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Community-level Moderators of a School-Based Childhood Sexual Assault Prevention Program

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Abstract

Childhood sexual abuse (CSA) is highly prevalent and associated with a wide variety of negative mental and physical health outcomes. School-based CSA education and prevention programs have shown promise, but it is unclear to what extent community-level characteristics are related to their effectiveness. The present cluster randomized controlled trial evaluated community-level moderators of the Safe@Last program compared to a waitlist control condition. Knowledge gains from pre- to post-intervention were assessed in 5 domains: safe versus unsafe people; safe choices; problem-solving; clear disclosure; and assertiveness. Participants were 1,177 students (46% White, 26% African American, 15% Hispanic, 4% Asian American, 6% Other) in grades 1 through 6 from 14 public schools in Tennessee. Multilevel models accounting for the nesting of children within schools revealed large effect sizes for the intervention versus control across all knowledge domains (d 's ranged from 1.56 to 2.13). The effectiveness of the program was moderated by mean per capita income and rates of substantiated cases of child abuse and neglect in the community. Intervention effects were stronger for youth living in lower as compared to higher income counties, and for youth attending schools in counties with lower as compared to higher abuse/neglect rates. Child characteristics (sex, race) did not moderate intervention effects. This research identified two community-level factors that predicted the effectiveness of a CSA education and prevention program designed to improve children's knowledge of personal safety skills. School-based CSA prevention programs may require modification for communities with higher rates of child abuse and neglect.

Keywords

sexual assault; personal safety skills; prevention; children; community-level moderators

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Childhood sexual abuse (CSA) is highly prevalent in the United States: the 62,936 reported cases in 2012 (U.S. Department of Health and Human Services, 2012) are likely an underestimate of the true scale of the problem because survivors often do not disclose their abuse (Finkelhor, Turner, Ormond, & Hamby, 2013; London, Bruck, Ceci, & Schuman, 2003; Smith et al., 2000; Ullman, 2007). Children exposed to CSA are at elevated risk for developing a variety of negative mental health (Bridge, Goldstein, & Brent, 2006; Davidson, Dowrick, & Gunn, 2016; Kilpatrick et al., 2003; Shin, Edwards, & Heeren, 2009), behavioral (Danielson et al., 2010; Lalor & McElvaney, 2010; Noll, Horowitz, Bonanno, Trickett, & Putnam, 2003), and physical health (Irish, Kobayashi, & Delahanty, 2010) outcomes. The extensive and deleterious effects of CSA on both the individual and society (Fang, Brown, Florence, & Mercy, 2012) underscore the importance of primary prevention efforts.

The effectiveness of CSA prevention programs has been operationalized in a variety of ways, including abuse disclosures and protective behaviors assessed through in-vivo measures (White et al., 2016); the most commonly-used outcomes, however, are questionnaire- and vignette-based assessments of knowledge acquisition and retention (Walsh et al., 2015). Knowledge of sexual abuse and developing personal safety skills are essential for reducing CSA rates (Wurtele & Owens, 1997). Unfortunately, some parents do not address these issues effectively, and children often report little understanding of what behaviors constitute sexual abuse (Tutty, 1993; Wurtele, 1998).

Schools are a well-suited location in which to deliver CSA education and prevention programs in a large-scale, cost-effective manner (Finkelhor, 2009; Tutty, 2000). A recent meta-analysis of 18 school-based CSA prevention programs found a medium effect size ($d = 0.61$) for mean knowledge scores in intervention compared to control groups (Walsh, Zwi, Woolfenden & Shlonsky, 2015). In addition to improving knowledge of personal safety skills, CSA education and prevention programs have been found to increase disclosure, decrease self-blame, and reduce rates of future victimization (Finkelhor, 2009; Walsh et al., 2015). Despite early concerns that CSA prevention programs might increase children's fears of becoming victims, increase confusion about what is versus what is not appropriate touch, and negatively impact their sexual development, iatrogenic effects rarely have been reported (Kenny, Capri, Thakkar-Kolar, Ryan, & Runyon, 2008; Topping & Barron, 2009).

The 'Safe@Last' program

The present study focused on a personal safety program developed in 1998 called Safe@Last. The curriculum teaches students in kindergarten through 6th grade how to recognize, respond to, and disclose sexual assault. To improve upon previous CSA prevention programs yielding only moderate effect sizes for knowledge gains (Walsh et al., 2015), the Safe@Last program optimized both delivery format and content. Learning involved behavioral skills training, rehearsal, and role-playing (Davis & Gidycz, 2000). The five primary learning objectives of the four-session Safe@Last program are to teach children: (1) to distinguish safe from unsafe people, (2) to differentiate between safe and unsafe situations, (3) problem-solving skills, (4) assertiveness skills, and (5) clear disclosure methods. The present study reports the results of a cluster randomized controlled trial (RCT)

conducted to evaluate the effectiveness of the Safe@Last program compared to a waitlist control condition, as indexed by changes in knowledge for each learning domain and in the overall total knowledge scores from pre- to post-intervention. Program content also addresses peer pressure, bullying, home alone safety, and the internet and social media. Program materials are age-appropriate, sequential, presented in an interactive online format, and are updated annually by program staff and a committee of educators comprised of clinicians and teachers from local schools and universities. Teaching methods include the use of role-playing, music, games, stories, an interactive online workbook, and engagement of parents and family outside the classroom.

