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A Self-Defense Program Reduces the Incidence of Sexual Assault in Kenyan Adolescent Girls

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A B S T R A C T

Purpose: To determine the effect of a standardized 6-week self-defense program on the incidence of sexual assault in adolescent high school girls in an urban slum in Nairobi, Kenya.
Methods: Population-based survey of 522 high school girls in the Korogocho-Kariobangi locations in Nairobi, Kenya, at baseline and 10 months later. Subjects were assigned by school attended to either a "No Means No Worldwide" self-defense course (eight schools; N = 402) or to a life-skills class (two schools; N = 120). Both the intervention and the life-skills classes were taught in the schools by trained instructors. Participants were administered the same survey at baseline and follow-up.
Results: A total of 522 girls (mean age, 16.7 ± 1.5 years; range, 14–21 years) completed surveys at baseline, and 489 at 10-month follow-up. At baseline, 24.5% reported sexual assault in the prior year, with the majority (90%) reporting assault by someone known to them (boyfriend, 52%; relative, 17%; neighbor, 15%; teacher or pastor, 6%). In the self-defense intervention group, the incidence of sexual assault decreased from 24.6% at baseline to 9.2% at follow-up ($p < .001$), in contrast to the control group, in which the incidence remained unchanged (24.2% at baseline and 23.1% at follow-up; $p = .10$). Over half the girls in the intervention group reported having used the self-defense skills to avert sexual assault in the year after the training. Rates of disclosure increased in the intervention group, but not in controls.
Conclusions: A standardized 6-week self-defense program is effective in reducing the incidence of sexual assault in slum-dwelling high school girls in Nairobi, Kenya.

IMPLICATIONS AND CONTRIBUTION

This study demonstrates that the No Means No Worldwide self-defense program is effective in reducing the incidence of sexual assault in a sample of high school girls living in an urban slum in Nairobi, Kenya.

Gender-based violence is a serious problem transcending racial, economic, social, and regional lines, threatening the growth, development, and health of adolescent girls worldwide. There is a growing awareness of the magnitude of gender-based violence globally, the negative consequences associated with it, and need to develop effective interventions [1–3]. The United States Agency for International Development's review of school-related gender-based violence in developing countries noted that "In the developing world, where economic imbalances are extreme, literacy rates low, basic universal education a goal rather than a reality, and the HIV [human immunodeficiency virus] pandemic often devastating, the question of gender

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violence and its impact on education and health is particularly critical" [4]. This report notes that little has been done to systematically review and document gender-based violence and its consequences in schoolgirls, or to assess potential interventions to reduce this violence.

Although both males and females are at risk for sexual assault, females consistently experience higher rates of assault in all regions of the world [3]. Surveys reveal much higher prevalence rates than official reports, because only a small portion of sexual assaults are reported to the police or other authorities [3,5,6]. In the United States, 18.3% of women have experienced either completed or attempted rape, and 44.6% experienced other forms of sexual violence [7]. Adolescents are at particular risk; over 42% of victims of completed rapes were assaulted before age 18 years, and 79.6% before age 25 years [7]. Gender-based violence and sexual assault rates are especially high in sub-Saharan Africa [3]. In a national survey of nearly 10,000 secondary schoolgirls in Kenya, approximately 40% of sexually active girls reported that their first encounter was either forced or they were "cheated into having sex" [8,9].

Sexual violence often has lasting and adverse consequences for the victim. In addition to immediate emotional and physical trauma associated with the assault, elevated rates of physical and psychological health problems have been noted in survivors [6,7,10–16]. Although sexually transmitted infections are always of concern, risk of exposure and acquisition during sexual assault is further elevated in areas of the world with high HIV prevalence, such as Kenya and other regions of sub-Saharan Africa [17]. Rape not only exposes adolescent girls and women to sexually transmitted diseases, including HIV/acquired immunodeficiency syndrome (AIDS), but also bears the possibility of impregnation by their assailant, with the fetus also at risk for HIV.

