcome indicated that students in the treatment condition improved significantly when compared to the control condition. Student ratings of belongingness were significantly higher from pre- to post-test for the treatment condition, [t(28)=4.02, β =0.71, SD=.18, p<.001)]; teacher ratings of students' academic engaged time (AET) also indicated a significant, positive effect favoring the treatment condition [t(183)=4.60, β =3.85 SD=.83, p<.001)]. The number of behavioral discipline occasions significantly decreased, favoring treatment group [t(182)=-2.45, β =-0.36 SD=.15, p=.02)], and the number of measured truancies also decreased in the treatment group [t(28)=-2.27, β =-0.17 SD=.08, p=.03).

Research Question 2

Model 2 for each outcome included demographic control variables (FRL, gender, and race) in addition to the condition predictor variable. Model 2 for belongingness indicated that both condition (β =0.41 SD=.10, p<.001) and non-white race were significant β =-0.12 SD=.06 p=.04) predictors. An interaction model was run between race and belongingness, though it was not significant at alpha=.05 and was not retained. Regarding AET, non-white race (β =-1.99, SD=.81, p=.02) and the treatment condition ($\beta=3.86$, SD=.81, p<.001) were significant predictors of increased AET in Model 2. An interaction term was tested between race and condition, but it was non-significant and therefore not retained. Regarding behavioral discipline, both FRL (β =-0.06, SD=.03, p=.04) and race (β =0.07, SD=.07=1, p=.03) were significant predictors as well as Condition (β =-0.07, SD=.03, p=.02). Interaction terms were created, and the best-fitting interaction model for behavioral discipline (Model 2a) included interactions between Condition and FRL (β =-0.42, SD=.12, p=.001) and FRL and race (β =0.29, SD=.13, p=.03). Regarding truancy, Model 2 indicated that Condition ($\beta=-0.08$, SD=.04, p=.04), FRL $(\beta = -0.8, SD = .04, p = .04)$, and race $(\beta = 0.11, SD = .04, p = .002)$ were significant predictors. Model 2a included interaction terms, but none were significant and fit was not improved, therefore Model 2 was retained.

Research Question 3

Model 3 for each outcome variable tested for baseline-targeted moderation (i.e., whether students in the treatment condition who had the most room to improve did so over and above those in the control condition, while also controlling for any significant demographic variables from Model 2. Regarding *belongingness*, race was no longer significant in the model, nor was it associated with the model of best fit, so it was dropped. The interaction between *Condition* and *belongingness* pre-score was significant (β =-0.53, SD=.09, p<.001) and indicated that, as

belongingness increased, those who started lower and were in the treatment condition were associated with significant increases in *belongingness* from pre- post-assessment (Figure 2). Regarding AET, *race* was included in the BTM model (Model 3), though it was non-significant and not associated with the model of best fit, and was therefore dropped from the model. The interaction between AET pre-score and condition was also non-significant. Regarding *behavioral discipline*, when the pre-score for behavioral discipline was included, neither *race* nor *FRL* were significant, nor were they included in the model of best fit, and were dropped from the model. The interaction between *Condition* and *behavioral discipline* pre-score was significant (β =-0.51, SD=.10, p<.001) and the negative coefficient indicates that students in the treatment condition who received higher rates of behavioral discipline at baseline had lower rates at post-assessment than students in the control condition with higher rates of discipline at baseline. The interaction between pre-score *Truancy* and *Condition* was non-significant, and neither race nor FRL were significant in Model 3.

Research Question 4

Three separate cross-lagged panel models were estimated between *belongingness*, *AET*, *truancy*, and *behavioral discipline*. A bi-directional relationship was found between the cross lags of *belongingness* and *AET*, though the standardized coefficient between *belongingness* preassessment and *AET* post-assessment was stronger (β =.66, p=.04) than the association between AET pre-assessment and belongingness post-assessment (β =.02, p=.02). Fit indices for the model were mixed (CFI=.932, TLI=.591, RMSEA=.272, SRMR=.044). All model coefficients and co-variances are standardized and reported in Figure 3. No significant cross-lags were found between *belongingness* and *truancy* or between *belongingness* and *behavioral discipline*.