Community-level Moderators

Community-level factors such as poverty (Coulton, Crampton, Irwin, Spilsbury, & Korbin, 2007) and neighborhood social processes (Maguire-Jack & Showalter, 2016; Molnar et al., 2016) are known to be associated with rates of child abuse and neglect, but the extent to which these community factors moderate the effectiveness of school-based CSA education/prevention programs has not been systematically investigated. Youth from disadvantaged backgrounds are at increased risk for exposure to CSA and traumatic events (Goodman, Miller, & West-Olatunji, 2012), and are three times more likely to report having experienced CSA as compared to youth from less disadvantaged environments (Sedlak et al., 2010). Children from lower SES families may respond differently to program content for a variety of reasons, including fear of blame or punishment for disclosing abuse and lower levels of parental involvement in school-based prevention programs (Briggs & Hawkins, 1994a, 1994b). Moreover, some children from lower SES backgrounds also may struggle academically (Sirin, 2005) and therefore have difficulty retaining knowledge presented in school-based CSA prevention programs. Recent work has shown that a short-term attachment-based intervention designed to enhance maternal sensitivity was effective among families at high risk for child abuse, but did not perform better than a control group in families at moderate risk for child abuse (Pillhofer et al., 2015). One aim of the preset study was to examine whether geographic CSA risk markers, such as the amount of documented abuse in the community, are related to school-based education and prevention program effectiveness.

Child-level Moderators

Meta-analytic findings reveal significant heterogeneity among studies, which could be explained by demographic and methodological factors (Walsh et al., 2015). The effectiveness of school-based sexual assault education and prevention programs may vary, in part, as a function of sociodemographic factors. Although most studies have not found sex differences in response to CSA education and prevention programs (Topping & Baron, 2009), at least two studies report greater benefits for girls than for boys (MacIntyre & Carr, 1999; Smothers & Smothers, 2011). Findings from studies examining race/ethnicity differences in CSA prevention effectiveness have been inconsistent (Finkelhor & Dziuba-Leatherman, 1995; Hazzard, Webb, Kleemeier, Angert, & Pohl, 1991; Smothers & Smothers, 2011). Finally, although some studies have failed to detect grade differences in knowledge gains (Hébert, Lavoie, Piché, & Poitras, 2001; Smothers & Smothers, 2011), a

recent meta-analysis found that knowledge acquisition in CSA prevention RCTs was greater for youth in Grade 4 or above ($d = 0.89$) than for youth from kindergarten to Grade 2 ($d = 0.42$; Walsh et al., 2015).

The current study randomly assigned students to condition within grade to evaluate whether the program was effective compared to a waitlist control group. Previous CSA prevention cluster RCTs have included random assignment by school district (Kolko, Moser, & Hughes, 1989), by school (Daigneault, Hébert, McDuff, & Frappier, 2012; Dake, Price, & Murnan, 2003; Hazzard et al., 1991; Hébert et al., 2001), and by classroom (Blumberg, Chadwick, Fogarty, Speth, & Chadwick, 1991; Crowley, 1989; Dawson, 1987; Grendel, 1991; Oldfield, Hays, & Megel, 1996; Snyder, 1986; Wolfe, MacPherson, Blount, & Wolfe, 1986).

Maximizing the effectiveness of personal safety training delivered in elementary school is critical given that risk for CSA is highest for children ages 7 to 13 (Finkelhor, 1994).

Present Study

The primary aim of the present study was to examine two community-level characteristics as potential moderators of the Safe@Last program effectiveness, operationalized as acquisition of program knowledge assessed immediately following program participation as compared to a waitlist control group, using a clustered RCT design. We hypothesized that the program would be less effective for children from schools in counties with lower per capita income compared to those from counties with higher per capita income. To our knowledge this is the first study to assess rates of child abuse and neglect, based on county-level data on rates of substantiated cases in the community, as a moderator of CSA education and prevention program effectiveness. A second aim of this study was to explore the extent to which the effectiveness of the program varied by child characteristics of sex and race, and to test the extent to which there were grade-level differences in the effectiveness of the program.

