*Original Research*

# Effectiveness of a Sexual Assault Self-defense Program for American Indian Girls

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## Abstract

This study evaluated the effectiveness of a 6-session (12-hour) empowerment self-defense classroom delivered curriculum (i.e., *IMpower*) among American Indian girls. Girls ($N = 74$) in one middle school and two high schools on an Indian Reservation in the Great Plains region of the United States received the intervention and completed a pre-test and a post-test six months following the final program session. The surveys administered assessed hypothesized intermediary (i.e., efficacy to resist a sexual assault, self-defense knowledge), primary (i.e., sexual violence victimization), and secondary (i.e., physical dating violence, sexual harassment) outcomes. Native American girls ($N = 181$) in five middle schools and three high schools in a nearby city where there was no sexual assault prevention occurring completed surveys assessing sexual violence, physical dating violence, and sexual harassment victimization approximately six months apart, thus serving as a comparison to girls in the treatment condition on primary and secondary outcomes. Girls exposed

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to the *IMpower* program reported significant increases over time in efficacy to resist a sexual assault and knowledge of effective resistance strategies. Furthermore, propensity score analyses suggested that girls who received the *IMpower* program reported significantly fewer types of sexual assault and sexual harassment at follow-up compared to girls in the control condition. However, no effect was found for physical dating violence. These data suggest that empowerment self-defense is a promising approach in preventing sexual assault and sexual harassment among American Indian girls.

## Keywords

## Effectiveness of a Sexual Assault Self-defense Program for American Indian Girls

Sexual assault, which ranges from unwanted touching to completed rape, is a pernicious issue in the United States, and disproportionally impacts American Indian youth (Robin et al., 1998; Rosay, 2016; Rutman et al., 2008; Warne et al., 2017). For example, in a nationally representative sample of urban American Indian high school students, researchers documented that 16.4% of American Indian youth reported being physically forced to have sex during the past year (compared to 6.6% of White youth; Rutman et al., 2008). Research suggests that sexual assault is related to a host of deleterious outcomes in American Indian youth, including (but not limited to) depression, suicidal ideation, and binge drinking (Edwards et al., 2020). Thus, the prevention of sexual assault among American Indian girls is of critical public health importance.

Sexual assault also co-occurs at high rates with sexual harassment (e.g., unwanted sexual comments) and physical dating violence (e.g., pushing, slapping; Hamby & Grych, 2013; Sessarego et al., 2019). These forms of violence share overlapping risk and protective factors (Hamby & Grych, 2013; Wilkins et al., 2014) and are therefore often concurrently targeted in programs that seek to prevent sexual assault (Coker et al., 2017; Edwards et al., 2019). Even if programs are primarily targeting the prevention of sexual assault, it is important to measure other outcomes, such as sexual harassment and physical dating violence, as secondary outcomes.

To date, research suggests that a handful of prevention initiatives lead to reductions in rates of sexual assault (DeGue et al., 2014). The Centers for Disease Control and Prevention has identified several strategies that research suggests are important in preventing sexual assault (Basile et al., 2016). For example, there are several studies that suggest that bystander intervention training reduces

sexual assault, sexual harassment, and dating violence among high school students (Coker et al., 2019; Edwards et al., 2019). Moreover, research suggests that engaging boys and men in prevention efforts via encouraging healthy masculinity and/or correcting misperceptions of social norms are effective in preventing sexual assault (Gidycz et al., 2011; Miller et al., 2012). Research also suggests that teaching adolescents healthy relationship skills (e.g., healthy ways to manage conflict) can help to reduce sexual assault and dating violence (Foshee et al., 1998; Foshee et al., 2004; Foshee et al., 2000; Niolon et al., 2019).

Additionally, empowerment self-defense training in which girls and women are taught to recognize risk and respond using verbal and/or physical resistance strategies to thwart a sexual assault is effective at reducing sexual assault (Orchowski et al., 2018). Although perpetrators are always to blame for sexual assault, it is important that girls and women be equipped with tools to effectively resist a sexual assault (Orchowski et al., 2018). Indeed, research suggests that when girls and women respond assertively to a sexual assault (e.g., scream, run away), they are more likely to thwart a sexual assault than if they use passive resistance strategies (e.g., cry, freeze; Gidycz et al., 2006; Gidycz et al., 2008; Orchowski et al., 2018; Turchik et al., 2007). Several rigorous research studies have found that empowerment self-defense training leads to reduced likelihood to experience a sexual assault (Gidycz et al., 2001; Gidycz et al., 2006; Orchowski et al., 2018; Senn et al., 2015). Moreover, despite some criticisms that self-defense training for girls is victim blaming, research suggests that girls and women who participate in empowerment self-defense training, compared to girls and women who do not, report less self-blame following a sexual assault (Gidycz et al., 2015; Mouilso et al., 2011; Orchowski et al., 2018; Senn et al., 2008).

Most research to date has evaluated empowerment self-defense training in samples of college women. An exception to this is the IMpower program, implemented by No Means No Worldwide. *IMpower* is a 6-session (12-hour) empowerment self-defense classroom delivered curriculum for girls ages 10–20 (refer to Table 1 for an overview of the six classes). The *IMpower* program teaches girls to identify risk, say "no" and talk their way out of trouble, and if "no" is not respected, girls learn physical skills to resist a sexual assault. Additionally, girls engage in chants and other activities to reinforce the messages that they are worth defending. To date, the *IMpower* program—which originated in Nairobi, Kenya—has been implemented and evaluated (via cluster randomized control trials) in high-risk environments (e.g., informal settlements) in Kenya and Malawi. Results from these trials suggest that the *IMpower* program leads to reductions in sexual assault victimization and increases in efficacy to resist a sexual assault and self-defense knowledge (Baiocchi et al., 2017; Decker et al., 2018; Sarnquist et al., 2014).

