INTRODUCTION

Students who experience depression, anxiety and other psychological disorders perform more poorly in class compared to students without these disorders (Hishinuma, Chang, McArdle, & Hamagami, 2012; Weidman, Augustine, Murayama, & Elliot, 2015). Depressed and anxious students are also more likely to be absent, take semesters off, and/or drop out of school. When students drop out of school due to social and emotional concerns, not only do the students themselves experience short- and long-term detrimental outcomes, but the academic institution and its ratings also suffer. While school systems are not responsible for meeting every need of their students, schools must meet the challenge when the need directly affects learning (Carnegie Council Task Force on Education of Young Adolescents, 1989). Even though schools are first and foremost responsible for helping students learn and achieve academic success, schools also serve as the major providers of mental health services to students (Rones & Hoagwood, 2000). By promoting an environment of wellness, schools support students' success academically, socially, emotionally, and behaviorally (Townsend et al., 2017). Research has shown that students who receive social and emotional support and prevention services achieve higher academic success (Tomyn, Fuller-Tyszkiewicz, Richardson, & Colla, 2016). By providing a healthy culture of mental and emotional wellness on campus, including wellness or mental health centers and programs, schools can improve student quality of life, and retain students who might be at risk.

BaseEd Intervention

BASE is an online therapeutic intervention created by mental health specialists to provide factual information regarding social, emotional and behavioral health issues commonly faced by middle and high school students. Based on 25 years of hands-on work with high-risk adolescents and their families, BASE Education developed over 30 online learning modules, including, among others: Self-Esteem, Anger Management, Restorative Practices, Healthy Communication, and Impulsive Decision-Making. In addition to factual and informative portions, each module provides students with the ability to answer questions about themselves, identify potential challenges they face in that area, and understand their own cognitive or behavioral patterns.

The BASE software is available for use online by schools and mental health systems to help address the mental health needs of adolescents and help prevent escalation of mental health issues. Educators and mental health providers select from the library of modules, as needed to address specific issues faced by the adolescents they serve. Each module is designed to take between 30 and 45 minutes to complete, so assigned modules can be completed within a regular education class period (e.g., health, advisory, and homeroom classes). Modules are also accessible outside of school through secure login to the online student portal, so modules can be assigned as homework or as part of an out-of-school program.

The goal of BASE is to ultimately help **all** adolescents find a healthier way to move forward successfully, in school and in life. While face-to-face treatment is the gold standard, in-person intervention methods are costly and time consuming such that schools

have difficulty addressing the needs of students with high need, much less applying preventive methods more universally. The BASE online self-paced modules offer an affordable and feasible means of reaching more students for broad positive impact. Further, technology is ubiquitous for our students today and students may feel more comfortable expressing their thoughts and feelings and learning about mental health issues behind a screen. The online modules create a safe place for adolescents to explore these issues and access information prepared by mental health specialists.

The goal of this research study was to conduct a school-based trial to establish initial evidence of the efficacy of BASE Education's online learning program for improving students' social, emotional, and behavioral functioning at school. For the proposed project, we selected a subset of five generally applicable online learning modules (see **Table 2** below) and tested changes over time as a function of intervention delivery in the classroom setting with middle school students (grades 6 through 8). This pilot test of BASE was conducted using a universal classroom-based study design, through which homeroom and academic advisory classroom teachers administered the BASE online learning modules with their students over the course of five weeks.

METHODS

Participants

School districts were recruited nationally by BASE Education through email distribution of study information. Of those districts that expressed interest, two provided a signed letter of commitment by the given deadline: one in Missouri and one in Colorado. Once IRB approval was obtained, district-established guidelines for research were followed (e.g., review by district-level personnel), including research materials compliant with district requirements. Following district-level approval, school district personnel distributed information describing the BASE Education project and requirements to eligible middle school teachers (i.e., homeroom and academic advisory teachers of 6th – 8th grade students).

Educator Sample. Middle school teachers in the two participating schools received detailed information via email describing the study goals and consent procedures including a link to a secure online educator consent form and demographic survey. A total of 22 educators participated in the study with 45% at School 1 and 55% at School 2. Of the participating teachers, 27% taught 6th grade, 27% taught 7th grade, 32% taught 8th grade, with 14% teaching a combined 7th/8th grade classroom. The majority of teachers (55%) had 3-5 years of teaching experience with 23% having taught only 1-2 years and 13% having taught 11 or more years. The average age of teachers was 32 years (SD = 9.69; range from 22 to 62 years of age). Participating teachers were 41% male and represented an approximate demographic spread of 27% African American or Black, 73% Caucasian or White, with 100% reported Non-Hispanic ethnicity.

Student Sample. Participating educators distributed parent permission materials to all students in their classrooms. Teachers sent paper packets home with students and/or emailed an online survey link to parents (as determined by school administrators) to

share study details, project contact information, parent permission forms (as required by the school district), and an envelope for returning signed consent paper forms to the school. Parents were given 2 weeks to return the permission forms indicating whether or not they wanted their child to participate in the pilot test. Of the total pool of students across the 22 participating classrooms, parent permission for participation in the research was obtained for 368 youth (approximately 69% of the total student population across these classrooms) and, of these students with parental permission, 304 youth assented (83%) to participate in the research project.