Method

Participants

Participants were 1,177 students in grades 1 through 6 (Table 1), including 573 males and 582 females (data on gender were missing for 23 participants). The full sample was 46% White, 26% African American, 15% Hispanic, 4% Asian American, and 6% Other (data on race/ethnicity were missing for 40 participants). There were 99 first graders, 238 second graders, 267 third graders, 265 fourth graders, 227 fifth graders, and 81 sixth graders. Although Safe@Last was delivered to children in kindergarten, knowledge retention was not assessed in this group due to concerns about the feasibility and validity of testing children that young.

Student participants represented 14 public schools in the state of Tennessee, including one magnet school. Schools varied regarding how parents were informed about the Safe@Last program: some schools sent letters including a description of the program and asked parents to provide written informed consent for their child to participate; other schools sent letters describing the program and included questions and answers for parents to go through with

their child; the remaining schools sent parents letters describing the program and indicating that the program would be provided to children in their child's grade level.

Procedure

Schools included in the present study (a) were contacted by program staff, (b) were identified through meetings with school officials, administrators, or counselors at state conferences, or (c) initiated contact with program staff to inquire about the Safe@Last program. School representatives were provided with information regarding the present study and those interested in participating were informed at the beginning of the 2014–2015 academic year whether each grade was randomly assigned to either the program or waitlist condition (see Table 1). All grades assigned to the waitlist condition completed the program after their post-test. The Safe@Last program was administered in schools by guidance counselors who accessed online training videos that focused on defining primary prevention, how to recognize and respond to CSA, and how to administer the program.

The Safe@Last program consists of four sessions, each lasting 35 minutes, typically delivered on a weekly basis over one month. The content, scripts, activities, and sequencing of objectives are tailored for children's developmental level and interests. For example, first graders sing the "Lost in the Store" song to learn about how to distinguish safe from unsafe people, whereas sixth graders discuss articles about lurkers in online chat rooms and cyber-stalkers.

The first session focuses on establishing classroom rules (e.g., raising hands), encouraging self-respect and respect among classmates, understanding the concept of personal space and how boundaries promote safety, and making safe choices by using problem-solving strategies (e.g., identifying possible consequences before making choices). The second session focuses on safety behaviors with strangers, teaches assertiveness skills (e.g., saying "NO!" when necessary), and introduces the concepts of personal information and disclosure. The third session focuses on how to identify safe people (including the fact that some people we know and trust can do things that are unsafe), introduces the concept of healthy versus unsafe touch (e.g., "ouch" and "uh oh" touches) and safe versus unsafe secrets (e.g., "an unsafe secret can make you feel sad, confused, or mixed up on the inside"), and identifies methods for disclosure (e.g., the "four W's": who was involved, what happened, when did it happen, where were you when it happened). The fourth session focuses on reviewing key concepts from previous sessions. An overview of the Safe@Last curriculum is available online (<http://www.besafeatlast.com/>).

Measures

Knowledge retention—The knowledge test was originally developed to assess each child's progress toward the five primary learning objectives. The test contained 10 multiple choice items for first graders and 25 multiple choice items for children in Grades 2 through 6. Pre-tests and post-tests contained identical questions for each grade. Questions targeted safe versus unsafe people (e.g., "*When you are at school, a safe person to talk to might be...*"), safe versus unsafe situations (e.g., "*How should a safe touch make you feel?*"), problem-solving skills (e.g., "*Your youth minister gave you a gift for helping out after*

church. He asked you not to tell anyone. Now he wants you to meet him outside of church at the park. What would you do?”), assertiveness skills (e.g., “A neighbor keeps picking on you. How do you ask him to stop?”), and disclosure methods (e.g., “When Linda decides to tell a safe adult, what are some details that she should tell?”). Response patterns from prior post-testing data collected in previous years were examined to identify items that were either too easy or too difficult. This resulted in modification of items for Grade 2 (6 items), Grade 3 (5 items), Grade 4 (8 items), Grade 5 (2 items) and Grade 6 (5 items); prior post-testing data were not available for Grade 1, and therefore no modifications were made to the Grade 1 test. Pre-tests were administered to all students assigned to the program at the beginning of the first session and post-tests were administered at the end of the fourth session. For students assigned to the waitlist condition, pre-tests and post-tests were administered approximately four weeks apart in the setting where they would eventually complete the program. Information regarding sex and race/ethnicity was obtained by youth self-report at pre-test. Total score reliability estimates (Cronbach’s alpha) for the pre-test and post-test were 0.76 and 0.91, respectively.

School characteristics—Summary statistics for school characteristics were obtained from county-level data for the state of Tennessee reported by National KIDS COUNT and the Tennessee Commission on Children and Youth (www.datacenter.kidscount.org). The present study focused on socioeconomic data (per capita personal income) and safety and risk behavior data (rates of substantiated child abuse or neglect per 1,000 children under 18 years of age). Based on county-level data, the schools included in the present study were characterized by a mean per capita annual income of \$38,291 (range: \$28,837 to \$71,761) and an average rate of 5.1% substantiated cases of child abuse or neglect (range: 1.4% to 8.5%).