**Table 1.** *IMpower* Class Outline.

|  | Learning Objectives |
| --- | --- |
| Session I. Introduction | Threat levels for sexual violence from low-risk to high-risk situations are discussed. Girls learn the definition of self-defense and the five primary tools of defense: spirit, mind, eyes, voice, and body. |
| Session II. Verbal skills | Verbal resistance strategies are learned through role playing, games, and other techniques. Girls are given tools to use verbal resistance strategies including how to say no effectively, setting boundaries, yelling "No!," assuming a strong stance, and enlisting others for help. Students are encouraged to disclose abuse during this session and victims are provided referrals to service providers for support. |
| Session III. Physical resistance | Physical resistance strategies are learned via demonstration from instructors. Students are shown where to focus physical resistance efforts and practice escaping holds and grabs. |
| Session IV. Physical resistance | Full force fighting techniques meant to disable assailants quickly are demonstrated. Students engage in full force fighting techniques for the full session. |
| Session V. Extreme risk strategies | Students are shown various responses to high-risk scenarios including choking, weapon use, and multiple assailants. Students practice engaging in responses to high-risk situations. |
| Session VI. Practice | Review session where instructors allow students to practice what they have learned throughout the programing for the entire session. |

The effectiveness of the *IMpower* program has not been evaluated yet in the United States, and to our knowledge, no studies have evaluated the impact of sexual assault prevention programming on American Indian youth. The purpose of the current study was to explore these gaps in the literature using a sample of American Indian middle and high school girls, some of whom received *IMpower* and some of whom did not. Moreover, given the high co-occurrence of sexual assault with sexual harassment and physical dating

violence (Hamby & Grych, 2013; Sessarego et al., 2019) in addition to the fact that refusal skills may also help to prevent these other forms of victimization, we examined sexual harassment and physical dating violence as secondary outcomes. Specific hypotheses were as follows:

$H_1$: Girls who received *IMpower* would report increases in efficacy to resist a sexual assault and self-defense knowledge (intermediary outcomes)

$H_2$: Girls who received *IMpower*, compared to girls who did not, would report fewer types of SA victimization (primary outcome).

$H_3$: Girls who received *IMpower*, compared to girls who did not, would report less physical dating violence and sexual harassment ictimization (secondary outcomes).

## Method

### Design

A quasi-experimental design was used such that American Indian girls residing on an Indian Reservation in the Great Plains region of the United States were compared to American Indian girls living in a city in the same state. Girls were not randomly assigned to receive the program on the Indian reservation given that there could be contamination effects in addition to the fact that our school and community partners felt that it was inappropriate to withhold the program from some girls in the school. Prior to the implementation of the program, several community members residing on the Indian reservation, including youth, provided feedback (via informal conversations) on the programming in order to make several adaptations to ensure its community relevance. This included the infusion of local language into the curriculum and adapting scenarios to be relevant to the local context. All research procedures were approved by the University of New Hampshire Institutional Review Board as well as Tribal Council and the Health Board on the Indian reservation. Finally, the President of the Tribe approved the publication of these data.

### Participants

Participants were American Indian middle and high school girls in grades 6 through 12 residing either on an Indian Reservation in ($N=74$; treatment group) or in a city in in the same state ($N=181$; comparison group) who completed both baseline and follow-up surveys. The girls in the reservation (treatment) sample were on average 14.0 years old (range = 12 to 18; $SD=1.90$), in grades 6 to 12 (median = 9th, $SD=2.03$), and the majority identified as heterosexual (66.7%). The girls in the city (comparison) sample were on average

13.7 years old (range = 12 to 18; *SD* = 1.29), in grades 6 to 12 (median = 8th, *SD* = 1.07), and the majority identified as heterosexual (80.1%). The girls in the city sample come from a larger multiple baseline study examining the impact of a youth-led initiative on reducing rates of sexual assault (Edwards et al., 2020); all data collected in the city sample that is presented in this article occurred before the implementation of the initiative.

## Data Collection

Written guardian consent procedures were used for participants under 18 years of age. Intensive recruitment procedures were used that included students receiving the consent forms in school, mailing the consent forms to guardians, calling, home visits, tabling at community events, and hosting community feeds. Figure 1 presents participant enrollment and retention data. Relative to attrition, there were no significant differences among the treatment participants instead of control participants between those who completed both pre- and post-tests compared to students who did not complete the post-tests with respect to age, grade, sexual orientation, mattering, bystander opportunity, binge drinking, grades, and victimization experiences. However, attrition analyses revealed that among treatment participants, those who endorsed alcohol use at the pretest were less likely to participate in the post-test survey. For the control group, there were no significant differences among Time 1 participants and Time 2 participants relative to sexual orientation, mattering, alcohol use, binge drinking, bystander opportunity, and victimization experiences. However, attrition analyses revealed that among control participations, those with higher grades and who were older at Time 1 were less likely to take the time two survey. Ultimately, these variables that were related to attrition were included in the group of covariates considered in the propensity score analyses that aimed to equate condition groups at baseline. In combination with modern missing data techniques and the use of intent-to-treat, our analyses adequately addressed attrition (Enders, 2010).

Students completed surveys in school and received a small incentive (i.e., fruit snack, pencil, and the chance to win a gift card). Surveys were completed prior to and six months after the *IMpower* programming for the treatment sample and approximately six months apart for the control sample (all behaviorally oriented questions inquired about past six months for both samples). The girls' surveys in the treatment sample were matched over time using a self-generated ID (i.e., subject number calculation form) which led to 94% of surveys being matched and allowed for anonymity of data. The girls' surveys in the control sample were matched over time using a broker system which led to 100% of surveys being matched. A broker system is a method to
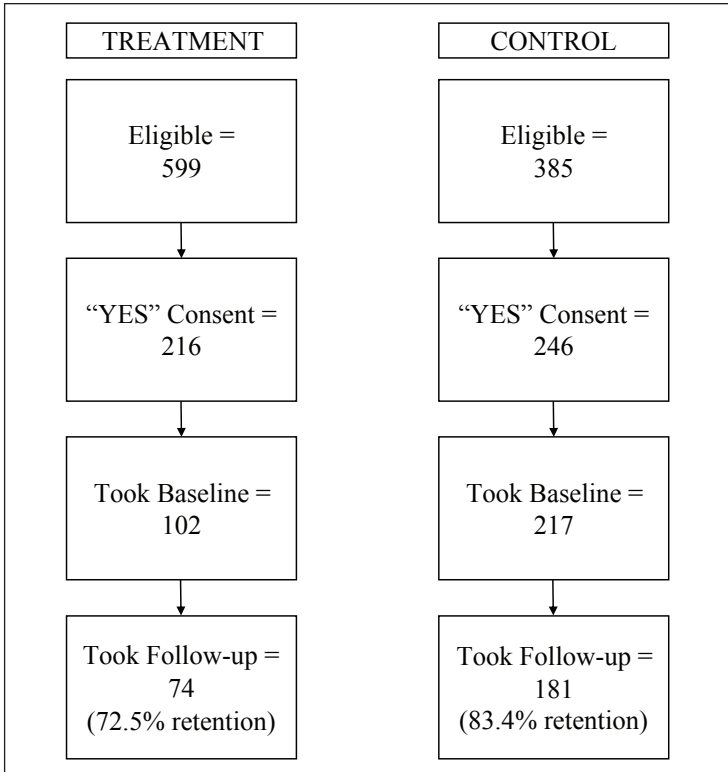
**Figure 1.** Consort flow diagram.