   Attrition: Over the course of the research study, 10 students (3%) failed to complete study activities or dropped out of the study due to transferring schools. Chi-square analyses revealed no significant differences by demographic characteristics for those students who remained in the sample versus those who attrited. Further, a Multivariate Analysis of Variance (MANOVA) revealed no significant differences across these groups for outcome measures at baseline (pre-intervention).

Therefore, the final sample included 294 middle school students who completed the research study. **Table 1** summarizes the demographic characteristics of the student sample. Across our two schools, 43% of students attended School 1 and 57% of students attended School 2. Of the participating youth, 34% were in 6th grade, 29% were in 7th grade, and 37% were in 8th grade with an average age of 12.62 (SD = 0.73) and ranging from 12 to 17 years of age. The youth sample was 52% female with an approximate racial distribution of 45% African American or Black, 38% Caucasian or White, 5% Asian or Pacific Islander, and 12% Other racial subgroup (e.g., multiracial, American Indian, unknown). Nearly half of the student sample (45%) reported Hispanic ethnicity.

Table 1. Student Sample Demographic Distributions

Characteristic	Category	N	Percent of sample
School	School 1	127	43%
	School 2	167	57%
Grade	6th grade	100	34%
	7th grade	84	29%
	8th grade	110	37%
Gender	Male	140	48%
	Female	154	52%
Race	African American/Black	132	45%
	White	110	38%
	Asian or Pacific Islander	14	5%
	Other	38	12%
Ethnicity	Hispanic	125	44%
	Non-Hispanic	169	56%

Sample by Condition. Assignment to treatment vs. control conditions occurred at the classroom-level to ensure students within a participating classroom were consistently assigned to a single study condition (to minimize contamination effects within classroom). Given recruitment of classrooms occurred on a rolling basis over several

weeks, classrooms were randomly assigned to the BASE intervention condition (BASE) or to the waitlist control condition (CO) as they were entered into the study. In the end, 11 classrooms were assigned to each condition with a total of 155 students (52%) assigned to BASE and 139 students (48%) assigned to CO. Chi-square analyses revealed no significant gender, race, ethnicity, or school differences across the BASE and CO conditions.

However, randomization at the classroom level resulted in more 8th grade students being assigned to the BASE condition (N = 72, 63%) compared to 6th and 7th grade students (N = 49, 49% and N = 38, 43%, respectively; $X^2_{(2)} = 9.26$, p<.01). This incongruence may have occurred because several classrooms in our sample included students from multiple grade levels.

Procedures

Precautions were taken to ensure study ethics and protection of human subjects. The study protocol was approved by 3C Institute's institutional review board (IRB). Parent consent and youth assent were obtained from all participants prior to participation. All parts of the study were completed online through a secure project website.

Training. Prior to study implementation, all participating teachers attended an informational session (90-minute online webinar for each school). During this session, BASE Education staff trained teachers and other school personnel in use of the BASE Education program, including the implementation schedule and oversight procedures for the pilot study. Then, 3C Institute research staff shared information regarding data collection procedures with expected time requirements and deadlines for study tasks. Procedures for ensuring security of the collected data were also reviewed.

Data Collection. Following consenting and condition assignment, teachers and students completed a set of online surveys prior to beginning the intervention period (i.e., baseline). The baseline survey included several demographic questions (for students) and a set of outcome surveys. Participating teachers and students were given 4 weeks to complete the baseline assessment. Then, during the 4 weeks following the intervention period, teachers and students completed post-intervention surveys, using the same set of outcome measures and data collection procedures.

Intervention. Teachers and students in the BASE condition completed five online learning modules (Self-Esteem, Digital Citizenship, Bullying/Cyber Bullying, Motivation, and Future Goals; see **Table 2**) as part of their regular classroom activities whereas CO teachers and students completed typical classroom activities with no access to the online learning modules. Research staff emailed secure login information to teachers assigned to the BASE condition who then distributed these to each of their students so they could access and complete the program.

It is important to note that **all** students in the treatment classrooms completed the BASE program, but study data was collected and analyzed only for those students with parental consent and student assent to participate in the research. During the intervention period,

students completed five BASE modules over a 5-week intervention period (one per week). At the start of each week, research staff emailed BASE teachers with a study timeline update and descriptions of their activities for that week. At the end of each week, research staff emailed the BASE teachers an update of their students' progress in the assigned module(s). At the end of the study period, all classrooms (BASE and CO) had open access to the online BASE modules.

Table 2 provides a listing of the order of BASE modules completed during each week of the intervention along with specific topics covered within each module. Completion time for students was expected to be between 30 to 45 minutes per week.

