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Economic Evaluation of an Intervention to Prevent Adolescent Dating Violence (Me & You)

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Abstract

Me & You: Building Healthy Relationships (Me & You) is a multilevel, technology-enhanced adolescent dating violence (DV) prevention program that aimed to reduce DV among ethnic-minority, early adolescent, urban youth. A group-randomized control trial of Me & You, conducted with 10 middle schools from a large urban school district in Southeast Texas in 2014–2015, found it to be effective in reducing DV perpetration and decreasing some forms of DV victimization. Economic evaluations of DV interventions are extremely limited, despite calls for more economic analyses to be incorporated in research. We help fill this gap by evaluating the cost-effectiveness from the payer and societal perspectives of implementing the *Me & You* program. Using cost data collected alongside the *Me & You* group-randomized trial, we computed incremental cost-effectiveness ratios. Our primary outcome was "any DV perpetrated" within 12 months of the intervention. We conducted a cost–benefit analysis beyond the intervention endpoint by using literature estimates of per-victim lifetime costs of DV. We performed sensitivity analyses to assess effects of uncertain parameters. Under the base-case scenario, the cost of the *Me & You* curriculum compared to the standard curriculum was $103.70 per-student from the societal perspective, and the effectiveness was 34.84 perpetrations averted, implying an incremental cost per perpetration averted of $2.98, which ranged from $0.48 to $73.24 in sensitivity analysis. Thus, we find the *Me & You* curriculum is cost-effective and cost-saving in most scenarios. Policymakers should carefully consider school-based DV prevention programs, and cost data should be regularly collected in adolescent prevention program evaluations.

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Keywords

dating violence < domestic violence; youth violence; adolescent victims< sexual assault; intervention < sexual assault

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Adolescent dating violence (DV) is a serious public health threat that can include physical violence, psychological or emotional violence, sexual assault, stalking, and cyber threats. Nationally, 3–8% of high school dating adolescents are victims of past-year physical and sexual DV (Vagi et al., 2015), with approximately 25–30% of the 16.8 million high school adolescents in the United States being affected by physical, sexual, or psychological victimization (Chen et al., 2018; Foshee et al., 2001). Prevalence is even higher among high-risk and ethnic-minority youth populations (Niolon et al., 2017; Vagi et al., 2015). Moreover, violence during adolescence predicts more severe partner violence later in life (Exner-Cortens et al., 2017; Johnson et al., 2015). From an economic standpoint, partner violence incurs substantial economic costs, including direct health, justice, and legal costs, and indirect costs in the form of psychological functioning, lost earnings, and lower productivity (Max et al., 2004; Peterson, Kearns, et al., 2018). Given the prevalence, consequences, and costs, programs aimed at preventing DV in younger populations have become a national priority (Niolon et al., 2017; Teten Tharp, 2012).

Adolescence presents a unique opportunity to reach youth before they become chronic offenders (Craig et al., 2011; Zwicker, 2002). Research suggests schools can be effective community settings for initiatives that prevent adolescents from becoming involved in violent dating relationships (De Koker et al., 2014). While these programs are becoming more prevalent, there is scant economic evaluation of school-based DV interventions in the United States, despite acknowledgment that such analyses are critical if broader take-up of DV-prevention programs is to occur (Luo et al., 2022). A few papers have analyzed the budget impact or implementation costs of adolescent DV programs, (Bush et al., 2018; Luo et al., 2022; Reidy et al., 2017; Wolfe et al., 2009) but there are almost no cost effectiveness analyses. The studies that have assessed budget impact or implementation costs have found that adolescent DV programs are affordable. For example, Luo and colleagues estimated the mean per-student cost of Dating Matters®—a CDC-developed multicomponent adolescent DV prevention model—at $145.50 compared to $44.81 per-student cost for the single-component Safe Dates program (Luo et al., 2022). Wolfe et al. calculated costs of Fourth R—an effective violence prevention program at reducing adolescent DV and other risky behaviors—at CA$16 per-student (Wolfe et al., 2009). In terms of cost-effectiveness analyses, we only found one unpublished study that evaluated the economics of Fourth R. They estimated savings were CA$2101 per student from costs avoided related to dating and peer violence (Crooks et al., 2017). Surprisingly, there is also a dearth of economic evaluations of adult DV prevention programs (Barbosa et al., 2018; Craig et al., 2011; Devine et al., 2012; Zwicker, 2002), with calls for more cost-effectiveness analysis to be incorporated into that research as well (Corso, 2009; Gold et al., 2011).