match surveys over time by which an individual maintains the master list who never has access to the behavioral data (and creates individual log-on cards for participants that do not display the participant ID), and the researchers never have access to the master list, thus allowing the data to remain anonymous to researchers. Although the funds were not available to implement a broker system with the control sample, matching of surveys among girls in this condition was high.

## Measures

### Condition
Girls in the treatment group were coded as one, and girls in the control group were coded as zero.

*Dependent variables.*
Four items were used to assess sexual assault. Three items were taken from Cook-Craig et al.'s (2014) measure assessing sexual coercion (i.e., "Another student had sexual activities with you although you did not really want to because either the student threatened to end your friendship or romantic relationship if you didn't or you felt pressured by the student's constant arguments or begging"), physically forced sex (i.e., "Another student forced you to do sexual things that you did not want to do [count such things as kissing, touching, or being physically forced to have sexual intercourse]?"), and incapacitated sex (i.e., "You had sexual activities when you did not want to because you were drunk or on drugs?"). One item from the Youth Risk Behavior Survey (YRBS; Centers for Disease Control and Prevention, 2014) was used to assess for sexual dating violence (i.e., "Someone you were dating or going out with forced you to do sexual things that you did not want to do [count such things as kissing, touching, or being physically forced to have sexual intercourse]?"). Participants responded "yes" or "no" to whether the behavior had happened during the past six months. Each item was scored 0 (*no experience in the past six months*) or 1 (*any experience in the past six months*). All four items were summed with higher scores indicative of more categories of sexual assault victimization experiences. These items were administered to girls in both conditions.

*Dating violence.*
One item was drawn from the YRBS (2014) to examine physical dating violence (i.e., "Someone you were dating or going out with physically hurt you on purpose [count such things as being hit, slammed into something, or injured with an object or weapon]?"). Participants responded "yes" or "no" to whether the behavior had happened during the past six months. The item was scored 0 (*no experience in the past six months*) or 1 (*any experience in the past six months*). This item was administered to girls in both the reservation and city samples.

*Sexual harassment.*
Two items from the American Association of University (AAUW, 2001) women were used to assess for sexual harassment. Items included sexual comments (i.e., "Another student made sexual comments, jokes, gestures, or looks about/to you?") and sexual rumors (i.e., "Another student spread sexual rumors about you?"). Participants responded "yes" or "no" to whether the behavior had happened during the past six months. The items were scored 0 (*no experience in the past six months*) or 1 (*any experience in the past six months*). The two items were then summed with higher scores indicative of more categories of sexual harassment victimization experiences. These items were administered to girls in both samples.

### Efficacy to resist

An item to assess girls' confidence to resist a potential attacker was modeled after previous research (Decker et al., 2018). The item read: "If I am attacked by a strong man, I feel confident that I can defend myself" with response options no (0) and yes (1). The items are displayed in Table 2. These questions were administered at pre-test and the 6-month post-test to girls only in the treatment condition.

### Sexual defense knowledge.

Four items assessed girls' self-defense knowledge that was modeled after previous research (Decker et al., 2018). The items and response options are displayed in Table 2. These questions were administered at pre-test and the 6-month post-test to girls only in the treatment condition.

### Covariates/cofounders.

Several additional surveys were included as measures of covariates/confounders for use in the propensity score analysis. These surveys were administered to girls in both the treatment and control conditions.

### Mattering.

We used a single item from the YRBS (Centers for Disease Control and Prevention, 2014; Eaton et al., 2012) to assess for mattering. Participants responded to the item (i.e., "Do you agree or disagree that at your school you feel like you matter to people?") on a four-point Likert scale ranging from 1 = *Strongly disagree* to 4 = *Strongly agree*.

### Alcohol use.

We used two items from the YRBS (Centers for Disease Control and Prevention, 2014; Eaton et al., 2012) to assess for alcohol use (i.e., "During the past 30 days, on how many days did you have at least one drink of alcohol?" and "During the past 30 days, on how many days did you have 4 [if you are a female] or 5 [if you are a male] or more drinks of alcohol in a row within a couple of hours?"). Response options were as follows: 0 = *0 days*, 1 = *1 or 2 days*, 3 = *3 to 9 days*, 10 = *10 to 19 days*, and 20 = *20 to 31 days*.

### Grades.

A question the YRBS (Centers for Disease Control and Prevention, 2014; Eaton et al., 2012) inquired about grades in school during the past six months (i.e., "During the past 6 months, how would you describe your grades in school?") with response options as follows: 1 = *Mostly A's*, 2 = *Mostly B's*, 3 = *Mostly C's*, 4 = *Mostly D's*, and 5 = *Mostly F's*.