Table 2. Intervention schedule of BASE online module completion with learning topics

Intervention Week	BASE Module Assignment	Learning Topics Covered
Week 1	Self-Esteem	Defines self-esteem, outlines categories of self-esteem, discusses how to develop a stronger sense of self, explores possible barriers to success, and provides tools to overcome challenges and reviews a plan for the future.
Week 2	Digital Citizenship	Discusses safety in the use of technology and outlines appropriate behavior in the digital world, including cell phone use, texting, social media, and all facets of cyber behavior.
Week 3	Bullying/Cyberbullying	Discusses different forms of bullying and explores ways to keep safe and avoid bullying.
Week 4	Motivation	Defines motivation, outlines the various types, explores barriers to success, provides tools to overcome challenges, and discusses ways to improve motivation and plan for the future.
Week 5	Future Goals	Defines what it means to have goals, highlights the benefit of being focused, helps the student create a vision for one's self, discusses strategies to stay on task, explores barriers to success, and provides tools to overcome challenges.

Measures

Teacher Measures. During consenting procedures, teachers completed a brief demographics questionnaire regarding their age, gender, race, ethnicity, level of education, vocational information, and classroom grade-level(s). At both baseline and post-assessment, teachers completed an online survey assessing their students' current level of school-based adjustment using a modified version of the *Engagement vs. Disaffection for Learning Scale* (EvsD; Wellborn, 1991; Skinner, Kindermann, & Furrer, 2009). The EvsD includes 20 items on which teachers rated each participating student on a 4-point scale (1=Not at All True to 4=Very True) to indicate how true that item is currently (within past 2 weeks). For this study, items were adapted to be more generally

applicable to middle school teacher observations of students regarding overall school engagement. This measure includes two broadband scales of *Engagement* and *Disaffection* which are further subdivided as behavioral or emotional resulting in four subscales (5 items each): Behavioral Engagement (e.g., '*This student works as hard as he/she can*'), Emotional Engagement (e.g., '*This student is enthusiastic*'), Behavioral Disaffection (e.g., '*This student comes unprepared to school*'), and Emotional Disaffection ('*In school, this student seems unhappy*'). Mean score were generated for each subscale where higher scores indicated higher engagement and higher disaffection, respectively. Each subscale showed high internal consistency with Cronbach alphas ranging from .80 for Emotional Disaffection to .96 for Behavioral Engagement.

Student Measures. At baseline, students reported basic demographic information, including age, grade, gender, race, and ethnicity. At both baseline and post-assessment, students completed a set of eight brief online surveys assessing their school-based and personal adjustment at school (i.e., student self-perception measures), as well as their knowledge of content covered in the assigned BASE modules. These outcome measures were chosen to reflect those attributes and skills expected to be impacted by participation in the BASE intervention.

The following areas were assessed using the indicated measure(s).

School Emotional Engagement (SEE): Students were asked to complete the *School Emotional Engagement Scale* (Wang, Willett, & Eccles, 2011) to assess their feelings of interest in, enjoyment with, and value of school learning. Consisting of 5 items, rated on a 5 point Likert scale (1=Strongly Disagree to 5=Strongly Agree), higher scores indicates higher levels of emotional engagement in school (e.g., '*I feel close to people in this school*). This scale demonstrated high internal consistency at baseline and post-intervention assessments (Cronbach's α = .80 and .87, respectively).

Future Aspirations (FA): Students completed the 5-item Future Aspirations/Goals subscale of the *Student Engagement Instrument* (Appleton, Christenson, Kim, & Reschly, 2006) to assess cognitive and psychological aspects of student engagement in school as it relates to their future success (e.g., '*School is important for achieving my goals*). Items were rated on a 4 point Likert scale ranging from Strongly Disagree (1) to Strongly Agree (5). This subscale showed high internal consistency at baseline and post-intervention (α = .84 and .88, respectively).

Academic Motivation (AM): Students completed the 4-item Intrinsic Motivation toward Accomplishment subscale of the *Academic Motivation Scale* (Vallerand, Pelletier, Blais, Briere, Senecal, & Vallieres, 1992). Items were rated on a 7-point scale (1=Does not correspond at all to 7=Corresponds exactly), with higher scores indicating higher levels of intrinsic academic motivation (e.g., '*In school, it makes me happy when I do better than I thought I could*'). Items were adapted to be more developmentally appropriate for middle student participants. High internal consistency for this subscale was found at baseline and post-intervention (Cronbach's α = .84 and .85, respectively).

School social connectedness (SSC): Students completed the *Loneliness and Social Dissatisfaction* measure to assess their level of social connectedness at school (Asher,

Hymel, & Renshaw, 1984). To reduce participant burden, students were asked to complete the 9 negatively worded items (as recommended by Ebesutani et al., 2012) (e.g., '*I feel alone at school*'). For each item, students indicated how true that item was for them on a 5-point scale from Always True (1) to Not True at All (5). A mean score was calculated so that higher scores indicated greater school social connectedness. High internal consistency was found for this scale at baseline and post-intervention (α = .88 and .89, respectively).

Self-Efficacy (SE): Students completed a self-report measure of their self-efficacy using the *New General Self-Efficacy Scale* (NGSES; Chen, Gully, & Eden, 2001). The NGSES was developed to address the need for a general self-efficacy measure with both divergent and predictive validity. It is comprised of 8 items, each rated on a 5-point scale (1=Strongly Disagree to 5=Strongly Agree), with higher scores indicating a greater sense of self-efficacy (e.g., '*In general, I think that I can obtain outcomes that are important to me*'). This scale demonstrated excellent internal consistency at baseline and post-intervention (α = .91 and .92, respectively).