Data Analytic Plan

Effectiveness—To test the effectiveness of the Safe@Last program on students’ knowledge retention, we ran a multilevel model using the Hierarchical Linear Models software (HLM v. 7 Raudenbush, Bryk, & Congdon, 2004) to account for the nesting of children within school. Specifically, we regressed post-test scores on group (intervention vs. waitlist control), controlling for pre-test scores. This analysis, therefore, tested the extent to which there was an intervention effect on students’ knowledge of information and skills taught in the Safe@Last program at post-test, accounting for pre-existing differences between the groups at pre-test, and also accounting for the dependent structure of the data (Rausch, Maxwell, & Kelly, 2003). Pre-test scores were centered at Level 1. Group was coded as 0 = waitlist control and 1 = intervention. The Level 1 model estimated the intervention effect within each school, and these estimates were aggregated at Level 2 to provide an average estimate for the sample. The HLM equation is presented below:

Level 1 Model:

$$\text{Post-test} = \beta_0 + \beta_1(\text{Pre-test}) + \beta_2(\text{Group}) + R$$

Level 2 Model:

$$\beta_0 = \gamma_{00} + U_0$$

$$\beta_1 = \gamma_{10} + U_1$$

$$\beta_2 = \gamma_{20} + U_2$$

In this model, γ_{00} represents the average post-test score for the waitlist control group, controlling for pre-test scores. The parameter γ_{20} represents the average intervention effect across schools; if γ_{20} is significant, this indicates a significant mean difference in post-test knowledge between the intervention and waitlist control group, accounting for any pre-test differences in knowledge. HLM models used maximum likelihood estimation to analyze all available data. Missing data for pre- and post-test scores in the present study was minimal: only one child was missing a pre-test score and two children were missing post-test scores.

Moderators—First, we tested school-level characteristics obtained from county data in 2014 as moderators of the intervention effect. Per capita income and the rate of substantiated child abuse and neglect cases were included as predictors (grand-mean centered) of the intercept (β_0) and intervention effect (β_2) at Level 2. Next, child characteristics of sex and race were tested as moderators of the intervention effect, to examine the extent to which the intervention effect differed for boys versus girls, and for White students as compared to non-White students. Sex and race were included as predictors at Level 1 along with their interactions with intervention group. Finally, we tested the extent to which the intervention differed by grade. Because students in the sixth grade all received the intervention, Grade 6 data were excluded from this set of analyses. Four dummy coded variables representing grades 1 to 5 were entered as predictors at Level 1, along with their interactions with *Group*. Grade 1 was the reference category in the first set of analyses, and analyses were rerun changing the reference category grade in order to test all 10 pairwise comparisons among the five grades. To account for multiple testing (10 pairwise comparisons for each domain of the Safe@Last program), we used the Benjamini-Hochberg corrected *p*-values to maintain alpha at .05 (Benjamini & Hochberg, 1995). The Benjamini-Hochberg false discovery rate correction adjusts the *p*-value based on the number of significant results in a family of tests, in order to control for the rate of Type I errors.

Results

Table 1 provides descriptive information about the sample and Table 2 presents the means and standard deviations of pre-test and post-test scores separately for the waitlist control and intervention groups. As a preliminary analysis, we first ran a model with *Group* as a predictor of pre-test scores to test for pre-existing group differences in knowledge of each program domain. Although grades were randomly assigned to receive the intervention, group differences were found on the total score, $b = 0.14$, $SE, p = .002$, as well as on four of the five domains: safe choices, $b = 0.13$, $SE = 0.04$, $p = .01$; problem-solving, $b = 0.14$, $SE =$

0.03, $p = .001$; clear disclosure, $b = 0.19$, $SE = 0.06$, $p = .008$; and assertiveness, $b = 0.12$, $SE = 0.04$, $p = .03$. Notably, the ANCOVA approach of predicting post-test scores controlling for pre-test scores can accommodate such “fluke random assignment” that results in group differences on the pre-test (Maxwell & Delaney, 2000, p. 380; Rausch et al., 2003).

Effect of the Safe@Last Program

Results from the multilevel models testing for group differences on post-test scores, controlling for the pre-test, are presented in Table 3. The intervention group showed significantly higher knowledge of all program domains at post-test compared to the waitlist control group, and effect sizes were large (d 's ranged from 1.56 to 2.13). Of note, the random effects were significant in each model, indicating significant variability between-schools in the intervention effect, thereby supporting the exploration of possible moderators of the intervention.