**Table 2.** Pre- to Post-test Changes in Self-efficacy to Resist a Sexual Assault and Self-defense Knowledge.

| Item (Construct) | Accurate (Pre-test) | Accurate (Post-test) | p-value |
|---|---|---|---|
| If I am attacked by a strong man, I feel confident that I can defend myself. (SERSA) | 50%(*n*=29) | 75.5%(*n*=37) | p = .039 |
| The main aim of self-defense is to get away (versus fight the attacker, get the police, win) (SDK) | 62.5%(*n*=35) | 85.7%(*n*=48) | p = .002 |
| It is okay to use force and even injure anyone who is close to me if he is forcing me to have sex and will not listen to me (e.g., brother, boyfriend, father, cousin) (SDK) | 76.6%(*n*=36) | 91.5%(*n*=43) | p = .016 |
| If I am grabbed by an attacker what should I use to free myself?: My voice to scream or lie (true) (SDK) | 62.5%(*n*=35) | 80.4%(*n*=45) | p = .031 |
| If I am grabbed by an attacker what should I use to free myself?: The parts of my body which are still free to fight with (true) (SDK) | 76.8%(*n*=43) | 98.2%(*n*=55) | p < .001 |
| If I am grabbed by an attacker what should I use to free myself?: Whatever is in my bag that I can use as a weapon (true) (SDK) | 57.1%(*n*=32) | 62.5%(*n*=35) | p = .664 |
| If I am grabbed by an attacker what should I use to free myself?: The part of my body that is being held (false) (SDK) | 87.5%(*n*=49) | 83.9%(*n*=47) | p = .804 |
| Which are the best ways to defend yourself if you are attacked?: Lie (true) (SDK) | 17.9%(*n*=10) | 66.1%(*n*=37) | p < .001 |
| Which are the best ways to defend yourself if you are attacked?: Scream (true) (SDK) | 71.4%(*n*=40) | 80.4%(*n*=45) | p = .383 |
| Which are the best ways to defend yourself if you are attacked?: Scratch the eyes (true) (SDK) | 67.9%(*n*=38) | 82.1%(*n*=46) | p = .057 |
| Which are the best ways to defend yourself if you are attacked?: Break the knee (true) (SDK) | 39.3%(*n*=22) | 58.9%(*n*=33) | p = .043 |

*Note.* SERSA = Self-efficacy to resist a sexual assault. SDK = Self-defense knowledge.

*Bystander opportunity.*
We used the work of Banyard (2015) as a base as well as adaptations of this work for high school samples by Coker et al. (2011). The items included: (a) "Saw or heard a student grabbing or touching another student sexually (like on their butt or breasts);" (b) "Saw or heard about a student using physical force or alcohol or drugs to make/force another student to have sex;" (c) "Saw or heard about a student sending a naked photo of another student without that person's permission;" (d) "Saw or heard about a student spreading sexual rumors about another student." Students were first asked the frequency of being in each situation in the past six months. Response options ranged from 0 = *0 times*, 1 = *1–2 times*, 3 = *3–5 times*, 6 = *6–9 times*, and 10 = *10 or more times*. Items were scored to create a composite measure with higher scores indicative of more bystander opportunity.

*Demographics.*
We asked several demographic questions in order to describe our sample. We also included demographic variables as covariates/confounders in the propensity score analyses. Demographics assessed age, grade in school, and sexual orientation (i.e., recoded to reflect identification as a sexual minority [i.e., bisexual, something else, lesbian/gay], 0 = No, 1 = Yes). Only girls who identified as American Indian were included in the analyses.

## Data Analysis

To assess changes in efficacy to resist a sexual assault and self-defense knowledge, the McNemer test, which is used for non-parametric paired nominal data, was used. For analyses examining differences in rates of sexual assault, sexual harassment, and physical dating violence (dependent variables [DV]) between the condition groups, *propensity score weighting* was used given our quasi-experimental design. Propensity score analysis is a rigorous quasi-experimental approach that aims to statistically equate two or more "treatment" groups on a set of observed confounders (i.e., covariates) as a means for minimizing selection bias in the evaluation of treatment effects, thus, producing more valid causal inferences related to questions of treatment efficacy (Rosenbaum & Rubin, 1983). Propensity score analysis methods reduce several covariates into a single variable (i.e., propensity score or balancing score), which represents the probability of being assigned to the treatment group given the vector of covariates. Conditional on the propensity score, the distribution of observed covariates is theoretically balanced across treatment groups. Following recommendations by Lanza et al. (2015), the propensity score analytic approach included several steps, detailed below.

Step 1 included the creation and estimation of the models that generated the propensity score weights using SAS 9.4. In this step, we first identified the potential covariates from pre-test (prior to the intervention; i.e., age, sexual minority status, grades, alcohol use, mattering, reactive bystander, as well as, pre-test indicators of our outcomes, sexual assault, sexual harassment, and physical dating violence) using theory and prior literature. We evaluated which covariates to include in the final propensity score models using bivariate tests to evaluate the magnitude of condition group differences on the covariates. Using *t*-tests (for continuous covariates) and chi-square analyses (for categorical covariates) using condition (0 = *Comparison*, 1 = *Treatment*) as the DV, covariates that resulted in absolute standardized mean differences >.20 (as an indication of selection bias; Stuart, 2010) were included in the model estimating the propensity score. This produced a final set of covariates that were included in the propensity score model (i.e., binge drinking, grades, bystander opportunity, sexual harassment). Second, we estimated the propensity score model parameterized as a logistic regression model. This model estimated the probability of receiving *IMpower* as predicted from our final set of covariates, resulting in an estimate of the propensity score for each participant (comparison and treatment group). Third, we checked whether the weighting was successful in improving covariate balance between conditions using each covariate's absolute standardized mean differences (i.e., difference in means between conditions divided by the standard deviation) resulting from a model that included the propensity score weight. We used the .20 cut-point to determine if the differences were either balanced or still undesirable (Stuart, 2010).

In Step 2, we used the propensity scores as weights (inverse probability of treatment weighting; IPTW; Hirano & Imbens, 2001) to adjust for confounding in the causal analysis estimating the average treatment effect (ATE; i.e., the average effect that would be seen if individuals in both conditions received the intervention compared with those individuals not receiving the intervention; Harder et al., 2010). In estimating our ATE, we used the rigorous intent-to-treat approach to the analysis, in combination with recommended estimation procedures to address missing data; all individuals who completed Time 1 data collection were retained in the analysis (Enders, 2010). We compared sexual assault outcomes (post-test) for young women who received *IMpower* versus those in the comparison group, controlling for pre-test values. The outcome analysis estimated in SAS 9.4 included the condition indicator as the independent variable and the IPTW as an ATE weight (for details refer to Lanza et al., 2013). We estimated a Poisson regression for the count outcome variables of sexual assault and sexual harassment, and a

logistic regression for the physical dating violence outcome variable. The Poisson regression coefficient of the exposure variable from this model, exponentiated, is the difference between conditions in the incidence rate ratio (IRR) for the sexual assault and sexual harassment outcomes, conditional on the covariates. The logistic regression coefficient of the exposure variable from this model, exponentiated, is the odds ratio (OR) of the outcome associated with difference in conditions in physical dating violence exposure, conditional on the covariates.