Effect Sizes

Effect size estimates were calculated for each outcome. All effect sizes were in the direction favoring the treatment group. The highest effect size was associated with AET (d=0.50) followed by belongingness (d=0.48), behavioral discipline (d=-0.37), and truancy (d=-0.25). The negative effect sizes for behavioral discipline and truancy represent reductions in occurrence among the treatment condition.

Discussion

Overall, we found significant main effects for each measured outcome favoring the treatment condition (i.e., SERVE Model condition). This finding establishes the initial efficacy of the SERVE Model to improvement student belongingness, AET, truancy and behavior discipline. These findings are particularly encouraging as low academic engaged time, truancy, and behavior discipline represent early warning indicators of more distal negative outcomes in school, such as school dropout (McMahon & Sembiante, 2020). The effects of the SERVE Model on these outcomes are consistent with previous research suggesting that student sense of belonging in the classroom acts as a protective factor against a variety of independently observed problem behaviors (Cook et al., 2018).

When examining the extent to which student demographics moderated the effect of the SERVE Model on student SEB outcomes, the best-fitting interaction model for behavioral discipline included interactions between *condition* and *FRL* and *FRL* and *race*. Moreover, both race and FRL were significant predictors of truancy. Attending school can impose greater levels of risk and stress for students from certain demographic backgrounds, such as those who are living in conditions of poverty, have been exposed to adverse childhood experiences, and come from racial and linguistic minoritized groups (Baugh et al., 2019). Our findings are consistent

with the literature on Tier 1 programming that has found similar interaction effects between treatment and student subgroups (Low et al., 2015).

Moderator analyses of baseline status were consistent with previous research where targeted benefits for students who started with low scores at baseline improved more than students who started in a more favorable place at baseline (Merle et al., under review). This significant moderation effect of student baseline status echoed Greenberg and Abenavoli's (2017) recommendation that the evaluation of universal prevention programs should conduct subgroup analysis, such as comparing the differential effects of a program across subgroups based on baseline status or demographics. Although this study was not specifically designed and powered for subgroup analyses, our findings did support such an approach to develop a more precise understanding regarding for whom Tier 1 universal prevention programs work (Thayer et al., 2019). This finding also sheds light on the extended utility of Tier 1 universal prevention programs (e.g., the SERVE model) to be strategically used as differentiated instruction embedded in the general education classroom for students with greater needs (e.g., low baseline in the target outcomes) to potentially reduce Tier 2 capacity constraints for students who may respond to a Tier 1 intervention designed to meet their need, particularly in low-resource schools.

Finally, we sought to understand potential mechanisms through which the SERVE model influenced outcomes. In our CLPM, we found a significant bi-directional relationship between AET and belongingness, indicating that belongingness has a significant impact on distal outcomes not directly targeted by classroom practices delivered in the context of a strong student-teacher relationship, particularly academic engaged time, which is an important predictor of academic performance (Barnett, Melugin, & Hernandez, 2020; Fisher et al., 1981). This finding contributes to evidence of the importance of student-teacher relationships and teachers'

routine classroom management practices on student perceptions of self and community, which is a pervasive determinant of behavioral indices (Korpershoek et al., 2020). Overall, these findings are important because teacher training in classroom management and positive student-teacher interactions and relationships is a malleable root cause of student social-emotional and behavioral outcomes and academic performance. As classroom management has been identified as teachers primary need in the field of education, particularly post-COVID, there is a greater need to scale these interventions as they can significantly impact a range of determinants of students' school and life success.