School-based adjustment: To assess students' behaviors and social-emotional adjustment at school, students completed two subscales of the *My Resiliency Factors* (MRF; DeRosier & Raab, 2011; DeRosier, Craig, & Leary, 2012). The MRF is a brief behavioral self-assessment tool designed to measure psychological and social factors that contribute to adolescents' ability to handle daily life stressors, such as positive attitudes and emotion regulation. Two subscales were completed by students: Cognitive Style (**CS**; 6 items; e.g., '*When bad things happen, I know things will get better*', '*I'm able to set realistic goals for myself*') and Life Skills (**LS**; 8 items; '*I'm flexible and able to adapt to changes*', '*I can control my emotions and behavior even when upset*'). Items were rated on a 4-point scale (1=Not at All/Never True About Me to 4=Very/Almost Always True About Me). Both of these subscales showed high internal consistency at baseline and post-intervention (Cognitive style α = .83 and .84, respectively; Life skills α = .80 and .81, respectively).

Student knowledge of BASE module content (KNOW): Research staff and BASE Education content experts created a set of 25 multiple-choice items (5 per module) to assess student's knowledge of content areas and topics covered within the five BASE Education online learning modules: (1) Self-Esteem, (2) Digital Citizenship, (3) Bullying/Cyber Bullying, (4) Motivation, and (5) Future Goals. At each time point, the percent correct across items was calculated for each student (range of 0% to 100%).

<u>**Software Usage**</u>. Throughout the intervention period, data regarding the BASE students' usage of the online learning modules was collected, including dates of login, which modules were accessed each week, the number of minutes spent completing each module, and the number of modules completed.

RESULTS

Descriptive Analyses

<u>**Inter-correlations among Outcomes**</u>. Correlational analyses were conducted to examine

the relations among the various outcome measures. First, student self-report ratings were examined at baseline (pre) and post-intervention time points. As **Table 3** displays, student reports at the two time points were significantly correlated for all measures (i.e., within-measure across-time correlations along the diagonal). Thus, as would be expected, there was consistency over time regarding students' self-perceptions for each area assessed. At baseline, all self-perception measures were moderately to strongly correlated with one another indicating students who reported more positive self-perceptions on one measure were more likely to report positive self-perceptions on the other measures (across-measure within-time correlations). This pattern of inter-correlations among self-perception outcomes was highly similar at each time point with a few exceptions. For example, student self-report regarding future aspirations and goals (FA) was correlated with school emotional engagement (SEE) and school social connectedness (SSC) at baseline, but not at post-intervention. And SSC was more strongly correlated with SEE at post-intervention than it was at pre-intervention.

	Measure	SEE	FA	AM	SE	SSC	LS	CS	KNOW
		Post-intervention							
B	**SEE**	**.22***	.08	.25**	.25**	.95**	.22*	.25**	-.02
a	**FA**	.37**	**.40***	.43**	.49**	.09	.32**	.30**	.11
s	**AM**	.52**	.45**	**.52***	.54**	.25**	.50**	.50**	.11
e	**SE**	.46**	.50**	.50**	**.50***	.27**	.56**	.58**	.07
l	**SSC**	.39**	.15*	.32**	.22*	**.65***	.25**	.28**	-.04
i	**LS**	.42**	.33**	.53**	.57**	.29**	**.53***	.76**	.00
n	**CS**	.34**	.35**	.54**	.59**	.37**	.78**	**.56***	.08
e	**KNOW**	.02	-.02	.03	-.02	-.07	.11	.05	**.63***

Table 3. Inter-correlations among student-report outcomes at pre- and post-intervention

Note. *p<.001; **p<.0001; within-measure across-time correlations are presented in **bold** along the diagonal; across-measure within-time correlations are presented under the diagonal for baseline assessment and above the diagonal for post-intervention assessment; SEE=School Emotional Engagement, FA=Future Aspirations/Goals, AMS=Academic Motivation, SE=Self-efficacy, SSC=School Social Connectedness, LS=Life Skills, CS=Cognitive Style, and KNOW=Knowledge of BASE content.

Interestingly, while student knowledge showed consistency over time, BASE content knowledge was not significantly related to any student self-perception measure at either time point. Thus, students' perceptions of their own school-based adjustment did not differ as a function of their level of BASE content knowledge at the same time point (i.e., no concurrent relationship).

Second, **Table 4** shows inter-correlations among teacher-report outcome measures at each time point. Again, there was significant consistency in ratings for each subscale at the two time points (i.e., within-measure across-time correlations along the diagonal). In other words, students who were rated highly by teachers at baseline tended to be rated highly on that subscale at the second time point as well. The pattern of correlations across subscales was very similar for the two time points and indicated strong consistency across measures. Thus, students who received high ratings on one subscale were likely to be rated highly on the other teacher-report subscales as well. This association was

particularly strong for the two engagement subscales, indicating these two subscales were largely redundant. Therefore, all subsequent analyses used the composite broadband scale for engagement rather than the two engagement subscales.