## Results

As demonstrated in Table 2, girls who received the *IMpower* program increased significantly over time in their efficacy to resist a sexual assault. Girls who received the *IMpower* program also increased significantly over time in all domains of self-defense knowledge ($H_1$).

Table 3 depicts raw descriptive statistics for outcome variables by condition prior to the propensity score analysis. Table 4 depicts the covariates that were retained in the propensity score model (i.e., binge drinking, grades, bystander opportunity, sexual harassment; met criteria absolute standardized mean difference >.20) and how the IPTW weighting improved covariate balance between conditions. After weighting, balance was improved on all covariates, as shown in the smaller absolute standardized mean differences (<.20).

Using the propensity score matching results in the context of Poisson regression, we tested whether girls who received *IMpower*, compared to girls

**Table 3.** Raw Descriptive Statistics for Outcome Variables (Prior to Propensity Score Weighting).

|  | Comparison Group | | | IMpower Group | | |
|---|---|---|---|---|---|---|
|  | *M* | *SD* | Rate Freq. | *M* | *SD* | Rate Freq. |
| *Pretest* | | | | | | |
| Sexual assault | 0.34 | 0.98 | 13.97 | 0.26 | 0.97 | 10.14 |
| Sexual harassment | 0.51 | 0.75 | 35.39 | 0.47 | 0.85 | 25.38 |
| Dating violence | 0.07 | 0.25 | 6.82 | 0.06 | 0.28 | 4.48 |
| *Posttest* | | | | | | |
| Sexual assault | 0.19 | 0.63 | 10.23 | 0.15 | 0.63 | 18.06 |
| Sexual harassment | 0.44 | 0.69 | 32.38 | 0.41 | 0.79 | 29.17 |
| Dating violence | 0.04 | 0.20 | 4.05 | 0.03 | 0.19 | 4.23 |

**Table 4.** Covariate Balance Before and After Propensity Score Weighting.

| Covariates (Pretest) | Before Weighting | | | After Weighting | | |
|---|---|---|---|---|---|---|
| | RD | ASD | t (df) | RD | ASD | t (df) |
| Binge drinking | .19 | .23 | 2.37* (228.78) | .10 | .11 | 1.19 (210.78) |
| Grades | .26 | .23 | 1.63 (245) | .10 | .07 | .59 (95.17) |
| Bystander opportunity | .58 | .25 | 1.98* (162.56) | .08 | .03 | .23 (103.32) |
| Sexual harassment | .12 | .27 | 1.87† (240) | .02 | .03 | .27 (97) |

*Notes.* RD = Raw group mean difference. ASD = Absolute standardized mean difference.
†$p < .10$. *$p < .05$.

who did not, reported lower rates of sexual assault victimization (primary outcome; $H_2$; refer to Table 5). After IPTW weighting, the model for sexual assault suggested that for girls in the *IMpower* group the incident rate in sexual assault was .20 (95% CI = [.13, .31]) times the incident rate in the comparison group. This suggests that for girls in the *IMpower* group, compared to those in the comparison group, the incidence of sexual assault decreased by 80%.

We tested whether girls who received *IMpower*, compared to girls who did not, reported lower rates of sexual harassment and physical dating violence victimization (secondary outcomes; $H_3$; refer to Table 5). After IPTW weighting, the model for sexual harassment suggested that for girls in the *IMpower* group the incident rate in sexual harassment was .74 (95% CI = [.55, .98]) times the incident rate for the comparison group. This suggests that for girls in the *IMpower* group, compared to the comparison group, the incidence of sexual harassment decreased by 26%. The physical dating violence outcome model estimated that for girls who received *IMpower*, compared to the comparison group, the estimated effect was modest and not statistically significant.

## Discussion

The purpose of the current study was to examine how the *IMpower* program impacted intermediary ($H_1$), primary ($H_2$), and secondary ($H_3$) outcomes in a sample of American Indian middle and high school girls. Consistent with previous evaluations of the *IMpower* program, there is evidence to support the effectiveness of the *IMpower* program in improving efficacy to resist a sexual assault and self-defense knowledge among participants (Baiocchi et al., 2017; Decker et al., 2018; Sarnquist et al., 2014). This finding extends previous research to a sample of American Indian girls demonstrating that knowledge and skills increase following participation in a empowerment self-defense program. Given the program's focus on teaching girls about

**Table 5.** Results of Post-intervention Outcome Models After Propensity Score Weighting.

| | Coefficient | SE | 95% CI | Wald Chi-square | p | IRR/ OR[95% CI] |
|---|---|---|---|---|---|---|
| *Sexual Assault* | | | | | | |
| Condition | −1.62 | .23 | −2.08, −1.16 | 48.14 | <.001 | .20 [.13, .31] |
| Pretest levels | .87 | .07 | .74, 1.01 | 155.50 | <.001 | 2.40 [2.09, 2.75] |
| *Sexual Harassment* | | | | | | |
| Condition | −.31 | .15 | −.59, −.02 | 4.42 | .036 | .74 [.55, .98] |
| Pretest levels | .87 | .08 | .71, 1.04 | 107.40 | <.001 | 2.39 [2.03, 2.82] |
| *Dating Violence* | | | | | | |
| Condition | −.95 | .68 | −2.29, .40 | 1.92 | .166 | .39 [.10, 1.48] |
| Pretest levels | −3.87 | .72 | −5.27, −2.46 | 29.09 | <.001 | .02 [.01, .09] |

*Notes.* CI = Confidence interval.
Condition coded: 0 = Comparison, 1 = Treatment.
Incidence rate ratios (IRR) provided for sexual assault and harassment from Poisson regression models.
Odds ratio (OR) provided for dating violence from logistic regression model.

effective resistance strategies, it makes sense that we observed increases in this domain. Moreover, one of the unique aspects of the *IMpower* program is that it not only teaches girls skills to use in a potential sexual assault situation, but there is an emphasis on empowering girls to believe that they are worth defending, which may help to explain the self-efficacy finding. Indeed, as documented in another paper from this same project that reports on exit interviews with youth following the program, a theme that emerged is that girls reported that the program made them realize that "I am worth defending" (Siller et al., under review). The importance of girls finding their voice and realizing they are worth fighting for relates to the Tribe's values of bravery and perseverance. This finding is especially important for American Indian girls who experience high rates of sexual assault, poverty, and parental

absence, all of which are rooted in historical trauma and ongoing oppression of and discrimination against American Indian populations.