Limitations and Future Directions

This study has limitations that should be considered within the context of our findings. First, the modest sample size of 185 students across 30 classrooms limits the generalizability, particularly given that this was a cluster-randomized controlled study design, and therefore the unit of analysis aligns with randomization (i.e., at the classroom level). Relatedly, some instances of singularity were found in the multilevel models (i.e., belongingness and AET), indicating potential over-fit likely due to limited sample size. Although there is not yet consensus about how to deal with singularity, we only ran multilevel models in relation to *a priori* theory and avoided running overly complex models (Matuschek et al 2017). The use of CLPM is also debated within the literature (Hamaker et al., 2015). Despite known limitations of CLPM to produce spurious associations at times (Lucas, 2023), there are no viable alternatives when only two waves of data are available, such as in this inquiry. Therefore, findings should be interpreted with caution and considered exploratory; and future research assessing the stability of traits, such as belongingness, with larger samples and additional waves of data should be conducted to further investigate the mechanisms through which the SERVE model achieves its effect. This

will also allow for more robust analytic methods to investigate these effects. Moreover, data were collected by students and teachers in this study and are subject to biases, such as social desirability (Fischer & Katz, 2000). However, this study found positive effects across multisources and multi-informants, including student report, teacher report, and school administrative records. This adds defensibility to the conclusion that the SERVE Model leads to beneficial outcomes for middle school students.

Implications

This study's findings hold significance for both research and educational practice. The observed positive effects of the SERVE Model on student-teacher relationships, belongingness, and behavioral outcomes provide valuable insights for researchers seeking to enhance the effectiveness of universal prevention programs. The interaction effects emphasize the importance of understanding with whom certain interventions are likely to work best. The study also has implications for understanding the specific mechanism through which relationship-focused approaches like the SERVE Model work. Findings from this study suggest that variables such as belonging may be a mechanism of academic engagement, which in turn leads to distal outcomes like academic achievement. For educational practitioners, the study underscores the pivotal role of positive student-teacher relationships in influencing academic outcomes, highlighting the need for ongoing teacher training in effective relational and behavior support practices. The moderation by student demographics and baseline status underscores the need for tailored strategies to address the unique needs of diverse student groups, with interactions identified for factors such as FRL status and race. The significant moderation effect of student baseline status suggests targeted benefits for students with low scores at baseline, offering insights for the strategic implementation of Tier 1 universal prevention programs in low-resource schools. In

addition, these findings emphasize the malleable root cause of student social-emotional and behavioral outcomes and advocate for the strategic implementation of low-burden yet high-impact universal practices to create welcoming and responsive learning environments. The study encourages a continuous commitment to refining and adapting interventions, fostering a collaborative approach between researchers and educators to promote student success and well-being.

Conclusions

This study highlights the potential impact of packaging relational and behavior support packages and supporting teachers to consistently implement those practices over time. The SERVE Model evidenced significant main effects on student belongingness, academic engaged time, and reductions in truancy and behavior discipline. The bi-directional relationship between academic engaged time and belongingness indicates the crucial role of positive student-teacher relationships in influencing academic performance. There is a need for replication to further gather evidence on the effectiveness of the SERVE Model as well as the specific mechanisms through which positive outcomes come about. Future intervention and implementation scientists should continue to study effective universal prevention programs that aim to promote positive student-teacher relationships and relationships among students as a means to promote improved behavior and greater academic engagement.

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 Table 1.

 Participant Demographic Characteristics

	Students			Schools	
Demographic	Combined N (%)	Treatment n (%)	Control n (%)	School 1	School 2
Total	185 (100%)	93 (51%)	92 (49%)	1061	1327
Sex					
Female	97 (52%)	52 (56%)	45 (50%)		
Male	86 (48%)	41 (44%)	45 (40%)		
Race					
Asian	16 (9%)	10 (11%)	6 (7%)	74 (7%)	53 (4%)
Black	34 (18%)	17 (18%)	17 (18%)	159 (15%)	146 (11%)
Hispanic	9 (5%)	3 (3%)	6 (7%)	74 (7%)	544 (41%)
Native American	0 (0%)	0 (0%)	0 (0%)	11 (1%)	27 (2%)
White	124 (67%)	62 (67%)	62 (67%)	700 (66%)	491 (37%)
Multi-racial	2 (1%)	1 (1%)	1 (1%)	42 (4%)	53 (4%)
Free or Reduced Priced					
Lunch status					
Free/Reduced	61 (33%)	34 (37%)	27 (29%)	329 (31%)	849 (64%)
Paid	124 (67%)	59 (63%)	65 (71%)	732 (69%)	478 (36%)

Table 2.