Community-level Characteristics as Moderators of the Intervention

Per capita income and rate of substantiated cases of abuse and neglect (both grand-mean centered) were included in multilevel models to determine the extent to which these community-level characteristics moderated the effect of the intervention (Table 4). A significant interaction of group $\times$ per capita income emerged in predicting post-test total knowledge, $\gamma = -0.00001$, $SE = 0.000003$, $p = .01$, and knowledge of clear disclosure, $\gamma = -0.00002$, $SE = 0.00001$, $p = .03$, domains. Simple slopes analysis indicated that, controlling for pre-test scores, the intervention group had significantly higher total knowledge scores than the waitlist control group, and this effect was stronger when per capita income was lower as compared to when per capita income was higher (Figure 1). With regard to the clear disclosure knowledge domain, simple slope analysis indicated that, controlling for pre-test scores, among students from communities with lower per capita income, the intervention group scored significantly higher than the waitlist control group (Figure 2).

The rate of substantiated cases of child abuse and neglect also moderated the effect of the intervention on knowledge of assertiveness, $b = -0.06$, $SE = 0.02$, $p = .04$, and on total scores, $b = -0.04$, $SE = 0.02$, $p = .023$. (Table 4). For both interactions, simple slope analyses showed that, controlling for pre-test scores, the intervention group had significantly higher knowledge scores than the waitlist control condition, and this effect was stronger when rates of child abuse and neglect were lower as compared to when rates of child abuse and neglect were higher (Figure 3).

Child Characteristics as Moderators of the Intervention

Main effects of child sex and race (White vs. non-White) and their interactions with group were examined in multilevel models. Neither child sex nor race moderated the effect of the intervention on post-test total or knowledge domain scores (p 's $> .05$). Thus, the Safe@Last program was equally effective for boys and girls and for both White and non-White students.

Grade Differences in Intervention Effect

The overall intervention effect (i.e., differences between waitlist control and intervention group in post-test total scores, controlling for pre-test total scores) was significant in all

grades except for Grade 1. The intervention effect was stronger in Grade 4 as compared to Grade 2, $b = 0.09$, $SE = 0.03$, $p = .004$, and Grade 3, $b = 0.10$, $SE = 0.03$, $p < .001$. Grade differences in intervention effects for each knowledge domain are detailed in Supplemental Table 1.

Discussion

Children who experience sexual abuse are at increased risk for a variety of negative physical health (Irish et al., 2010; Sachs-Ericsson, Blazer, Plant, & Arnow, 2005), mental health (Broman-Fulks et al., 2007; Kilpatrick et al., 2003), and behavioral and academic (Daignault & Hébert, 2009) outcomes. Moreover, the relation between CSA and poor mental health outcomes remains significant even after controlling for exposure to other types of childhood adversities (Molnar, Buka, & Kessler, 2001). Attempts to reduce rates of CSA either have targeted offenders (tertiary prevention) or have focused efforts on parenting practices and potential victims (primary prevention). RCTs of school-based CSA education and prevention programs have generally yielded medium effects sizes, suggesting that these programs require further refinement. Community-level factors that could be related to CSA program effectiveness rarely have been examined (Daigneault et al., 2012). The present study sought to address this critical gap in the literature by examining two community characteristics – per capita income and rates of child abuse and neglect – as moderators of the effectiveness of a school-based personal safety skills program called Safe@Last.

Results of this cluster RCT showed that children in Grades 2 through 6 who completed the Safe@Last program had significantly better knowledge scores at the post-intervention assessment than did those in the waitlist control condition. Effect sizes across these content domains were large (d 's ranged from 1.56 to 2.13), compared favorably with meta-analyses of CSA prevention studies assessing knowledge gains (mean effect sizes ranging from 0.61 to 0.98; Berrick & Barth, 1992; Walsh et al., 2015), and indicate that modifying program delivery and content based on recommendations from qualitative and quantitative reviews (Davis & Gidycz, 2000; Kenny et al., 2008) was successful. By the end of the program, students were better able to distinguish safe from unsafe people, make safe choices when confronted with potentially unsafe situations, engage in problem-solving strategies, utilize clear disclosure methods, and identify assertive responses to inappropriate touch. Improved understanding of disclosure methods is particularly important given that fear of negative consequences, self-blame, shame, and personal or society pressures for secrecy are known to interfere with this process (Goodman-Brown, Edelstein, Goodman, Jones, & Gordon, 2003; Paine & Hansen, 2002). Although first graders in the program and waitlist conditions did not differ significantly in their knowledge gain, this was likely due to a ceiling effect: pre-test scores were elevated (mean correct total score = 83%) and suggest that the 10-item multiple choice test for the first grade level was not sufficiently difficult. In contrast to the other grades, previous post-testing data were not available for Grade 1, and therefore the Grade 1 test was not able to be modified based on prior pilot data.