		Post-intervention			
	Measure	**BE**	**EE**	**BD**	**ED**
B a s el i	**Behavioral Engagement (BE)**	**.68****	.89**	-.79**	-.58**
	Emotional Engagement (EE)	.90**	**.64****	-.72**	-.63**
	Behavioral Disaffection (BD)	-.77**	-.71**	**.58****	.73**
	Emotional Disaffection (ED)	-.58**	-.59**	.74**	**.55****

Table 4. Inter-correlations among teacher-report outcomes at pre- and post-intervention

Note. *p<.001; **p<.0001; within-measure across-time correlations are presented in **bold** along the diagonal; across-measure within-time correlations are presented under the diagonal for baseline assessment and above the diagonal for post-intervention assessment.

Third, we examined the degree to which student- and teacher-report measures were related to one another at each time point. As **Table 5** shows, there tended to be low agreement between teacher and student ratings, which is consistent with the literature (Achenbach, McConaughy, & Howell, 1987; Renk & Phares, 2004; Gresham, Elliott, Cook, Vance, & Kettler, 2010). Interestingly, in many instances, a given correlation was higher at post-intervention than at baseline. For example, teacher ratings of school engagement were not related to students' academic motivation (AMS) or future aspirations/goals (FA) at baseline, but these areas were significantly related at post-intervention. It may be that teachers and students became more familiar with one another over time and therefore were more consistent in their perceptions at the second time point.

Interestingly, whereas knowledge scores showed no significant correlations with students' self-perceptions (see **Table 3**), correlations between teacher ratings and students' scores on the knowledge test were significant at both time points and were the highest of any teacher-student correlations. While the reason for this pattern of findings is unknown, it may be that students who scored higher on the knowledge assessment also tend to perform higher academically in general, and that teachers' ratings of students emotional and behavioral domains may be biased to some extent by their knowledge of students' academic performance more generally. Thus, students who do well academically may tend to score higher on the knowledge test **and** to be seen by teachers as more well-adjusted at school.

Table 5. Correlations between student self-report and teacher-report outcome measures at pre- and post-intervention

	Teacher-report Measure		
Student Self-report Measure	**School Engagement (Pre/Post)**	**Behavioral Disaffection (Pre/Post)**	**Emotional Disaffection (Pre/Post)**

School Emo. Engagement	.14* / -.01	-.09 / .01	-.10 / -.08
Future Aspirations/Goals	.10 / .15*	-.13* / -.12*	-.08 /-.12*
Academic Motivation	.09 / .16*	-.12* / -.12*	-.08 / -.15*
Self-Efficacy	.11 / .14*	-.09 / -.11	-.07 / -.16*
School Social Connectedness	-.01 / .03	.00 / -.02	-.04 /-.12*
Life Skills	.15* / .12*	-.12* / -.12*	-.12* / -.12*
Cognitive Style	.10 / .11	-.06 / -.11	-.09 / -.19*
BASE Content Knowledge	.26** / .35**	-.24** / -.31**	-.22** / -.22**

Note. *p<.05; **p<.01.

Differences at Baseline. Prior to investigating the impact of the BASE intervention for changes in student outcomes over time, we tested whether the two conditions (BASE vs. CO) differed at baseline and explored possible demographic differences. For each demographic variable (school, grade, gender, race, ethnicity), we conducted a Multivariate Analysis of Variance (MANOVA) with condition and demographic main effects as well as the two-way interaction (e.g., school by condition). There were no significant differences by condition (i.e., no significant multivariate main effect) for any outcome measure at pre-intervention. There were also no significant baseline main effects by school, race, or ethnicity. In other words, these groups were found to be statistically equivalent for each outcome measure before the BASE intervention period.

However, results indicated a multivariate main effect for grade ($F_{(16, 554)}$ = 2.32, p < .01) and for gender ($F_{(8, 279)}$ = 2.70, p < .01). The grade main effect was present at the univariate level for the student knowledge outcome ($F_{(2, 284)}$ = 6.56, p < .01). Eighth grade students demonstrated significantly higher percent correct scores compared to 7th and 6th graders who were not significantly different from one another (46%, 40%, and 38%, on average respectively).

The gender main effect was present at the univariate level for student knowledge ($F_{(1, 286)}$ = 8.41, p < .01) and the School Social Connectedness measure ($F_{(1, 286)}$ = 5.64, p < .05). Females demonstrated higher percent correct scores for baseline knowledge of BASE content (44% and 39%, on average respectively). And males (M = 2.71, SD = .37) reported a higher level of school connectedness at baseline compared to females (M = 2.60, SD = .41).

Intervention Condition Analyses

Overview. We elected to implement a Multivariate Analysis of Covariance (MANCOVA) approach to test for intervention condition differences in student outcomes over time. Given the baseline imbalance by grade across conditions, MANCOVA was chosen rather than change scores in order to decrease the likelihood of biased effect estimates of mean differences (Fu & Holmer, 2015; Rosenberger & Lachin, 2002). MANCOVA adjusts each student's post-score for their baseline score before examining post-intervention mean differences across treatment conditions. For all analyses, when an effect was found to be significant at the multivariate level, univariate ANCOVAs were investigated to determine for which outcomes the effect held. Then, post-hoc mean comparison tests were conducted to determine the direction of effects across groups.