Model Building Process for Belongingness

Parameter	Model 1	Model 2	Model 3	
	Fixed Effects β (SD)			
Intercept (Belongingness Post-Pre)	0.78 (.18)***	0.78 (.17)***	0.75 (.09)***	
Level 1 (Student)				
Race (1=white)		-0.22 (.11)*		
Belongingness Pre			-0.94 (.09)***	
Level 2 (Classroom)				
Condition (1=Tx)	0.71 (.17)***	0.71 (.17)***	0.66 (.09)***	
Interaction				
Condition X Belongingness Pre			-0.53 (.09)***	
	Randon	$a Effects \sigma^2(SD)$		
Classroom Intercept (U _{0j})	.59 (.77)	.56 (.75)	.00 (.00)	
Residuals (r _{ij})	2.05 (1.43)	2.02 (1.42)	1.46 (1.21)	
	Model F	it Statistics		
# Parameters	4	5	6	
AIC	682.96	680.83	593.60	
BIC	695.78	696.85	612.82	
Deviance	674.96	670.83	581.60	
$X^{2}\left(df\right)$	13.82 (1)***	4.14 (1)*	89.23 (1)***	

Note: Tx= treatment condition, * p<.05. ** p<.01. *** p<.001. Level 1 (student N=182), Level 2 (Classroom, N=30)

Table 3.

Model Building Process for Academic Engaged Time

Parameter	Model 1	Model 2	Model 3	
	Fixed Effects β (SD)			
Intercept (AET Post-Pre)	2.83 (.82)***	2.80 (.81)***	2.77 (.70)	
Level 1 (Student)				
Race (1=white)		-1.99 (.81)*		
AET Pre			-5.85 (.70)***	
Level 2 (Classroom)				
Condition (1=Tx)	3.75 (.82)***	3.86 (.78)***	3.65 (.70)***	
Interaction				
Condition X AET Pre			-0.83 (.71)	
	Randon	n Effects $\sigma^2(SD)$		
Classroom Intercept (U _{0j})	.00 (.00)	.00 (.00)	.00 (.00)	
Residuals (r _{ij})	.90 (.95)	.87 (.93)	.25 (.50)	
	Model F	it Statistics		
# Parameters	4	5	6	
AIC	1420.1	1394.9	1342.63	
BIC	1433.0	1410.9	1361.85	
Deviance	1412.1	1385.9	1330.63	
$X^{2}\left(df\right)$	19.76 (1)***	5.96 (1)*	54.27 (1)***	

Note: Tx= treatment condition, AET=academic engaged time, * p<.05. ** p<.01. *** p<.001. Level 1 (student N=185), Level 2 (Classroom, N=30). All fixed effect coefficients are standardized.

Table 4.

Model Building Process for Behavioral Discipline

Parameter	Model 1	Model 2	Model 2a	Model 3
	Fixed Effects β (SD)			
Intercept (BD Post-Pre)	-0.09 (.03)**	-0.09 (.03)**	-0.07 (.03)*	-0.09 (.02)***
Loyal 1 (Student)				
Level 1 (Student) Race (1=white)		0.07 (.03)*	0.06 (.03)*	
FRL		` /	` /	
BD Pre		-0.06 (.03)*	05 (.03)	0.71 (05)***
				-0.71 (.05)***
Level 2 (Classroom)	0.00 (.02)*	0.07.(02)*	0.07.(02)*	0 15 (0 4) ***
Condition (1=Tx)	-0.08 (.03)*	-0.07 (.03)*	-0.07 (.03)*	-0.15 (.04)***
Interaction				
Condition X FRL			-0.42 (.13)**	
FRL X Race			0.29 (.13)*	
Condition X BD Pre				-0.51 (.10)***
	Random Effects σ^2 (SD)			
Classroom Intercept (U _{0j})	.00 (.00)	.00 (.00)	.00 (.00)	.00 (.00)
1 (3)	,	,	\	,
Residuals (r _{ij})	.18 (.42)	.17 (.41)	.16 (.40)	.08 (.28)
	Model Fit Statistics			
# Parameters	4	6	8	6
AIC	205.66	198.99	187.27	59.64
BIC	218.48	218.21	212.90	78.87
Deviance	197.66	186.99	171.27	47.64
X^2 (df)	5.81 (1)*	10.67 (2)**	15.72 (2)***	1283 (0)***