Perhaps the most promising finding is that compared to girls in the control group, American Indian girls who received the *IMpower* program reported lower rates of sexual assault, and effect sizes were large (i.e., 80% decrease in rates of sexual assault for girls in the treatment condition). This finding extends previous research with girls in East Africa (Baiocchi et al., 2017; Decker et al., 2018; Sarnquist et al., 2014) and young women in college in the United States (Gidycz et al., 2001; Gidycz et al., 2006; Orchowski et al., 2018; Senn et al., 2015), demonstrating that empowerment self-defense training is effective in reducing sexual assault among American Indian girls.

Furthermore, findings suggest that exposure to the *IMpower* program reduced sexual harassment. To date, we are not aware of any research examining the impact of empowerment self-defense training on reducing sexual harassment. It is possible that girls who received the *IMpower* training were perceived by boys as more assertive, which resulted in a lower likelihood of experiencing sexual harassment. Alternatively, the presence of the *IMpower* program in schools could have helped to shift social norms to be intolerant of sexual harassment and sexual assault, thus reducing the likelihood that boys would perpetrate sexual harassment. More research is needed to better unpack and understand these promising findings.

Whereas the *IMpower* program reduced sexual assault and sexual harassment, we found that the program did not have an effect on reducing physical dating violence. This finding may be an artifact of the single-item indicator we used to assess physical dating violence. It is also possible that an initial act of physical assault may not be thwarted, but that girls could put skills into action to stop the violence from escalating. For example, a boy may slap his girlfriend and then she may use resistance strategies (e.g., run away) to thwart additional violence. Given our limited measurement of physical dating violence, this nuanced response would not have been possible to detect. Alternatively, it is possible that the skills learned in *IMpower* may not translate to situations of physical dating violence. Although there is no empirical literature on this topic, the American Indian co-authors of this article believe that to effectively address physical dating violence, programs may need to include trauma-informed intervention components to help girls cope with high rates of exposure to domestic violence within the household that often co-occurs with substance abuse.

## Limitations and Future Research

The current study's limitations indicate opportunity for future research. First, we had a relatively small sample size limiting the generalizability of our findings, suggesting that future research should use larger sample sizes of American Indian girls when examining the effects of empowerment self-defense training. Second, we were unable to randomly assign schools/girls to a treatment or control condition, and our control and treatment groups were not perfectly matched given differences in age and geographic location, which may have impacted findings although rigorous propensity score analyses were used. Along these lines, we compared American Indian girls who resided on a reservation to American Indian girls in a nearby city. It is important to note that American Indian youth in this region of the country are transient, spending time in both the city and on the nearby reservation. Although this could have presented potential contamination issues, we would expect that if contamination were an issue, we would have found less robust intervention effects. Nevertheless, future research would benefit from using cluster randomized control trials in which Indian reservations are randomly assigned to treatment or wait-list control conditions, as long as this is acceptable to tribal communities. Third, due to time constraints, we were limited in what constructs we could measure, and measures of some other potential intermediary variables (e.g., collective empowerment) were not included. Thus, the impact that the program had on other outcomes is unknown. Also, although all girls regardless of condition received victimization questions, other questions like efficacy to resist a sexual assault were only administered to girls in the treatment condition given the dataset associated with the control community was pre-existing prior to the launch of the project and thus causal relationships about the impact of the programming on these variables cannot be determined given our design limitations. Along these lines, several of our measures, although used in previous research, do not have documented psychometric properties. Similarly, the fact that we used single-item indicators for some of our variables is also a limitation and future research should use more comprehensive measures. Fourth, there were less than ideal enrollment and retention rates, which is not uncommon for highly impoverished communities seeking to do public health research. Thus, the extent to which the program worked for youth not enrolled in the research procedures is unknown. Fifth, although the analyses that we conducted controlled for differences in the treatment and control conditions on numerous variables, it is noteworthy that 33.3% of girls in the treatment condition identified as a sexual minority (compared to 19.9% of girls in the control condition).

## Conclusions

The current study represents the first-ever evaluation of a sexual assault prevention program in a sample of American Indian girls. These findings show strong support for the implementation of the *IMpower* program with this population and should be considered when sexual assault and sexual harassment prevention efforts are being developed that specifically target American Indian girls. Although other evidence-based components such as bystander intervention training (Orchowski et al., 2018) are also needed as part of comprehensive prevention practices, these data provide preliminary evidence of one effective method to reduce the public health burden of sexual assault and harassment among American Indian girls.

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### References

AAUW. (2001). *Hostile hallways: Bullying, teasing, and sexual harassment in school.* https://www.aauw.org/files/2013/02/hostile-hallways-bullying-teasing-and-sexual-harassment-in-school.pdf

Baiocchi, M., Omondi, B., Langat, N., Boothroyd, D. B., Sinclair, J., Pavia, L., Mulinge, M., Githua, O., Golden, N. H., & Sarnquist, C. (2017). A behavior-based intervention that prevents sexual assault: The results of a matched-pairs, cluster-randomized study in Nairobi, Kenya. *Prevention Science*, *18*(7), 818–827. https://doi.org/10.1007/s11121-016-0701-0

Banyard, V. L. (2015). *Toward the next generation of bystander prevention of sexual and relationship violence: Action coils to engage communities* (1st ed.). Springer International Publishing. https://doi.org/10.1007/978-3-319-23170-9

Basile, K. C., DeGue, S., Jones, K., Freire, K., Dills, J., Smith, S. G., & Raiford, J. L. (2016). *STOP SV: A technical package to prevent sexual violence*. Centers for Disease Control and Prevention. https://www.cdc.gov/violenceprevention/pdf/SV-Prevention-Technical-Package.pdf

Centers for Disease Control and Prevention. (2014). *Youth risk behavior surveillance: United States, 2013* (Surveillance Summaries, Issue). https://www.cdc.gov/mmwr/preview/mmwrhtml/ss6304a1.htm

Coker, A. L., Bush, H. M., Brancato, C. J., Clear, E. R., & Recktenwald, E. A. (2019). Bystander program effectiveness to reduce violence acceptance: RCT in high schools. *Journal of Family Violence*, *34*(3), 153–164.