Given use of MANCOVA, least squares means (LSM) are reported which are group means after having controlled for baseline scores (i.e., covariate). To aid interpretation, least squares means were standardized with the average set to zero for all outcomes.

Condition effects. A MANCOVA was conducted to test whether post-intervention student outcomes differed by condition (BASE vs. CO) after controlling for baseline scores. A significant multivariate main effect for condition was found ($F_{(10,267)} = 1.98$, p<.05). **Table 6** displays standardized LSMs, standard errors (STEs), univariate statistics, and partial eta-squared effect sizes for all student and teacher outcomes. The condition main effect was significant at the univariate level for BASE knowledge and teacher-reported school engagement. Examination of LSMs revealed students in the BASE condition showed gains in knowledge over the intervention period whereas CO students showed a decline in percent correct on the student knowledge test. Similarly, teachers reported students in the BASE condition showed greater school engagement at post-intervention whereas CO students showed a decline in this area, according to teachers.

Table 6. Standardized least square means (LSM), standard errors (STE), ANCOVA F-statistics, and effect sizes by condition for student and teacher outcomes

Student Self-report	BASE Condition LSM (STE)	Control Condition LSM (STE)	$F_{(1,276)}$	Partial eta-squared (η)
School Emo. Engagement	.07 (.08)	-.08 (.09)	1.59	.01
Future Aspirations/Goals	-.01 (.08)	.00 (.09)	.00	.00
Academic Motivation	.00 (.08)	-.02 (.09)	.05	.00
Self-Efficacy	.02 (.08)	.02 (.09)	2.01	.01
School Social Connectedness	.06 (.08)	-.11 (.09)	.00	.00
Life Skills	.05 (.08)	-.03 (.09)	.39	.00
Cognitive Style	.00 (.08)	-.03 (.08)	.02	.00
BASE Content Knowledge	**.19 (.08)**	**-.20 (.09)**	**10.73****	**.04**
Teacher-report	**BASE Condition LSM (SE)**	**Control Condition LSM (SE)**	$F_{(1,276)}$	Partial eta-squared (η)
School Engagement	**.16 (.08)**	**-.15 (.09)**	**6.97***	**.03**
Behavioral Disaffection	-.09 (.08)	.09 (.09)	2.13	.01
Emotional Disaffection	-.04 (.08)	.04 (.09)	.43	.00

Note. ** p<.01; significantly different conditions are signified in **bold**

Condition by demographics. In order to examine whether the impact of condition on student outcomes differed by demographic characteristics of students, we conducted separate MANCOVAs by gender, grade, and race/ethnicity. For race/ethnicity, we

categorized students as Hispanic/White (n = 105), African-American (n = 131), or Other sub-group (n = 52; e.g., Asian American, American Indian, Pacific Islander, multi-racial). In each MANCOVA, we included both main effects as well as the two-way interaction between condition and the demographic variable.

The MANCOVA for **gender** showed no significant main or interaction effect involving gender. However, the analysis for **grade** showed a significant multivariate main effect for grade ($F_{(22,526)} = 1.59$, $p<.05$) as well as a significant multivariate interaction effect for condition by grade ($F_{(22,526)} = 2.00$, $p<.01$). The grade main effect was significant at the univariate level for two outcomes: school emotional engagement (SEE; $F_{(2,273)} = 3.60$, $p<.05$) and self-efficacy (SE; $F_{(2,273)} = 3.66$, $p<.05$). Students in the 6th grade reported declining emotional engagement in school (LSM = -.20) whereas 7th and 8th graders reported slightly higher SEE at post-data collection (LSM = .11 and .11, respectively). For self-efficacy, students in the 8th grade reported gains in self-efficacy (LSM = .19) whereas 6th and 7th graders did not (LSM = -.05 and -.18, respectively).

The **grade by condition** interaction effect held at the univariate level for school emotional engagement ($F_{(2,273)} = 5.45$, $p<.05$) and teacher ratings of school engagement ($F_{(2,273)} = 3.22$, $p<.05$) and emotional disaffection ($F_{(2,273)} = 4.62$, $p<.05$). For SEE, post-hoc examination of LSMs showed no condition differences for 7th or 8th grades, but 6th grade students in the CO group reported significantly declines in emotional engagement in school (LSM = -.48) whereas 6th grade students in the BASE condition reported modestly gains in SEE (LSM = .11). For teacher-rated school engagement and emotional disaffection, there were no significant differences by condition for 6th or 7th graders. However, teachers reported 8th grade students in the BASE condition showed significantly greater school engagement (LSM = .29) at post-intervention than did 8th grade students in the CO condition (LSM = -41). Similarly, 8th graders who completed the BASE intervention showed less emotional disaffection towards school at post-intervention (LSM = -.18) while students who did not participate in BASE showed worsening school emotional disaffection (LSM = .37).