Note: Tx= treatment condition, AET=academic engaged time, * p<.05. ** p<.01. *** p<.001. Level 1 (student N=185), Level 2 (Classroom, N=30). All fixed effect coefficients are standardized.

Table 5.

Model Building Process for Truancy

Parameter	Model 1	Model 2	Model 3	
	Fixed Effects β (SD)			
Intercept (Truancy Post-Pre)	-0.00 (.08)	-0.11 (.04)**	-0.11 (.03)***	
Level 1 (Student)				
Race (1=white)		0.11 (.04)**		
FRL		-0.08 (.04)*		
Truancy Pre			-0.39 (.02)***	
Level 2 (Classroom)				
Condition (1=Tx)	-0.17 (.08)*	-0.08 (.04)*	-0.05 (.03)	
Interaction				
Condition X Truancy Pre			-0.00 (.02)	
	Ro	andom Effects $\sigma^2(SD)$)	
Classroom Intercept (U _{0j})	.05 (.22)	.00 (.05)	.01 (.08)	
Residuals (r _{ij})	.93 (.97)	.22 (.46)	.08 (.28)	
	M	Iodel Fit Statistics		
# Parameters	4	6	6	
AIC	5	247.31	76.24	
BIC	517.41	266.53	95.45	
Deviance	530.23	235.31	64.24	
$X^{2}\left(df\right)$	4.37 (1)*	274.10 (2)***	171.06 (0)***	

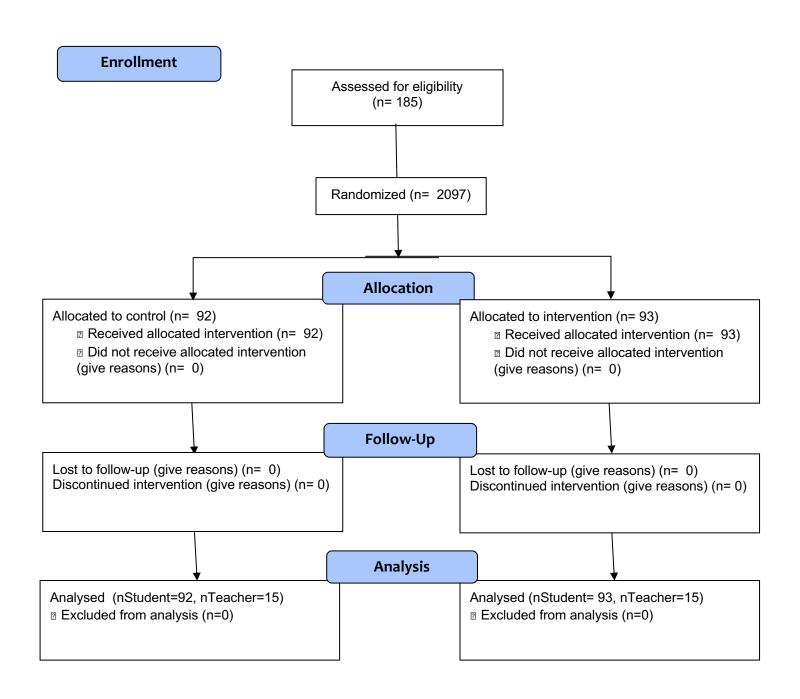
Note: Tx= treatment condition, AET=academic engaged time, * p<.05. ** p<.01. *** p<.001. Level 1 (student N=185), Level 2 (Classroom, N=30). All fixed effect coefficients are standardized.