Most interventions developed to reduce risk of gender-based violence, including sexual assault, have focused on changes in knowledge and attitudes, and have not included evaluation of behavioral outcomes [4,18,19]. In contrast, studies suggest that self-defense training can decrease risk of sexual assault. Brecklin and Ullman [20] studied self-defense and assertiveness training and women's physical and psychological response to subsequent rape attacks in a national sample of 3,187 female college students in 32 colleges in the United States. They found that individuals with some form of pre-assault training were more likely than women without training to report that their resistance stopped an attempted rape, or made the attack less aggressive [20]. In addition, studies have demonstrated that women who received self-defense training show improvement in multiple emotional and psychological domains, including decreased levels of depression, anxiety, hostility, and fear, and greater assertiveness, self-esteem, perceived control, and global and physical self-efficacy [20,21]. Despite these potential positive effects, self-defense training remains an underused intervention. No studies have been conducted to assess efficacy in an adolescent population, and studies among adults are also limited. In particular, no study has been performed in areas with high assault rates and limited financial resources.

The aim of our study was to determine the effect of a standardized 6-week self-defense program on the incidence of sexual assault in adolescent high school girls in an urban slum in Nairobi, Kenya. We hypothesized that the self-defense intervention would significantly reduce the incidence of sexual assault in the year after the training, compared with a control group that only received life-skills training without a self-defense component.

Methods

Study population

We invited adolescent girls between ages 14 and 21 years, who attended all 10 high schools in the Korogocho and Kariobangi North locations of Kasaroni district, Nairobi, Kenya, in 2011, to participate in this study. Korogocho is 11 kilometers northeast of Nairobi's city center; in 2009, it was estimated to be the fourth largest slum in Nairobi. The name *Korogocho* is derived from the term for *chaos*. Pressed into 1.5 square kilometers, it is home to over 50,000 people from more than 30 ethnic groups. Kariobangi North is an adjacent slum with similar population demographics, and is physically separated from Karogocho by a small industrial area. In both slums, the unemployment rate among parents of schoolchildren is 46.7%, and 68.9% of parents have a mean income $<$ Ksh 1,500/month, equivalent to $19 USD [22].

Study design

Participation in the study was voluntary and we obtained written informed consent/assent from all participants. Permission to conduct the study was granted by the Kenya National Council for Science and Technology, the public body mandated with reviewing study protocols and granting study permission in Kenya. The proposal was reviewed by the Stanford University Human Subjects Research Committee and was determined to be exempt from institutional review board review because the study did not obtain individually identifiable, private information.

This was a non-randomized, census-based, longitudinal cohort study. Randomization was deliberately not used within individual schools or among schools within the same community, to prevent cross-contamination across study groups. Adolescent girls attending all eight high schools in Korogocho were assigned to participate in the intervention group. Girls at both high schools in Kariobangi North comprised the control group. The study therefore captured the total population of adolescent girls attending high school within these two district locations at the time of the study. We purposefully selected the schools in the Korogocho and Kariobangi high schools because they are similar with respect to socioeconomic demographics, average performance of students on national examinations, and teacher-to-student ratios. The control group received a 1-hour life-skills class, the current national standard in Kenya.

The intervention consisted of six 2-hour sessions of the No Means No Worldwide program, held weekly for 6 weeks, followed by 2-hour refresher courses at 3-, 6-, 9-, and 10-month intervals. The intervention was taught by women, ages 20–32 years, selected from the same neighborhood and trained over a 3-month period in the verbal and physical skills described in the No Means No Worldwide curriculum. Applicants were required to pass a rigorous examination consisting of a written test, oral examination, and physical skills demonstration before becoming paid employees teaching the No Means No Worldwide curriculum at intervention sites.