In this paper, we analyzed the cost-effectiveness of *Me & You*, a multilevel technology-enhanced DV intervention among ethnic-minority, early adolescent youth from a large urban school district in Southeast Texas. In doing so, we are contributing both to the sparse literature on cost-effectiveness of DV interventions overall, as well as to the even sparser cost-effectiveness literature that focuses specifically on adolescent DV programs. Decision makers and policy makers among others will benefit from having this knowledge gap filled. We previously reported the research design and outcomes of the intervention as compared to the standard curriculum (control) (Peskin et al., 2019).

Methods

We conducted *Me & You*, a group-randomized controlled trial in 10 middle schools from a large urban school district in Southeast Texas from 2014–2015. Schools were eligible to participate if they were not receiving any other effective DV programs. We randomized five schools to the intervention group and five to the control group. Only English-speaking sixth-graders were eligible to participate, because funding allowed only for the development and implementation of English-language materials, and the number of Spanish-only speaking students was small. Study staff informed students about the purpose, general design, and enrollment criteria during classroom time, and information packets were sent home to parents. We obtained student assent and parental consent before administering the baseline survey. If students did not return the parental consent form after 3 weeks, research staff attempted to obtain verbal consent using a scripted telephone protocol. We offered a $5 gift card for returning the parental consent form regardless of consent status, plus additional $5 gift cards for completing the baseline and first follow-up survey (immediately post-intervention) and a $10 gift card for completing the second follow-up survey (12 months post-baseline). The UTHealth and school district review boards approved the study (Peskin et al., 2019).

Intervention

Me & You included student-, parent-, and school-level components that were developed using intervention mapping, a systemic theory-and evidence-based instructional design approach, and were informed by previous formative work and an adolescent advisory board. More details about the intervention approach and its' theoretical underpinnings can be found in Peskin et al. (2019).

The student component consisted of 13 25-minute lessons. Five of these lessons were classroom-based, facilitated by the teacher, and included group discussion, roleplay, and other skill-building activities. Another five lessons were computer-based and completed by students individually; the remaining three lessons were blended classroom-computer modules that were delivered in a classroom setting but involved some group-based computer activities delivered by trained facilitators. Individual and group computer activities included peer-animations and modeling, interactive quizzes, and virtual role play skills practice. Lessons covered various topics, such as selecting personal rules for healthy friendships and dating relationships, detecting situations that could challenge those rules, and protecting their rules using refusal and alternative actions.

The parental component consisted of two parent newsletters and three parent-child take-home activities intended to promote parent-child communication about dating and relationships. The school component consisted of a 2-day teacher training delivered before the curriculum intervention that introduced a paradigm for recognizing, responding, and referring youth experiencing DV, and to impart effective teaching strategies. Finally, we emailed a school newsletter to all staff and faculty, which covered DV types, unhealthy relationship behaviors, the importance of addressing DV in schools, and the same “recognize-respond-refer” paradigm from teacher training. We ultimately trained eight research staff and four teachers to implement the curriculum, and we installed the computer-based application on school computers (Peskin et al., 2019).

Control schools received their regular health education classes from state-approved textbooks and did not receive any evidence-based DV education (Peskin et al., 2019).

Effect Estimation

The primary outcome taken from the *Me & You* study was “any DV perpetrated” (measured as one or more perpetrations of any type) within the past 12 months (from the second follow-up survey). DV was a dichotomous variable, categorized as participation in one or more DV types (physical, psychological, threatening, sexual, or cyber) versus no participation in any type. We used the Conflict in Adolescent Dating and Relationship Inventory (CADRI) scale to assess physical, psychological, threatening, and sexual DV perpetrations, and used a 13-item scale adapted from previous studies to assess cyber DV (Peskin et al., 2019). The CADRI has been shown to have adequate reliability and validity (Wolfe et al., 2001).

We used multilevel logistic and linear regression analyses to compute adjusted odds ratios (aOR) and adjusted risk ratios (aRR), which estimated differences in outcomes post-intervention between treatment and control groups, adjusting for pre-intervention baseline imbalances as well as other potential confounders (i.e., age, gender, race/ethnicity, and time between assessments). Adjusting was necessary given that this was a group-randomized control trial (in contrast to an individually randomized control trial) and thus we could not ensure balance in baseline conditions between groups (here, schools). More details about the effects estimation can be found in Peskin et al. (2019).