Figure 1. Consort Diagram

CONSORT



CONSORT 2010 Flow Diagram



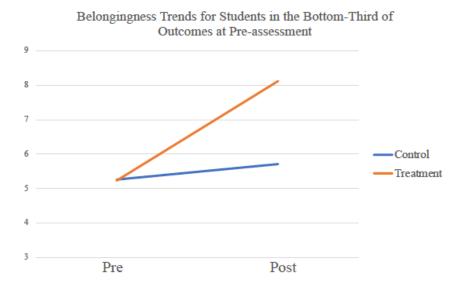


Figure 2. Note: N=81 (n=38 Control, n=43 Treatment). Only includes students who scored in the bottom-third of ratings of belongingness at pre-score.

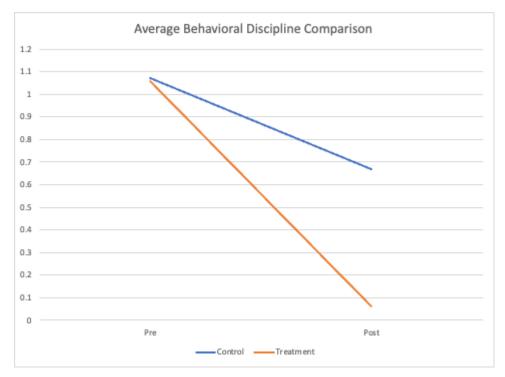


Figure 2a. *Note*. N=32 (n=15 control, n=16 treatment). Only students who had at least one measured behavioral discipline at pre-assessment included.

Cross-Lagged Panel Model

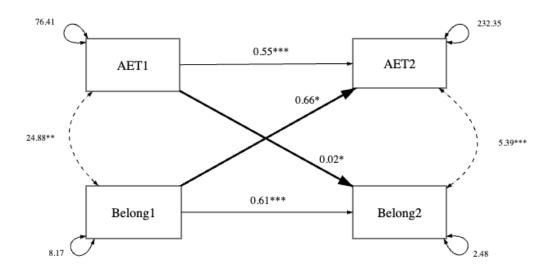


Figure 3. Cross Lagged Panel Model for Belongingness and Academic Engaged Time. Note. *=p<.05, **=p<.01, ***=p<.001, Number of parameters = 14, CFI=.932, TLI=.591, RMSEA=.272, SRMR=.044. All coefficients are standardized.

Supplemental File 1: CharacterStrong SERVE Model

The SERVE Model for Adult Relationship Practices is based on findings from research, years of practical experience as educators, and input from students. It is based on two core beliefs: (1) the belief that the ability to influence students comes through serving students to meet their needs and (2) the belief that when it comes to creating a supportive and inclusive classroom, it is all about relationships. SERVE is an acronym that organizes low-burden, high impact practices to help educators increase their intentionality and impact on critical student outcomes like belonging, wellbeing, and engagement, knowing that these outcomes enable learning and life success

Start intentionally. The S in SERVE stands for Start Intentionally with the signature practice of 4 at the Door plus 1 More, which is a structured version of evidence-based practice positive greetings at the door. As students transition into class, there is a natural opportunity to connect relationally through genuine, positive greetings to welcome each student as they enter the classroom. Thus, the purpose of 4 at the Door + 1 More is to connect with students to cultivate belonging in the class, facilitate academic engagement, and prevent behaviors that interfere with learning. 4 at the Door + 1 More includes five core components, which include:

- Eye to Eye: A culturally responsive gesture or interaction for each student to know "I see you and you matter" (e.g., eye contact or a verbal elicitation).
- Name to Name: Greet every student authentically who enters your room by their name.
- Hand to Hand: Connect with students using gestures, handshakes, high fives, fist bumps, elbow bumps, etc. Educators are taught to be conscious of when certain ways of greeting students may not be culturally appropriate and offer ideas about how to allow students the choice of how they would like to be greeted.

- Heart to Heart: Engage in thoughtful and individualized conversation to connect with students as human beings each day before they enter as students (e.g., find their interests and ask about them consistently).
- + 1 More (High Interest Entry Activity): Because the educator is greeting students at the
 door, it is important to have a high interest entry task prepared for students to engage
 with as they wait for class to get started to prevent undesirable behavior from occurring.