Each session had a trainer to student ratio of approximately 1:15. Intervention sessions took place between January 2011 and February 2011. We included in the analysis participants who completed the baseline survey, and at the follow-up survey answered "Yes" to the question "Have you taken the No Means

No Worldwide self-defense classes (or the No Means No Life-Skills classes) before today?" Those who indicated that they had attended neither class (n = 33) were excluded.

Intervention

The self-defense curriculum is a manual-based curriculum developed over a 3-year period to address the special needs of women and children living in areas where the incidence of rape is high (http://nomeansnoworldwide.org/classes-curriculum). The program is based on women's empowerment and self-defense programs from the United States, Europe, and Israel. The goals of the program are to reduce the incidence of sexual assault by increasing women's use of assertiveness/boundary setting, to enhance ability to detect and respond to risky scenarios, to increase the use of verbal and physical self-protective strategies, to enhance self-efficacy in responding to threatening sexual violence situations, and to reduce feelings of self-blame for those who have previously been assaulted. In addition, the program provides information about recovery and assistance for assaulted women. Table 1 shows key elements of the program.

The control groups received a life-skills class, which is accredited by Kenya's Ministry of Education and is the current national standard for adolescent education regarding sexuality and gender-based violence. The 1-hour class consists of didactic material on adolescent growth and development, sexuality, unprotected sexual activity, rape, sexual harassment, teenage pregnancy, and rights of minors. The classes are taught by teachers, and although rape and sexual harassment are in the curriculum, information is provided in an informational manner, and no specific strategies are taught to prevent sexual assault.

Survey

We administered an anonymous, cross-sectional, descriptive written survey at baseline and 10 months later at the end of the academic year, before the 2-month holiday between school academic years. The same questionnaires were used at baseline and follow-up, at both the control and intervention schools. The only exception was that the control schools did not receive questions regarding specific self-defense skills, because they had not been taught these skills. Questionnaires used closed-ended structured questions, with limited but specific questions addressing sexual assault. Questions were constructed to elicit simple "Yes"/"No"/"Do not know" responses, thereby minimizing nonparticipation and response errors. At baseline, participants were asked, "Has anyone forced you to have sex with them in the past year (penetrated your vagina, mouth, or anus with their penis or any other object)" At follow-up, they were asked, "Since you took the self-defense classes (or life-skills class, for the control group), has anyone forced you to have sex with them (penetrated your vagina, mouth, or anus with their penis or any other object)?" If respondents answered "Yes," they were asked the number of times the episode occurred and whether the perpetrator was a neighbor, relative, teacher, pastor, boyfriend, doctor, stranger, or "gangster." They were then asked whether they had told someone else about the event, and if so, whom.

The survey was conducted by six trained research assistants and one supervisor, who were experienced in demographic health survey interviews and were residents of the same neighborhood. All research assistants received 4 days of intensive training by the study investigators. The training emphasized the use of data collection tools, including administration of the questionnaires using the ballot box method (BBM). The BBM has been shown to be effective in eliciting higher response rates in reporting on gender-based violence in Zimbabwe [23]. In this method, the research assistant reads aloud, both in English and Kiswahili, each question one at a time, and the participants, who are spaced at least 6 feet apart around the room, circle the symbol corresponding to their answer on their questionnaire. The participant then folds the questionnaire and drops it into a locked portable wooden or metal box with a slot on the top, similar to a ballot box. The research assistant then shakes the ballot box in front of the participants, to demonstrate that the responses are mixed with those of prior respondents, to ensure anonymity. Research assistants were trained how to ask sensitive questions on sexual behavior and how to ensure confidentiality