We then defined averted events of this outcome as

$$Averted\ Perpetrations > \ = (1 - aRR)*(baseline\ risk\ of\ event)*(volume\ of\ students) \quad (1)$$

where aRR is the adjusted relative risk estimated from our intervention, (1-aRR) is the preventative fraction, and baseline risk is the fraction of students who perpetrated violence in the baseline survey (Sharp et al., 2014).

Cost Estimation

We estimated labor, supply, and overhead costs from the societal and payer (here, school) perspectives in 2014 US dollars. Data sources included questioning staff for approximate time to complete tasks, study invoices, and current market prices for supplies. We aggregated costs by activity and divided total costs by the number of students participating in the intervention treatment arm. We excluded development and research costs from the analysis since they are not relevant to future implementation decisions about adolescent DV prevention programs. (Gray, 2011)

Personnel Cost ——We estimated task times retrospectively and computed personnel costs by multiplying the hours staff spent on each activity by the adjusted salary per hour, using the base salary for each position to calculate the adjusted salary per hour (Andersen et al., 2002). In calculating the adjusted salary per hour, we assumed that teachers worked fewer hours per year than workers in other professions (1739 hours vs. 2087), but we assumed the same 0.85 productivity rate for all workers (Yeh, 2011). While we knew project staff base salaries, we did not have actual information about teachers' salaries involved in the intervention. Based on the school district's Compensation Manual for 2013–14, we assumed $52,825—the mid-point of the salary schedule for 10-month teachers with Bachelors' degrees—as the base salary for all teachers (Independent School District, 2013).

Parent Cost ——We calculated the opportunity cost of parents' time from participating in the intervention. Our base case assumed that parental involvement required 1.5 hours and that parents' weekly salaries were equal to 2014 Bureau of Labor Statistics (BLS) median weekly earnings (Bureau of Labor Statistics, 2014).

Supply Cost ——Supplies included food, handouts, flip charts, markers, headphones, flash drives, and other resources used to plan and implement the intervention. We did not include costs to enroll students because we assumed that the intervention would be integrated into the school curricula, and students would not be given the option to opt-out. We calculated costs by quantifying each activity's materials and their pricing according to current market rates.

Overhead ——We estimated administrative services, utilities, computer usage, software, and office space by multiplying the total direct cost (base) by a hypothetical indirect rate of 30%, consistent with the healthcare costing literature (Briggs, 2001). The indirect cost base is the summed personnel and supply cost.

Economic Evaluation

The incremental cost-effectiveness ratios (ICERs) represent the cost per event of DV perpetration averted, comparing the control group to the intervention group for the total analytic sample.

For the base case ICER scenario, we made the following assumptions: (i) teacher salaries equal to the mid-level salary as per the school district's 2013–14 Teacher Salary Schedule (Independent School District, 2013), (ii) all other staff salaries equal to their actual values, (iii) parent weekly salaries equal to the 2014 BLS median weekly earnings (Bureau of Labor Statistics, 2014), (iv) parent time equal to 1.5 hours, (v) the aRR and the baseline risk of any DV perpetration equal to the point estimates from the model. We then varied these assumptions for the sensitivity analysis and allowed: (i) teacher salaries to range from −10 and +10 years of experience on the school district experience schedule, (ii) parent hourly wage to range 20% higher and lower, and parent time to range from 1 hour to 2 hours, (iii) all staff salaries to equal teacher salaries, and at the high and low range of the school district's published teacher salaries, (iv) the aRR to take on values at the upper and lower levels of its 95% confidence interval (CI), and (v) the baseline risk to take on high and low estimates from the literature (Chen et al., 2018; Foshee & Matthew, 2007).

We assessed statistical uncertainty first using univariate and multivariate deterministic analysis and then more formally using multivariate probabilistic sensitivity analyses. In the univariate analysis, we varied each parameter individually and then computed a high and low range (assuming the high values of all parameters simultaneously and the low values of all parameters simultaneously) to establish high and low thresholds. In the multivariate probabilistic analysis, we assumed distributions for the uncertain parameters and did a Monte Carlo simulation, drawing values of the parameters from the distributions 1000 times, re-calculating the ICER each time. We plotted the results on the cost-effectiveness plane and looked at the proportion offavorable results relative to a given willingness-to-pay (WTP) threshold. We repeated this analysis for many different WTP thresholds and presented results as cost-effectiveness acceptability curves (CEAC), which show the probability that an intervention is cost-effective relative to the alternative for the range of WTP values (Briggs, 2000).