Engage relationally. The E stands for Engage Relationally with the practice of Temperature Checks that provide students with an opportunity to have a voice to express how they are doing socially and emotionally in class, and enable educators to respond to students based on what they are communicating and sharing to provide timely and meaningful support.

Respond with empathy. The R stands for Respond with Empathy, which includes establishing community agreements and a proactive process for reposting to difficulties in a positive and supportive manner. First, community agreements empower students to generate norms about how to treat and respond to one another with empathy. Community Agreements provide students and educators with an opportunity to share what each individual needs in order to feel safe, supported, and successful in the classroom learning environment. The individual needs that are expressed and shared by students are distilled into 3-5 Community Agreements that represent the collective needs of the class. These Agreements help establish norms and expectations regarding how each member of the class will show up to help co-create a positive classroom culture and climate. By co-creating these Agreements educators move beyond imposing rules on students, which is important because students are more likely to invest and have ownership around something they helped create. Community Agreements establish what it looks like to treat others with kindness, dignity, and respect, especially during situations where

there are disagreements and differences. Finally, they provide the context for Responding in Empathy.

In the SERVE Model, Responding with Empathy is grounded in a supportive process called PROMPT. PROMPT is a series of practices that help educators empathetically respond to behaviors as they progress in severity. The PROMPT practices are listed as follows in order of intensity needed (low to high):

- Proximity control: Moving about the space frequently, placing oneself in proximity of distracting or disruptive behavior)
- Redirection: When a student is demonstrating an unskillful behavior, asking them to do something with a high probability that they will say, "yes" to gain momentum with positive response and then to get the student back to the task at hand)
- Ongoing Monitoring: Identifying skillful behavior as soon as it occurs and positively
 reinforcing the skillful behavior establishes momentum for skillful behavior over time
 and helps students feel proud and/or recognized for making responsible choices
- Prompting expected behavior: Providing a direct, explicit, and concise prompt to the student about what they should be doing instead of labeling the unskillful behavior)
- Teaching interaction: Treating the presence of chronic unskillful behavior as an
 opportunity for the student to learn more skillful behaviors in a private, calm, nonthreatening, respectful manner).

Through this responsive and tailored process, PROMPT gives educators a framework to respond to behavior appropriately and effectively while maintaining a positive relationship and reinforcing the safe classroom climate norms collectively established by the group.

Values Practiced Consistently. The V stands for Values Practiced Consistently with an emphasis on the practice of Staff CharacterDares which help to role model prosocial behaviors and relationship-building on a consistent basis. These are student-facing activities. The CharacterDare process is a series of prompts and reflective conversations organized around specific character challenges (i.e., Dares) that provide staff with proactive ideas, opportunities, and accountability to put character in action to cultivate positive relationships and engagement in class. For example, one CharacterDare is titled Student as the Teacher and encourages the teacher to connect with 3-5 students in class and ask the student to teach them about something they are interested in and spend time getting good at.

Exit Intentionally. The E stands for Exit Intentionally with a weekly practice of reflecting on the relationship status with each student to hone in on those who need relational support the most the following week. Exit Intentionally is CharacterStrong's form of the evidence-based framework for cultivating and maintaining positive teacher-student relationships, Establish-Maintain-Restore (EMR; Duong et al., 2021). The framework for organizing specific relational practices was derived from previous research on relationship-strengthening practices within education and family settings and was organized along the dimensions of positive relationship formation (i.e., establish), relationship maintenance (i.e., maintain), and reestablishment following episodes of teacher–student conflict (i.e., restore). Teachers are trained on the three distinct, interrelated phases of a relationship (i.e., establish, maintain, and restore) that are linked to concrete relationship practices. In addition to the practices, teachers use a relationship reflection form that involves assessing their relationship status with each student in the classroom. The reflection form helps teachers identify the students who are most in need of

relationship practices (i.e., those in the "establish" and "restore" columns on the form). The goal is for teachers to move all students into the "maintain" phase, indicating a positive relationship has been established and is being maintained for all students in the class.