Table 1
Key elements of the No Means No Worldwide self-defense program

Session I. Introduction
Participants are informed about the objectives of the program. The definition and goals of self-defense are discussed, as is the use of voice in ending conflict. A large illustrated banner of the Assault Continuum is used to show students various threat levels, from low to high risk. Students learn the five primary tools of defense: spirit, mind, eyes, voice, and body.
Session II. Use of voice
Facilitators discuss the use of awareness in assessing risk and prevention of assault. Instructors teach verbal strategies including: saying no effectively, setting boundaries, assuming a strong stance while yelling "No!", and enlisting others to help. Role playing, games, and other techniques are used to engage girls in verbal resistance strategies. Fighting is stressed as a last resort.
Session III. Physical fighting and the concepts that increase efficacy
Students begin with Tools and Targets, an exercise in thinking of their body as equipped with tools for fighting and the assailant's body as covered with weak vulnerable areas to target. Instructors demonstrate how to match their strong tools against the assailant's weak targets.
The concept of "What's Free, What's Open" is to be used when the student has already been grabbed by an assailant. Students are asked to focus not on the part held by the assailant, but on body parts that are free to fight the assailant. Students learn and practice ways to escape holds and grabs.
Session IV. Fighting full force
This session addresses full force fighting techniques meant to disable an assailant quickly. Girls practice going from quiet, fake compliance to full-on attack mode. The element of surprise is discussed. Students practice fighting for the full 2-hour session.
Session V. Extreme risk strategies
This session teaches various responses to use in extreme risk scenarios. Topics covered include being choked or confronted with armed assailants or multiple assailants.
Session VI. Practice, practice, practice
This session reviews all physical strategies and gives girls the entire session to practice what they have learned. Students are encouraged to tell if anyone is abusing them or if they are being targeted for abuse. This is the entry point for victims of sexual assault to seek additional support through the Sexual Assault Survivors Anonymous organization. (www.sasaworldwide.org)

and anonymity. Practice data collection sessions were conducted outside the study areas, to identify unforeseen situations that might arise while collecting data.

Statistical analysis

Experienced data entry operators double-entered data into an SPSS database (SPSS Inc, Chicago, IL). The primary outcome variable was the difference in incidence of sexual assault between the intervention (No Means No Worldwide) group and the control (life-skills training) group at 10-month follow-up. "Sexual assault" was defined as physically forced or otherwise coerced penetration of the mouth, vagina, or anus, using a penis or other body part or any object, as per the Centers for Disease Control and Prevention definitions [7]. We analyzed results using chi-square analysis for categorical data or Fisher exact test where appropriate, and the independent *t*-test for continuous variables. Data are presented as means ± standard deviation. We analyzed results using SPSS v19.0 software.

Results

A total of 522 girls, aged 14–21 years, completed the study questionnaire at baseline. Mean age was 16.7 ± 1.5 years. Of these girls, 128 (24.5%) reported that they had been a victim of sexual assault in the year prior to the baseline survey, with most (90%) reporting assault by someone known to them (Figure 1). Only 10% of those assaulted reported that they had been sexually assaulted by a stranger or "gangster." Of the 128 participants who reported sexual assault in the prior year, 75 reported that it had occurred once; 28, twice; 11, three times; and 11, four times. Only 76 of the 128 subjects who were assaulted (59.4%) had informed someone else about the event. Figure 2 shows that 402 girls were assigned to the intervention group, and 120 to the control group. Table 2 shows that at baseline, the groups did not differ by age or incidence of rape in the prior year. In addition, they did not differ by perpetrator or number of times the sexual assault occurred. In the intervention group, the incidence of sexual assault over the prior year decreased from 24.6% at baseline to 9.2% at follow-up ($p < .001$), whereas in the control group it remained unchanged: 24.2% at baseline and 23.1% at follow-up ($p = .10$) (Figure 3). At follow-up, in the intervention group, but not in controls, there were significant decreases in assaults by boyfriends ($p < .0004$) and relatives ($p < .002$). Disclosure rates increased significantly in the intervention group (55.6% to 97.1%; $p < .0001$), but not in controls (Table 2).

A total of 215 girls in the intervention group (56.4%) reported having used the self-defense skills to successfully fight off an attacker and avoid the assault in the year after the training. Of these, 108 (50%) used verbal skills alone, 71 (33%) started with verbal skills and then added physical skills, and 36 (17%) used physical skills alone.