Effectiveness of the Safe@Last program differed according to per capita income, such that intervention effects on total knowledge scores and knowledge of clear disclosure were stronger for youth living in lower as compared to higher income counties; these effects were

significant over and above the impact of rates of substantiated child abuse and neglect. This finding is consistent with evidence that low SES and poverty are associated with elevated risk for physical and sexual abuse (Coulton et al., 2007; Hussey, Chang, & Kotch, 2006; Mustaine, Tewksbury, Huff-Corzine, Corzine, & Marshall, 2014). Youth from higher income families typically display better cognitive and academic performance than youth from lower income families, which may be attributed to a variety of factors including access to neighborhoods and schools with more resources and greater parental resource investment (Gershoff, Aber, Raver, & Lennon, 2007). Parental investment also may be associated with children's knowledge of personal safety skills. A recent meta-analysis of parenting programs designed to reduce maltreatment found stronger effects for programs conducted in low and middle income countries ($d = .67$) than for those conducted in high income countries ($d = .20$) (Chen & Chan, 2016). Another study, however, found poor knowledge retention when a CSA intervention was delivered to children in a low-income urban environment (Daigneault et al., 2012). Future studies need to identify the mechanisms that contribute to program response for parent- versus child-targeted interventions in families at various levels on the income spectrum.

Rates of substantiated cases of child abuse and neglect also moderated program effects over and above the impact of per capita income; intervention effects were significant regardless of abuse/neglect rates but were stronger for children attending schools in counties with lower as compared to higher abuse/neglect rates. Research examining the role of social processes in explaining associations between neighborhood structural factors and child maltreatment has emphasized the protective role of larger social networks, having neighbors who are familiar with local children and their parents, and positive role models (Molnar et al., 2016). Social processes may help to explain why rates of substantiated cases of child abuse/neglect moderated the effects of the Safe@Last program. Children in counties with lower rates of abuse/neglect may have benefited from shared personal safety knowledge derived from an extended network of family and neighbors and from greater parental involvement. Understanding how neighborhood social processes impact CSA prevention represents an important avenue for future research with the potential to inform how programs should be tailored for different school districts.

Child characteristics including race and sex did not moderate the effect of the Safe@Last program on knowledge gain. The absence of racial differences is reassuring given evidence that CSA risk is higher in African-American and Hispanic youth compared to Whites and non-Hispanic youth, respectively (Sedlak et al., 2010), and given that CSA disclosure and reporting are each associated with cultural factors (Fontes & Plummer, 2010). The lack of sex differences is also reassuring given the elevated CSA risk in girls as compared to boys (Stoltenborgh, van Ijzendoorn, Euser, & Bakermans-Kranenburg, 2011). The Safe@Last program resulted in knowledge gains for children in Grades 2 through 6 across all content domains, with some grades having stronger gains than in others. The effectiveness of the program for children across this wide age range is important given early critiques that school-based programs address concepts that are too advanced for young children (Melton, 1992). Early studies of CSA prevention found that younger children had more difficulty learning the concepts than older children (Topping & Barron, 2009), which led some researchers to recommend that child-focused programs be tailored to the target age group,

and that they use concrete rather than abstract presentations of the concepts to younger children (Conte, Rosen, Saperstein, & Shermack, 1995).

Strengths of the present study include the large sample size, clustered RCT design, multilevel modeling framework to address nesting in the data structure, and the examination of substantiated cases of child abuse and neglect as a community-level moderator of intervention effects, which had not yet been explored in the CSA prevention literature. The Safe@Last program also addressed the concern that early prevention efforts “put the onus of responsibility onto children” (Wurtele, 2009, p. 14) by encouraging engagement of parents and family in program learning activities and providing training to school staff through the ‘train the trainer’ model.

Nevertheless, the present study also had several limitations that should be addressed in future research. First, it is unclear how long children in the program were able to retain their knowledge of personal safety skills, as the post-test occurred following the fourth and final session. Meta-analytic findings suggest that mean knowledge scores do not change significantly for intervention groups up to 6 months post-intervention (Walsh et al., 2015); future studies are needed to examine whether such retention also characterizes Safe@Last participants. Second, as noted previously, intervention effects were not significant in first graders due to a probable ceiling effect. Future iterations of the Safe@Last testing materials require adaptation to better capture knowledge gains in this age group. We now have test data from the current study that can be used to improve the questions for first graders. Third, low interest among sixth grade classes and the absence of a sixth grade waitlist control group prevented their inclusion in analyses of grade X intervention interactions. Finally, longitudinal studies are needed to determine the impact of Safe@Last on CSA disclosure rates. However, interpreting changes in these rates is challenging because apparent increases in disclosure could actually be driven by increases in CSA incidence (Briggs & Hawkins, 1994a, 1994b). Of note, one retrospective study found that rates of CSA disclosure were twice as high in women who had never participated in a school-based prevention program compared to those who had (Gibson & Leitenberg, 2000).