Coker, A. L., Bush, H. M., Cook-Craig, P. G., DeGue, S. A., Clear, E. R., Brancato, C. J., Fisher, B. S., & Recktenwald, E. A. (2017). RCT testing bystander effectiveness to reduce violence. *American Journal of Preventive Medicine*, *52*(5), 566–578. https://doi.org/10.1016/j.amepre.2017.01.020

Coker, A. L., Cook-Craig, P. G., Williams, C. M., Fisher, B. S., Clear, E. R., Garcia, L. S., & Hegge, L. M. (2011). Evaluation of Green Dot: An active bystander intervention to reduce sexual violence on college campuses. *Violence Against Women*, *17*(6), 777–796. https://doi.org/10.1177/1077801211410264

Cook-Craig, P. G., Coker, A. L., Clear, E. R., Garcia, L. S., Bush, H. M., Brancato, C. J., Williams, C. M., & Fisher, B. S. (2014). Challenge and opportunity in evaluating a diffusion-based active bystanding prevention program green dot in high schools. *Violence Against Women*, *20*(10), 1179–1202. https://doi.org/10.1177/1077801214551288

Decker, M. R., Wood, S. N., Ndinda, E., Yenokyan, G., Sinclair, J., Maksud, N., Ross, B., Omondi, B., & Ndirangu, M. (2018). Sexual violence among adolescent girls and young women in Malawi: A cluster-randomized controlled implementation trial of empowerment self-defense training. *BMC Public Health*, *18*(1), 1–12. https://doi.org/10.1186/s12889-018-6220-0

DeGue, S., Valle, L. A., Holt, M. K., Massetti, G. M., Matjasko, J. L., & Tharp, A. T. (2014). A systematic review of primary prevention strategies for sexual violence perpetration. *Aggression and Violent Behavior*, *19*(4), 346–362. https://doi.org/10.1016/j.avb.2014.05.004

Eaton, D. K., Kann, L., Kinchen, S., Shanklin, S. L., Flint, K. H., Hawkins, J., Harris, W. A., Lowry, R., McManus, T., Chyen, D., Whittle, L., Lim, C., & Wechsler, H. (2012). *Youth Risk Behavior Surveillance-United States, 2011* (Morbidity and Mortality Weekly Report. Surveillance Summaries, Issue). http://www.cdc.gov/mmwr/preview/mmwrhtml/ss6104a1.htm

Edwards, K. M., Banyard, V. L., Charge, L. L., Kollar, L. M. M., & Fortson, B. (2020). Experiences and correlates of violence Among American Indian and Alaska Native youth: a brief report. *Journal of interpersonal violence*. Advance online publication. DOI: 10.1177/0886260520983273.

Edwards, K. M., Banyard, V. L., Sessarego, S. N., Waterman, E. A., Mitchell, K. J., & Chang, H. (2019). Evaluation of a bystander-focused interpersonal violence prevention program with high school students. *Prevention Science*, *20*, 488–498.

Enders, C. K. (2010). *Applied missing data analysis*. The Guilford Press.

Foshee, V. A., Bauman, K. E., Arriaga, X. B., Helms, R. W., Koch, G. G., & Linder, G. F. (1998). An evaluation of Safe Dates, an adolescent dating violence prevention program. *American Journal of Public Health*, *88*(1), 45–50.

Foshee, V. A., Bauman, K. E., Ennett, S. T., Linder, G. F., Benefield, T. S., & Suchindran, C. (2004). Assessing the long-term effects of the Safe Dates program and a booster in preventing and reducing adolescent dating violence victimization and perpetration. *American Journal of Public Health*, *94*(4), 619–624. https://doi.org/10.2105/AJPH.94.4.619

Foshee, V. A., Bauman, K. E., Greene, W. F., Koch, G. G., Linder, G. F., & MacDougall, J. E. (2000). The Safe Dates program: 1-year follow-up results. *American Journal of Public Health*, *90*(10), 1619–1622.

Gidycz, C. A., Lynn, S. J., Rich, C. L., Marioni, N. L., Loh, C., Blackwell, L. M., Stafford, J., Fite, R., & Pashdag, J. (2001). The evaluation of a sexual assault risk reduction program: A multisite investigation. *Journal of Consulting and Clinical Psychology*, *69*(6), 1073–1078. https://doi.org/10.1037/0022-006X.69.6.1073

Gidycz, C. A., McNamara, J. R., & Edwards, K. M. (2006). Women's risk perception and sexual victimization: A review of the literature. *Aggression and Violent Behavior*, *11*(5), 441–456.

Gidycz, C. A., Orchowski, L. M., & Berkowitz, A. (2011). An evaluation of a social norms and bystander intervention to prevent sexual aggression among college men. *Violence Against Women*, *17*, 720–742.

Gidycz, C. A., Orchowski, L. M., Probst, D. R., Edwards, K. M., Murphy, M., & Tansill, E. (2015). Concurrent administration of sexual assault prevention and risk reduction programming: Outcomes for women. *Violence Against Women*, *21*(6), 780–800. https://doi.org/10.1177/1077801215576579

Gidycz, C. A., Rich, C. L., Orchowski, L. M., King, C. R., & Miller, A. K. (2006). The evaluation of a sexual assault self defense and risk reduction program for college women: A prospective study. *Psychology of Women Quarterly*, *30*(2), 173–186. https://journals.sagepub.com/doi/10.1111/j.1471-6402.2006.00280.x

Gidycz, C. A., Wynsberghe, A. van., & Edwards, K. M. (2008). Prediction of women's utilization of resistance strategies in a sexual assault situation: A prospective study. *Journal of Interpersonal Violence*, *23*(5), 571–588. https://doi.org/10.1177/0886260507313531

Hamby, S. L., & Grych, J. (2013). *The web of violence: Exploring connections among different forms of interpersonal violence and abuse*. Springer Science+Business Media.