To calculate the net benefit (NB), we relied on a nascent literature that estimates per-victim costs of victimization. Extending the endpoints of the CE analysis beyond the scope of the *Me & You* randomized trial, we used Peterson et al.'s estimate of the discounted, present-value, per-victim lifetime costs of intimate partner violence (IPV) equal to $81,960 (2014 US$), which represents the average lifetime expected cost for an 18-year-old IPV victim and includes health, criminal justice costs, and lost productivity from any type of DV (sexual, physical, stalking) and thus matches our outcome of "any DV perpetrated" (Peterson, Kearns, et al., 2018). Given their estimate is not focused on an adolescent population per se and thus does not perfectly match our younger intervention group (12–13-year olds), we also calculated what the minimum benefit of an averted event and minimum intervention effect sizes would need to be to make *Me & You* cost-effective. We assumed that one perpetration averted equals *at least* one victimization averted, as described in the Effects Estimation section above.

Results

A total of 826 sixth-grade students completed the baseline survey; 709 completed both follow-up surveys (one immediately post-intervention, one 12 months post-baseline). The 709 students comprise the total analytic sample used in our analyses. Of these, 271 were in the control group and 438 were in the treatment group. We show student demographic characteristics and some results from the baseline survey in Appendix Table A1 (more detail can be found in Peskin et al. (2019)). As seen there, the majority of students were Hispanic or Black, and the average age of these students was 12.2 years (SD=0.59). In addition, there were occasional imbalances in some baseline characteristics and in students' experiences with dating and DV, which we controlled for in our analyses. Imbalances were not unexpected because this was a group-randomized trial (schools were randomized rather than individuals).

Intervention Costs

As seen in Table 1, from the societal perspective, the base-case incremental cost per student participating in the *Me & You* intervention was $103.70. Labor accounted for 41.2% of total costs, materials for 11.1%, curricula costs for 10.5%, and parent time accounted for 37.2% of total costs. From the school perspective, which omits parents' time, the cost per student was $65.14, of which labor accounted for 65.6%, materials for 17.7%, and curricula for 16.7%.

Intervention Effectiveness

We used "any DV perpetration" as our primary outcome to assess the total *minimum* events averted. As reported previously (Peskin et al., 2019) (and reproduced here in-part in Appendix Table A2), for the full-sample, *Me & You* demonstrated reductions in occurrence of any DV perpetration. At second follow-up, the unadjusted rates were 11.0% (treatment) and 21.5% (control). Adjusting those outcomes for baseline imbalances and other confounders via regression models yielded an adjusted odds ratio [aOR] of 0.46 [95% CI: 0.28–0.74]. More detail about the effects evaluation can be found in Peskin et al. (2019).

For the purposes of this CE analysis, we re-ran the regressions to get the adjusted risk ratio [aRR], which we needed to input into the equation (1). Using the formula from that equation, our estimated aRR of 0=0.63 [95% CI: 0.43–0.92] translated into *at least* 34.8 averted DV perpetration events over 12 months. For ease of exposition, we will present results from the minimum intervention effectiveness threshold perspective (e.g., that *only* 34.8 DV events were averted).

Note first that while we chose to focus on the total sample, using the dating sample yielded very similar results. This is because, as seen in Appendix Table A1, while the baseline risk of the dating sample was more than double that of the total sample (51.1 vs. 21.5), the volume of student was less than half (192 vs. 438) and these differences cancel out in equation (1). Second, reducing victimization was also a focus of the intervention. However, given that victimization results generally were not statistically significant (see Appendix Table A2), we focus just on perpetration for these analyses.

Cost-Effectiveness

Table 2 presents estimates of the cost-effectiveness analysis. The cost per DV incident averted (ICER) was $2.98 in the base case from the societal perspective, and this cost decreased to $1.87 when we excluded parents' costs in the school perspective.

Table 3 shows the one-way and multivariate deterministic sensitivity analyses; as seen there, results were most sensitive to the range of the relative risk, but not to the range of baseline risk, parent or staff time, or teacher salary. The base case societal-perspective ICER increased to $13.77 when the relative risk increased to the upper limit of its' 95% confidence interval, and the maximal range of the ICER extended from $0.48 to $73.24 as we moved from the low-value combination of costs and parameters to the high-cost combination. The maximum school-perspective ICER, which has the highest cost combination of parameters, is $43.90.