The MANCOVA for **race/ethnicity** showed a significant multivariate main effect for race/ethnicity ($F_{(22,526)} = 1.93$, $p<.01$) and a significant multivariate interaction effect for condition by race/ethnicity ($F_{(22,526)} = 1.78$, $p<.05$). The race/ethnicity main effect was significant at the univariate level for teacher-rated school engagement ($F_{(2,273)} = 11.14$, $p<.0001$) and teacher-rated behavioral disaffection ($F_{(2,273)} = 3.51$, $p<.05$). According to teachers, African-American students showed lower school engagement and greater behavioral disaffection over time (LSM = -.28 and .17, respectively) compared to Hispanic/White (LSM = .22 and -.12, respectively) or Other racial/ethnic sub-groups (LSM = .22 and -.15, respectively).

The **race/ethnicity by condition** interaction was present at the univariate level for all student-report self-perception outcomes, except academic motivation: SEE ($F_{(2,273)} = 5.61$, $p<.01$), FA ($F_{(2,273)} = 3.59$, $p<.05$), SSC ($F_{(2,273)} = 3.29$, $p<.05$), SE ($F_{(2,273)} = 6.57$, $p<.01$), LS ($F_{(2,273)} = 9.34$, $p<.0001$), and CS ($F_{(2,273)} = 5.04$, $p<.01$). Post-hoc mean comparisons revealed no significant differences by condition for the African-American or Other racial/ethnic subgroups. This interaction effect was due to particular gains being

demonstrated by the Hispanic students in the sample who participated in the BASE intervention. **Table 7** displays standardized LSMs, standard errors (STEs), and partial eta-squared effect sizes by condition for Hispanic students' self-perception outcomes. In all instances, Hispanic students in the BASE condition showed improvements in their self-perceptions whereas Hispanic students in the control condition showed declines in these areas over the study period. The impact of the BASE intervention was particularly strong for increasing Hispanic students' emotional engagement in school and life skills (e.g., emotion regulation, flexibility).

Table 7. Standardized least square means (LSM), standard errors (STE), and effect sizes by condition for Hispanic students' self-perception outcomes			
Student Self-report	**BASE Condition LSM (STE)**	**Control Condition LSM (STE)**	**Partial eta-squared (η)**
School Emo. Engagement	**.35 (.12)**	**-.27 (.14)**	**.11**
Future Aspirations/Goals	**.23 (.12)**	**-.17 (.14)**	**.04**
Academic Motivation	.21 (.12)	-.11 (.15)	.03
Self-Efficacy	**.24 (.12)**	**-.27 (.16)**	**.07**
School Social Connectedness	**.25 (.11)**	**-.26 (.13)**	**.08**
Life Skills	**.31 (.13)**	**-.40 (.15)**	**.11**
Cognitive Skills	**.24 (.12)**	**-.28 (.14)**	**.07**
*Note. Significantly different conditions are signified in **bold***			

Intervention Dosage Analyses

BASE usage. Given implementation of the BASE intervention was largely self-paced and self-directed by the students themselves, there was variation with regard to the amount (or dosage) students actually received over the course of the 5-week intervention period. Of the 155 students assigned to BASE, only 12 (7%) did not complete all five of the assigned modules. On average, students engaged in the BASE intervention for a total of 200 minutes (SD = 88) with a range of 48 minutes to 786 minutes. For each of the five modules, on average, students spent 39 minutes (SD = 22) on the Self-esteem module, 54 minutes (SD = 28) on the Digital Citizenship module, 39 minutes (SD = 23) on the Bullying module, 31 minutes (SD = 22) on the Motivation module, and 37 minutes (SD = 24) on the Future Goals module.

Demographic differences in BASE usage. We examined whether dosage (i.e., number of minutes spent engaging in BASE modules) varied by any demographic variable. We conducted an Analysis of Variance (ANOVA) with school, grade, gender, and race/ethnicity predicting BASE dosage. The ANOVA revealed no significant differences in dosage by school or racial/ethnic sub-group. However, a significant main effect was found for **grade** ($F_{(2,148)} = 3.38$, p<.05) and for **gender** ($F_{(1,148)} = 4.88$, p<.05). Post-hoc mean comparisons revealed 6th grade students engaged in the BASE intervention to a significantly greater extent (223 minutes on average; SD = 83) than did either 7th or 8th graders (7th: mean = 177 minutes, SD = 58; 8th: mean = 202 minutes, SD = 100) who were not significantly different from one another. With regard to gender, females spend

significantly longer engaging in the BASE intervention than did males (M = 218, SD = 101 for females vs. M = 187, SD = 69 for males).

Relation between BASE dosage and student outcomes. Based on the implementation science literature (Durlak, et al., 2011; Donkin, et al, 2011; Durlak & DuPre, 2008; Berkel, et al. 2011; Ritterband, et al. 2009; Bennett & Glascow, 2009), we would expect greater usage of the BASE online learning modules to positively impact student outcomes. To test this hypothesis, we examined the correlation between time spent engaging in the BASE intervention and the least square mean scores for student outcomes (i.e., post-means controlling for baseline means). As the correlations in **Table 8** show, spending more time engaged in the BASE intervention modules was associated with significant gains in BASE content knowledge as well as significant improvements in students' self-efficacy and their belief that school engagement is important for achieving future goals and success.