In conclusion, the present study found strong support for enhanced knowledge of personal safety skills in youth who completed the Safe@Last program compared to those randomly assigned to a waitlist control condition, and identified two community-level moderators of program effectiveness: per capita income and rates of documented child abuse/neglect. Future research is needed to determine the mechanisms contributing to lower program effectiveness in schools from counties with higher income levels and those with higher child abuse/neglect rates.

Universal school-based CSA prevention programs are desirable given their ability to reach a large number of students at relatively low cost without singling out high risk students in a manner that might lead to greater discomfort or stigmatization (Wurtele, 2009). Over a decade ago, as many as 67% of youth ages 10 to 16 had been reported to have completed a school-based CSA prevention program (Finkelhor & Dziuba-Leatherman, 1995). This percentage has likely dropped considerably in recent years, however, due to competing demands from standardized academic testing and programs focused on bullying, dating

violence, and drug abuse (Wurtele, 2009). Enhancing children's personal safety skills is an important piece of what must be a coordinated effort to prevent CSA, which also includes family education, offender treatment and prevention, public awareness initiatives, and training in CSA detection and management for school personnel, childcare providers, researchers, and healthcare professionals (Wurtele, 2009).

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Figure 1.

Per capita income significantly moderated the intervention effect on post-test total knowledge scores.

Note. Lower and higher per capita income were plotted at -1 and $+1$ *SD* from the mean, respectively. Asterisks (** $p < .001$; * $p < .01$) indicate a significant mean difference between the waitlist control and intervention groups on total knowledge post-test scores in both higher and lower per capita income communities.

Figure 2.

Per capita income significant moderated the intervention effect on post-test clear disclosure knowledge scores.

Note. Lower and higher per capita income were plotted at -1 and $+1$ *SD* from the mean, respectively. Asterisks ($*p < .001$) indicate a significant mean difference between the waitlist control and intervention groups on clear disclosure post-test scores in lower per capita income communities.

Figure 3.

Rates of substantiated cases of abuse and neglect significantly moderated the intervention effect on post-test total knowledge scores.

Note. Lower and higher rates of substantiated cases of abuse and neglect were plotted at -1 and $+1$ *SD* from the mean, respectively. Asterisks (** $p < .001$; * $p < .01$) indicate a significant mean difference between the waitlist control and intervention groups on the total knowledge post-test scores in communities both higher and lower in rates of substantiated abuse/neglect cases.

Table 1

Sample Characteristics and Descriptive Statistics

	Grade 1 (n = 99)	Grade 2 (n = 218)	Grade 3 (n = 267)	Grade 4 (n = 265)	Grade 5 (n = 227)	Grade 6 (n = 81)
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Sex						
Male	46 (47)	111 (47)	132 (49)	127 (48)	115 (51)	42 (52)
Female	53 (53)	107 (45)	135 (51)	138 (52)	110 (49)	39 (48)
Race/Ethnicity						
White	84 (85)	124 (52)	76 (29)	118 (45)	82 (36)	59 (73)
African American	10 (10)	19 (8)	102 (38)	75 (28)	83 (37)	11 (14)
Hispanic	2 (2)	32 (13)	65 (24)	35 (13)	41 (18)	4 (5)
Asian American	2 (2)	13 (6)	15 (6)	9 (3)	4 (2)	4 (5)
Other	1 (1)	10 (4)	9 (3)	28 (11)	17 (8)	3 (4)
Randomized to Program	87 (88)	136 (57)	165 (62)	110 (42)	117 (52)	81 (100)
Pre-Test						
Total score	83	50	46	48	47	45
Safe People	79	47	46	61	40	25
Safe Choices	83	51	48	39	51	37
Problem Solving	86	52	47	49	57	56
Clear Disclosure	81	46	40	53	44	74
Assertiveness	77	54	47	36	46	48
Post-Test						
Total Score	94	64	62	63	67	80
Safe People	92	58	58	62	57	64
Safe Choices	95	63	65	62	70	82
Problem Solving	95	67	65	67	74	90
Clear Disclosure	90	63	56	65	66	85
Assertiveness	90	68	64	61	70	84

Table 2

Mean and Standard Deviation of Safe@Last Program Knowledge for Waitlist Control and Intervention Groups

	Waitlist Control (N = 481)		Intervention (N = 695)	
	Pre-test	Post-test	Pre-test	Post-test
	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>
Total Score	0.42 (0.16)	0.45 (0.19)	0.56 (0.20)	0.83 (0.17)
Safe People	0.43 (0.25)	0.43 (0.27)	0.54 (0.26)	0.75 (0.19)
Safe Choices	0.41 (0.22)	0.44 (0.25)	0.55 (0.28)	0.85 (0.21)
Problem Solving	0.46 (0.22)	0.49 (0.25)	0.60 (0.25)	0.87 (0.21)
Clear Disclosure	0.41 (0.25)	0.43 (0.29)	0.57 (0.26)	0.82 (0.24)
Assertiveness	0.39 (0.29)	0.44 (0.27)	0.55 (0.30)	0.86 (0.23)