Appendix Figure A1 displays the CEAC, which was computed from the probabilistic sensitivity analysis and shows the probability of the intervention being cost-effective relative to the standard curriculum for a hypothetical set of decision-maker WTP values. If WTP were $5 per student, the probability that *Me & You* would be cost-effective relative to the control would be 50.4%. For a $25 WTP, the probability of cost-effectiveness increases to 84.0%. The CEAC asymptotes to almost 99% because about 1% of draws in the Monte Carlo simulation resulted in an ineffective intervention, meaning the number of averted events was negative. This result occurred whenever the draw for relative risk was greater than one. (Foshee & Matthew, 2007)

Figure 1 shows the base-case of our cost–benefit analysis (CBA): Long-term benefits from preventing perpetration (equal to the present-value, per-victim lifetime costs of IPV of $81,960, as per the literature (Peterson, Kearns, et al., 2018), multiplied by the 34.84 events averted from our intervention) vastly outweigh total intervention costs ($45,421) with a benefit-cost ratio of 62.9. Table 4 shows sensitivities for the cost–benefit analysis. For example, row five says that under the base-case levels of costs and events averted, the intervention would have a positive NB>0 as long as the per-victim lifetime costs of IPV were at least $1304. Using the extreme bounds from our sensitivity analysis gives a range of benefit-cost ratios of 2.55–444.84; the corresponding range of the minimum lifetime per-victim IPV cost required to make the intervention net-benefit positive is $184-$32,080.

As mentioned, for ease of exposition, we presented our cost analyses from the minimum intervention effect perspective (e.g., that “any perpetration averted” equaled only one perpetration averted). Accordingly, all results should be interpreted as minimum bounds. That is, for all scenarios, estimates of ICERs, net benefit savings and benefit-cost ratios could be larger if by preventing “any perpetration,” the intervention actually prevented more than one, ceteris paribus.

Discussion

Randomized trials of school-based interventions aimed at reducing adolescent DV have been shown to be effective, including some geared for ethnic-minority middle school youth (Briggs, 2000; Reidy et al., 2017; Taylor et al., 2013; Peskin et al., 2014). However, most multilevel DV middle school interventions were not designed primarily for middle school students, nor do most existing interventions incorporate technology-based modules into their curricula (Peskin et al., 2019), which can limit interactivity and enjoyment. *Me & You* addressed both of these gaps and also provided the first formal cost analysis of a school-based DV intervention. Our results support arguments that investment in evidence-based preventative programming results in better outcomes and lower societal costs (Crooks et al., 2017).

This study randomly assigned schools from a heavily ethnic-minority school district in southeast Texas. From data of students who completed the initial survey, we estimated that the baseline lifetime prevalence of DV was 21.5% in the intervention group and 27.4% among control students. After *Me & You*, the unadjusted prevalence of having perpetrated DV in the past 12 months was 11% in the intervention group and 21.5% in the study group, with an aOR of 0.46 [95% CI: 0.28–0.74] (Peskin et al., 2019). This reduction is in line with findings from DV interventions in similar populations (Foshee et al., 2005; Peskin et al., 2014; Reidy et al., 2017).

We found that *Me & You* had a cost per student of $103.70 and an ICER of $2.98 per averted DV perpetration from the societal perspective in the base case, which respectively increased to $153.99 and $73.24 in the highest cost combination of parameters. These results are in line with the literature. A recent paper that analyzed the budgetary impact from the payer perspective of implementing two programs comparable to ours, Dating Matters® and Safe Dates—CDC-developed comprehensive adolescent DV prevention models also aimed at high-risk, urban, minority middle-school youth—found an average cost of $145.40 and $44.81 per student, respectively. (Luo et al., 2022) Using a cost per averted events framework like ours, Sharp et al. (2014) evaluated an emergency department (ED)-based program designed to prevent violence among at-risk youth aged 14–18 and found similar results ($3.63-$54.96 per event averted) (Sharp et al., 2014). Dopp et al. (2020) showed that a multisite community-based intervention for problematic sexual behaviors (PSBs) in 13–14 year-olds was cost-effective under most scenarios, though the program cost considerably more per participant ($1772 per 1 standard deviation change in PSB) (Dopp et al., 2020). Wang et al. (2000) evaluated the economics of school-based programs aimed to prevent sexually transmitted infections and unintended teen pregnancy and found them to be highly cost saving. (Wang et al., 2000)

We excluded the development cost of the *Me & You* curriculum and software, school recruitment, and other costs exclusively related to research since they were not relevant to future implementation decisions about similar adolescent DV reduction programs. We also excluded costs related to procuring student participation, assuming that students would be required to participate if the curricula is adopted at the district level. However, if schools allow students to opt-out, additional costs to inform parents and obtain parental permission would need to be included. This cost was small ($0.33/student) relative to the total.