Table 8. Correlations between BASE intervention dosage and student outcomes

Student Self-report	Correlation (*r*)
School Emo. Engagement	.00
Future Aspirations/Goals	**.23****
Academic Motivation	.09
Self-Efficacy	**.25****
School Social Connectedness	.07
Life Skills	.06
Cognitive Style	.12
BASE Content Knowledge	**.16***
Teacher-report	Correlation (*r*)
School Engagement	-.06
Behavioral Disaffection	.04
Emotional Disaffection	-.01

Note. *p<.05; **p<.01; significant correlations are **bolded**.

CONCLUSIONS

This paper presents data from a randomized trial investigating the impacts of participation in the BASE Education web-based SEL skills building program (BASE) with 6th through 8th grade students. The BASE intervention for this study was comprised of five online learning modules (Self-Esteem, Digital Citizenship, Bullying/Cyber Bullying, Motivation, and Future Goals) which were selected as a sampling of foundational and highly relevant social emotional learning topics for this age group, and due to their instructional alignment to empirically derived social-emotional competency frameworks, including that of the Center for Academic and Social Emotional Learning (CASEL). Students completed the online BASE intervention independently in a self-paced fashion over a 5-week period, engaging with the software for approximately 40 minutes per week on average. The intervention was implemented universally with all

students in homeroom and academic advisory classrooms. The impact of participation in BASE over time was examined using a randomized design where approximately half of students were in wait-list control classrooms and half were in treatment (BASE) classrooms.

A systematic series of analyses were conducted to examine the impact of participation in BASE on students' school-based adjustment according to both the students themselves and their teachers. A parallel set of outcome measures was collected prior to (pre) and following (post) student participation in BASE. Student self-report measures of school-based adjustment (i.e., student self-perception measures) were administered, as well as an assessment of students' knowledge of content covered in the assigned BASE modules. Teachers completed surveys to assess their students' school engagement and behavioral and emotional school-based adjustment.

As expected, pre-post scores for each measure were significantly correlated with one another, indicating significant consistency in each area across time. This is not surprising given the short timeframe for the study of 5-weeks. In order to examine the impact of participating in BASE, above and beyond this developmental consistency in each outcome area, we conducted a analyses of covariance which examined outcomes at post-intervention, after controlling for students' pre-intervention scores.

Across the student population, there was evidence that the BASE intervention resulted in significant increase in **content knowledge** for students from pre- to post- time points. In other words, as would be expected students' social emotional literacy increase significantly as a function of exposure to the instructional content presented in the BASE modules. Further, the more students engaged with the BASE instructional content (i.e., intervention dosage), the greater their gains in social emotional content knowledge.

There was also an overall main effect indicating that participation in BASE resulted in significantly greater **school engagement**. Specifically, teachers reported students who completed BASE Modules showed significantly higher engagement in school at post-intervention, compared to students who were not exposed to BASE (i.e., students in control classrooms). Thus, students in BASE classrooms were seen by teachers as exhibiting behaviors indicative of greater school engagement, such as working hard and being enthusiastic at school. Further, analyses by grade sub-groups revealed the positive impact of BASE on school engagement was particularly pronounced for 6th and 8th grade students. Teachers reported 8th graders in the BASE condition showed significantly higher engagement and lower emotional disaffection at school at post-intervention, compared to students who did not participate in BASE. In addition, 6th grade students who did not participate in BASE showed significant declines in their self-reported feelings of interest in, enjoyment with, and value of school learning whereas 6th grade students in the BASE condition did not show this decline (indicating an inoculation effect for BASE).

A unique feature of this study was the particularly large Hispanic student representation in the sample. This feature afforded the ability to investigate racial/ethnic sub-group differences for the BASE intervention. And these analyses revealed the significantly positive impact of participation in the BASE modules for Hispanic **students' self-**

perceptions. In all instances (except academic motivation), student self-report outcomes of their social emotional and behavioral adjustment at school showed significant improvements for Hispanic students in the BASE condition whereas Hispanic students in the control condition showed declines in each of these areas over the study period. There is evidence in the literature that mental health and emotional concerns are less openly discussed within Hispanic cultures. It may be that Hispanic students have less exposure to the social emotional content presented in the BASE modules such that the learning experience is particularly impactful for these students.

Importantly, the significant findings from this initial evaluation of BASE are remarkable given the brief intervention period and relatively limited exposure students had to the BASE instructional content. Logistical restrictions within our participating schools limited the possible length of the intervention period. While we selected five foundational BASE modules for the purposes of this study, the potential of the intervention offers more than 30 instructional modules covering a wide array of social emotional and behavioral health topics. Consistent with other studies that have shown intervention exposure to be significantly related to outcomes, there was evidence from this study that greater exposure to the BASE instructional content over the intervention period (i.e., more minutes of engagement in the modules) resulted in greater gains in self-efficacy and positive future aspirations and goals for participating students, in addition to greater content knowledge. We would expect longer exposure to BASE and exposure to additional BASE modules would result in even greater benefits for students.

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