Note. Scores represent the proportion correct (e.g., 0.42 = 42% correct)

Table 3

Results from Multilevel Models Testing Group Differences on Post-test Scores

	Total Score	Safe People	Safe Choices	Problem-Solving	Clear Disclosure	Assertiveness
	γ (SE)	γ (SE)	γ (SE)	γ (SE)	γ (SE)	γ (SE)
Fixed Effects						
Level 1						
Intercept	0.49 (0.05) ***	0.44 (0.04) ***	0.50 (0.05) ***	0.54 (0.05) ***	0.45 (0.06) ***	0.50 (0.05) ***
Pre-test	0.44 (0.06) ***	0.32 (0.06) ***	0.29 (0.06) ***	0.35 (0.06) ***	0.36 (0.08) ***	0.37 (0.05) ***
Group	0.32 (0.05) ***	0.30 (0.04) ***	0.33 (0.06) ***	0.32 (0.05) ***	0.36 (0.07) ***	0.34 (0.05) ***
Random Parameters						
Level 2 (between-schools)	Estimate (SD)	Estimate (SD)	Estimate (SD)	Estimate (SD)	Estimate (SD)	Estimate (SD)
Intercept	0.02 (0.15) ***	0.04 (0.44) ***	0.02 (0.16) ***	0.014 (0.54) ***	0.04 (0.19) ***	0.02 (0.15) ***
Pre-test	0.06 (0.23) ***	0.05 (0.32) ***	0.03 (0.19) ***	0.05 (0.35) ***	0.09 (0.29) ***	0.03 (0.17) ***
Group	0.18 (0.03) ***	0.04 (0.30) ***	0.03 (0.19) ***	0.05 (0.32) ***	0.05 (0.23) ***	0.03 (0.17) ***
Effect size ^a						
	1.82	2.13	1.78	1.95	1.56	2.02

Note. $N = 1177$ students from 14 schools. Group coded 0 = waitlist control, 1 = intervention

^a Effect sizes were calculated based on equation 13 from Raudenbush and Xiao-Feng (2001)

 $p < .001$

Table 4
Results from Multilevel Models Testing Community Characteristics as Moderators of the Intervention

	Total Score	Safe People	Safe Choices	Problem-Solving	Clear Disclosure	Assertiveness
	Fixed Effects					
Level 1	γ (SE)	γ (SE)	γ (SE)	γ (SE)	γ (SE)	γ (SE)
Intercept	0.53 (0.04) ***	0.47 (0.03) ***	0.51 (0.05) ***	0.57 (0.04) ***	0.52 (0.05) ***	0.56 (0.05) ***
Pre-test	0.46 (0.07) ***	0.32 (0.05) ***	0.30 (0.05) ***	0.35 (0.05) ***	0.37 (0.08) ***	0.37 (0.05) ***
Group	0.29 (0.05) ***	0.27 (0.04) ***	0.32 (0.05) ***	0.28 (0.04) ***	0.29 (0.05) ***	0.28 (0.05) ***
Level 2						
Per capita income	0.00001 (.000004) **	0.00001 (0.00001) †	0.00001 (0.00001)	0.00001 (0.00001) †	0.00002 (0.00001) *	0.00002 (0.00001) †
Substantiated abuse	0.04 (0.02) *	0.04 (0.01) **	0.03 (0.02)	0.05 (0.02) *	0.07 (0.02) *	0.06 (0.02) *
Group X Per capita income	-.00001 (.0000031) *	-0.00001 (0.00001)	-0.000002 (0.00001)	-0.00001 (0.00001) †	-0.00002 (0.00001) *	-0.00002 (0.00001) †
Group X Substantiated abuse	-0.04 (0.02) *	-0.02 (0.02)	-0.04 (0.02) †	-0.05 (0.02) *	-0.05 (0.03) †	-0.06 (0.02) *
	Random Parameters					
Level 2 (between-schools)	Estimate (SD)	Estimate (SD)	Estimate (SD)	Estimate (SD)	Estimate (SD)	Estimate (SD)
Intercept	0.02 (0.15) ***	0.01 (0.10) ***	0.03 (0.17) ***	0.02 (0.14) ***	0.03 (0.17) ***	0.02 (0.15) ***
Pre-test	0.06 (0.25) ***	0.03 (0.18) ***	0.04 (0.19) ***	0.03 (0.18) ***	0.08 (0.28) ***	0.03 (0.16) ***
Group	0.03 (0.17) ***	0.02 (0.13) ***	0.03 (0.18) ***	0.02 (0.15) ***	0.05 (0.21) ***	0.03 (0.16) ***

Note. $N = 1177$ students from 14 schools. Group coded 0 = waitlist control, 1 = intervention

* $p < .05$;

** $p < .01$;

*** $p < .001$