Adjusting all staff salaries to levels of paid educators yielded higher cost estimates for the interventions. Costs increased to $122.49 per student because many of the non-investigator project staff earned less than the school district's average teacher salary. However, aspects of the intervention (e.g., training) need not be done by educators.

It should be noted that, while economies of scale often reduce costs in real-world applications of interventions, this might not be the case for the current program; *Me & You* would be implemented at the school (or district) level and thus economies of scale savings may not apply. Also possible is that costs may vary by school district size and/or by geography (Crooks et al., 2017). Costs might also increase if curricula need to be adapted to local cultural conditions.

We designed *Me & You* to promote parent-child communication about dating and relationships via two parent newsletters and three parent-child take-home activities however our cost estimation did not survey parents on their time spent, nor time value, and thus we had to make assumptions. We set parent weekly salaries equal to the 2014 BLS median weekly earnings (Bureau of Labor Statistics, 2014) ($19.78 per hour) and assumed parent time spent was 1.5 hours. Our results were not sensitive to these assumptions—for example, in our highest parent-cost scenario (20% higher wage, 2 hours spent), the ICER increased only to $3.64 from the base-case $2.98, which implies *Me & You* would be cost effective from society's perspective across communities with a large range of parent hourly wages. We also analyzed costs from the school perspective—that is, we excluded parents' costs—and found the ICER decreased from $2.98 to $1.87 per averted event and, under the highest combination of parameters, would cost the school $43.90 per averted event. This is in-line with recent results that the average cost of implementing a similar program, Safe Dates, was $44.81 from the payer perspective (Luo et al., 2022).

Finally, our CBA indicates *Me & You* is cost-saving to society under most scenarios. For example, in the base-case, the intervention would have a NB>0 as long as one violent-event-averted saved society at least $1304; under the most extreme parameters (i.e., fewest events averted and highest program costs), getting a NB>0 would require saving $32,080 per event. Peterson et al.'s estimate of the present-value, per-victim lifetime costs of IPV for the average 18 year old—equal to $81,960 ($104,238 for women, $24,298 for men) (Peterson, Kearns, et al., 2018)—is sufficiently greater than these numbers, but even shorter-term estimates of adult IPV costs (Bonomi et al., 2009; Corso et al., 2007; Cui et al., 2013; Peterson, Liu, et al., 2018) still lie within the range to render *Me & You* of positive NB. For example, Peterson and a different set of co-authors found the short-term cost of lost-productivity alone (i.e., ignoring short-term health care costs, justice-related costs, etcetera) averaged $730 per victim; a 1995 National Violence Against Women analysis estimated short-term medical costs for female IPV victims was $1210 for rape, $1178 for physical assault, and $424 for stalking (in 2014 US$) (CDC, 2003; Peterson, Liu, et al., 2018).

The reader could also look at our CBA results conversely: holding the present-value, per-victim lifetime costs constant at Peterson et al.'s $81,960, our sensitivity analyses demonstrate the intervention would still be cost-beneficial even if far fewer perpetrations were averted, for example, if the long-term effects waned. Row 1 of Table 4, for example, shows that if only 2.10 events were averted *and* program costs were at their highest bound, the benefit-to-cost ratio would still be 2.55.