Harder, V. S., Stuart, E. A., & Anthony, J. C. (2010). Propensity score techniques and the assessment of measured covariate balance to test causal associations in psychological research. *Psychological Methods*, *15*(3), 234.

Hirano, K., & Imbens, G. W. (2001). Estimation of causal effects using propensity score weighting: An application to data on right heart catheterization. *Health Services and Outcomes Research Methodology*, *2*(3–4), 259–278.

Lanza, S. T., Moore, J. E., & Butera, N. M. (2013). Drawing causal inferences using propensity scores: A practical guide for community psychologists. American *journal of community psychology, 52*(3-4), 380–392.

Lanza, S. T., Dziak, J. J., Huang, L., Wagner, A., & Collins, L. M. (2015). *PROC LCA & PROC LTA users' guide (Version 1.3.2)*. http://methodology.psu.edu

Miller, E., Tancredi, D. J., McCauley, H. L., Decker, M. R., Virata, M. C. D., Anderson, H. A., Stetkevich, N., Brown, E. W., Moideen, F., & Silverman, J. G. (2012). "Coaching Boys into Men:" A cluster-randomized controlled trial of a dating violence prevention program. *Journal of Adolescent Health*, *51*(5), 431–438. https://doi.org/10.1016/j.jadohealth.2012.01.018

Mouilso, E. R., Calhoun, K. S., & Gidycz, C. A. (2011). Effects of participation in a sexual assault risk reduction program on psychological distress following revictimization. *Journal of Interpersonal Violence*, *26*(4), 769–788. https://doi.org/10.1177/0886260510365862

Niolon, P. H., Vivolo-Kantor, A. M., Tracy, A. J., Latzman, N. E., Little, T. D., DeGue, S., Lang, K. M., Estefan, L. F., Ghazarian, S. R., & McIntosh, W. L. K. (2019). An RCT of dating matters: Effects on teen dating violence and relationship behaviors. *American Journal of Preventive Medicine*, *57*(1), 13–23.

Orchowski, L. M., Edwards, K. M., Hollander, J. A., Banyard, V. L., Senn, C. Y., & Gidycz, C. A. (2018). Integrating sexual assault resistance, bystander, and men's social norms strategies to prevent sexual violence on college campuses: A call to action. *Trauma, Violence, & Abuse*, *21*(4), 811–827. https://doi.org/10.1177/1524838018789153

Robin, R. W., Chester, B., & Rasumssen, J. (1998). Intimate violence in a Southwestern American Indian tribal community. *Cultural Diversity and Mental Health*, *4*(4), 335–344. https://doi.org/10.1037/1099-9809.4.4.335

Rosay, A. B. (2016). *Violence against American Indian and Alaska Native women and men: 2010 findings from the National intimate partner and sexual violence survey*. https://www.ojp.gov/pdffiles1/nij/249736.pdf

Rosenbaum, P. R., & Rubin, D. B. (1983). The central role of the propensity score in observational studies for causal effects. *Biometrika*, *70*(1), 41–55.

Rutman, S., Park, A., Castor, M., Taualii, M., & Forquera, R. (2008). Urban American Indian and Alaska Native youth: Youth Risk Behavior Survey 1997–2003. *Maternal and Child Health Journal*, *12*(1), 76. https://doi.org/10.1007/s10995-008-0351-3

Sarnquist, C., Omondi, B., Sinclair, J., Gitau, C., Paiva, L., Mulinge, M., Cornfield, D. N., & Maldonado, Y. (2014). Rape prevention through empowerment of adolescent girls. *Pediatrics*, *133*(5), e1226–e1232. https://doi.org/10.1542/peds.2013-3414

Senn, C. Y., Eliasziw, M., Barata, P. C., Thurston, W. E., Newby-Clark, I. R., Radtke, H. L., & Hobden, K. L. (2015). Efficacy of a sexual assault resistance program for university women. *New England Journal of Medicine*, *372*(24), 2326–2335. https://doi.org/10.1056/NEJMsa1411131

Senn, C. Y., Saunders, K., & Gee, S. (2008). Walking the tightrope: Providing sexual assault resistance education for University women without victim blame. In S. Arcand & D. Damant (Eds.), *Violences faites aux femmes in the collection: Problemes sociaux et interventions sociales* (pp. 353–372). University of Quebec Press.

Sessarego, S. N., Siller, L., & Edwards, K. M. (2019). Patterns of violence victimization and perpetration among adolescents using latent class analysis. *Journal of Interpersonal Violence*. https://doi.org/10.1177/0886260519862272

Siller, L., Edwards, K. M., Leader Charge, L., Bordeaux, S., Leader Charge, D., & Herrington, R. (under review). "I learned that I am worth defending": A qualitative evaluation of the IMpower Program on an Indian reservation.

Stuart, E. A. (2010). Matching methods for causal inference: A review and a look forward. *Statistical Science: A Review Journal of the Institute of Mathematical Statistics*, *25*(1), 1.

Turchik, J. A., Probst, D. R., Chau, M., Nigoff, A., & Gidycz, C. A. (2007). Factors predicting the type of tactics used to resist sexual assault: A prospective study of college women. *Journal of Consulting and Clinical Psychology*, *75*(4), 605–614. https://doi.org/10.1037/0022-006X.75.4.605

Warne, D., Dulacki, K., Spurlock, M., Meath, T., Davis, M. M., Wright, B., & McConnell, K. J. (2017). Adverse childhood experiences (ace) among American Indians in South Dakota and associations with mental health conditions, alcohol use, and smoking. *Journal of Health Care for the Poor and Underserved*, *28*(4), 1559–1577. https://doi.org/10.1353/hpu.2017.0133

Wilkins, N., Tsao, B., Hertz, M., Davis, R., & Klevens, J. (2014). *Connecting the dots: An overview of the links among multiple forms of violence*. C. f. D. C. a. P. National Center for Injury Prevention and Control. https://www.cdc.gov/violenceprevention/pdf/connecting_the_dots-a.pdf

YRBS. (2014). https://www.cdc.gov/healthyyouth/data/yrbs/index.htm

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