Limitations must be acknowledged. First, as discussed, we only have estimates of "any perpetration averted," not the exact number of perpetrations averted, and thus all estimates are lower bounds. In addition, we only have self-reported measures of perpetration. While we are using a validated and widely accepted measure of DV (the CADRI), it is possible that reporting of DV decreased even if actual DV did not, though this issue would affect the entire DV literature, not just our study. Second, it is possible that the efficacy of the Me & You intervention wanes over time and the number of future perpetrations averted is actually lower. However, as just discussed, our sensitivity analyses show that the intervention would still be cost-beneficial if far fewer perpetrations were averted. More broadly, while adolescent DV has been shown to strongly predict DV later in life, there are no estimates of transition probabilities from perpetrating DVas an adolescent to perpetrating as an adult; (Cui et al., 2013; Exner-Cortens et al., 2017; Johnson et al., 2015) thus, we were limited in our ability to model and extrapolate *Me & You*'s successes in reducing students' perpetration of DV into the future. Third, our study population's age was 12–13 years, but insofar as the few estimates of DV costs exist, they are typically for those 18+ (Peterson, Liu, et al., 2018). Together, these limitations imply our CBA may not be accurately capturing (and likely underestimating) the costs of adolescent DV, nor the savings from reducing its' prevalence. For this reason, we provided a range of lifetime per-victim IPV costs and a range of perpetrations averted required to give Me & You a positive net benefit. Fourth, our estimates do not include the opportunity cost to students and faculty from participating in Me & You. The 25-minute sessions were typically held during regular health education classes, so it is possible that material otherwise learned during that time would have had other health benefits, but modeling this would have required too many assumptions to be credible and meaningful. Similarly, we did not measure the impact of *Me & You* using recommended measures of health state preferences (like Quality Adjusted Life Years; QALYs), and therefore our results can only be compared to other studies measuring costs per event/perpetrations averted. Estimating QALYs for this cohort would also have required too many assumptions. Finally, the intervention was administered in a large, urban school district, and thus results may not generalize to other populations. While the research has found that rates of DV are similar across rural, urban, and suburban locales (Edwards, 2015), and thus it is feasible our effect sizes could generalize, this is an area for further research.

Conclusion

We evaluated the economics of the *Me & You* intervention and found it to be cost-effective at reducing adolescent DV perpetration below the level attained with the standard curriculum from both the school and societal perspectives. Decision-makers need to consider the uncertainties and their willingness to pay, cost structure, and level of planning and training required to implement the interventions to determine whether the resources required to add this new curriculum would be worth the investment. Moreover, program cost data should be routinely collected in school-based DV prevention programs to facilitate decision-makers' assessments of DV prevention methods and feasibility of widespread implementation.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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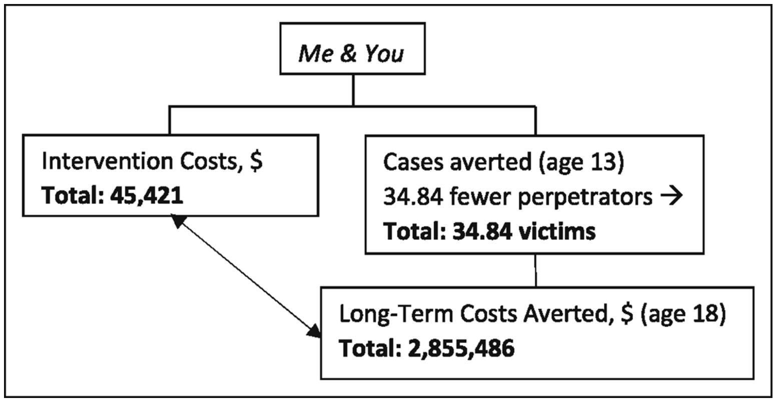

Figure 1.

Cost–Benefit Analysis. Notes: Results of base-case analysis. Using a long-term, present-value, per-victim cost of IPV equal to $81,960 from Peterson, Liu, et al. (2018), the net benefit was $2,810,065 [(34.84*$81,960)-$45,421], and the benefit cost ratio ([(34.84*$81,960)/$45,421) was 62.86.

Table 1.

Cost of the Intervention.

	Control (Standard Curriculum) (*n*=27l)	Treatment (Me & You Curriculum) (*n*=438)
Activity & Input	**Cost ($)**	**Cost ($)**
1 Facilitator training & planning meetings	0.0	7953.14
Labor	0.0	6863.68
Materials	0.0	1089.46
2 Implementation	0.0	26,986.14
Labor	0.0	7531.13
Materials	0.0	2787.84
Curricula	0.0	3675.00
Parent time	0.0	12,992.18
TOTAL DIRECT COST	0.0	34,939.29
Overhead[a]		10,481.79
Total cost (societal perspective)	0.0	45,421.07
Cost per student (societal perspective)	0.0	103.70
Total cost[b] excluding parent time (school perspective)	0.0	28,531.24
Cost per student excluding parent time (school perspective)	0.0	65.14

Notes: Based on authors’ calculation from study data.

[a]Overhead cost estimated at 30% of direct cost.

[b]Total cost includes direct cost, that is (34,939.29-I2,992.I8)*I.3.

Table 2.

Incremental Cost-Effectiveness (Cost per Averted Event/Perpetration).

Strategy	Cost (per Student)	Effect (Averted Events[a])	Incremental Cost	Incremental Effect	Incremental Cost Effectiveness Ratio (ICER) - Cost per Averted Event
Base case					
Me & *You*	$103.70	34.84	$103.70	34.84	$2.98
No intervention	0	0	—	—	—
Excluding parent time					
Me & *You*	$65.14	34.84	$65.14	34.84	$1.87
No intervention	0	0	—	—	—

Notes: where RR=relative risk, based on authors' calculation from study data, Baseline Risk of Event was the fraction of students who had perpetrated dating violence in the baseline survey, and the number of students=438.

[a] Averted events = (l-RR)*(Baseline Risk of Event)*(Number of Students).

Table 3.

Effect of One-way and Multi-way Sensitivity Analyses on Averted Events, Incremental Costs, and ICERs.

Parameter Adjustments	Range of Values	Averted Events	Incremental Costs ($/Student) [Societal Perspective]	ICER ($/Averted Event)	Incremental Costs excluding Parent ($/Student) [School Perspective]	ICER excluding Parent Costs ($/Averted Event)	Source
Relative risk							Study data
Low estimate	0.43	53.68	n/a	$1.93	n/a	$1.21	
High estimate	0.92	7.53	n/a	$13.77	n/a	$8.65	
Baseline risk							Chen et al., 2018;
Low estimate	0.06	9.72	n/a	$10.66	n/a	$6.70	Foshee & Matthew, 2007
High estimate	0.818	132.57	n/a	$0.78	n/a	$0.49	
Parent time & salary							
Low estimate	1; $15.98	n/a	$85.91	$2.47	n/a	n/a	BLS[a]
High estimate	2; $23.73	n/a	$126.82	$3.64	n/a	n/a	
Staff salary							
All Staff=ISD	$52,825/ yr	n/a	$122.49	n/a	$83.93	$2.41	ISD[b]
Low estimate	$47,273	n/a	$1 16.09	n/a	$77.53	$2.23	
High estimate	$60,084	n/a	$130.86	n/a	$92.20	$2.65	
Combination							
All low; baseline high		204.22	$98.30	$0.48	$77.53	$0.38	
All high; baseline low		2.10	$153.99	$73.24	$92.30	$43.90	

Notes: "Compensation Manual 2013–2014", ISD Salary Schedules, (Table: Teacher Salary Schedule -2013–2014 Salary- 10 Month Teacher). Cells not affected by the parameter adjustments depicted by "n/a".

[a]Bureau of Labor Statistics. (2014). *Median weekly earnings of full-time wage and salary workers by selected characteristics,* 2013–2014.

[b]Independent School District (ISD), 2013.

Table 4.

Sensitivity Analysis for Cost-Benefit Analysis.

	Events Averted	Total Intervention Costs	Net Benefit ($)	Benefit-Cost Ratio	Minimum Lifetime Per-Victim IPV Cost to get NB>0 ($)
1	Lower bound (2.10)	Upper bound ($67,446)	104,867	2.55	32,080
2	Base case (34.84)	Upper bound ($67,446)	2,788,278	42.34	1936
3	Upper bound (204.22)	Upper bound ($67,446)	16,670,580	248.17	330
4	Lower bound (2.10)	Base case ($45,421)	1261,892	3.79	21,604
5	Base case (34.84)	Base case ($45,421)	2,810,303	62.87	1304
6	Upper bound (204.22)	Base case ($45,421)	16,692,604	368.51	222
7	Lower bound (2.10)	Lower bound ($37,627)	134,685	4.58	17,897
8	Base case (34.84)	Lower bound ($37,627)	2,818,097	75.89	1080
9	Upper bound (204.22)	Lower bound ($37,627)	16,700,398	444.84	184

Notes: This analysis calculates, from the societal perspective, the Net Benefit=Total Benefits-Total Costs, and the Benefit-Cost Ratio =Total Benefits/Total Costs given different combinations of values of events averted (column I) and intervention costs (column 2). Column I and 2 values are taken from the base case (see Tables I and 2) and extreme ranges of the sensitivity analysis (see Table 3). Benefits are calculated assuming the long-term, present-value, per-victim cost of IPV equal to $81,960 from Peterson, Liu, et al. (2018). For each row, we then calculate what the minimum lifetime per-victim cost of IPV would need to be to get a positive net benefit.