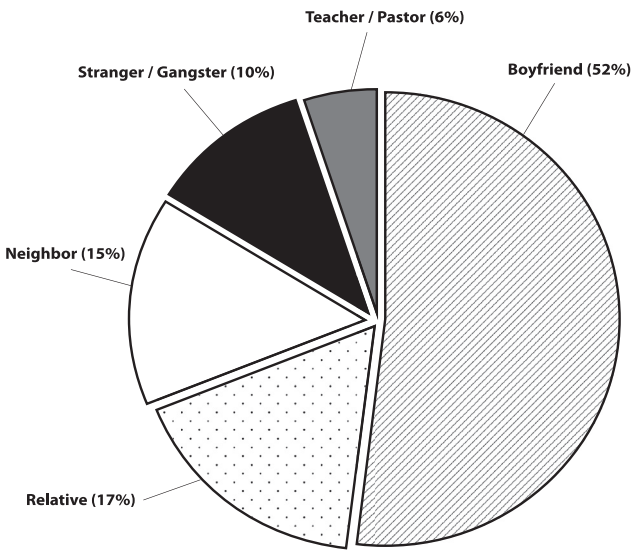

Figure 1. Perpetrators of sexual assault, at baseline (N = 522).

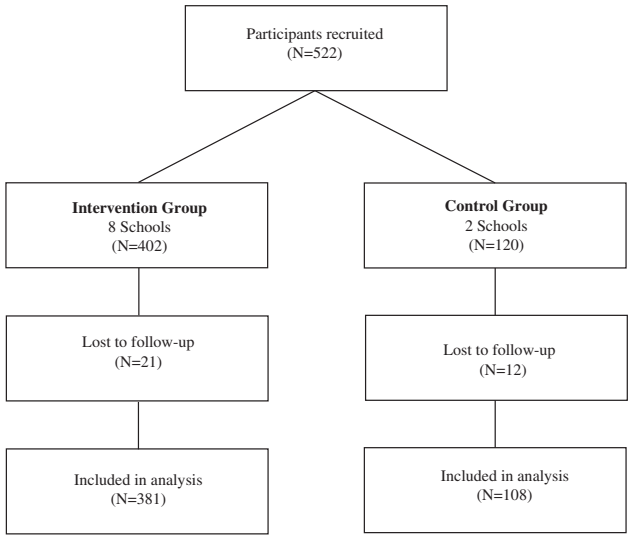

Figure 2. Flowchart depicting study sample. Subjects were purposely assigned to either the intervention or the control group, based on the location of the school they attended. Randomization was deliberately not used within individual schools or among schools within the same community, to prevent cross-contamination across study groups.

Discussion

In this study, one in four adolescent girls from the Korogocho and Kariobangi North locations in Nairobi, Kenya had been sexually assaulted in the prior year. Sexual assault is associated with potentially devastating lifelong morbidities including, but not limited to, sexually transmitted infections including HIV/AIDS, unwanted pregnancy, unsafe abortions, premature school dropout, poverty, suicidal ideation, as well as lifelong emotional dysfunction, interpersonal difficulties, and reduced earning and employment. In Kenya, one quarter of women between the ages of 15 and 19 years are either pregnant or already are young mothers, and the prevalence of HIV-1 infection is 2.7% in 15- to 19-year-olds and increases to 6.4% for 20- to 24-year-olds [24]. Studies suggest that HIV prevalence is further increased in Nairobi's urban slums, and that adolescence is a critical time for HIV acquisition [25–28]. Among Kenyan women, sexual experience before age 15 years, compared with after 19 years, is associated with 62% higher likelihood of being HIV positive [28,29], and 12.5% of those aged 15–19 years who have ever had sexual intercourse report that their first episode of sexual intercourse was forced against their will. In those under 15 years of age, this

Table 2
Demographic features and incidence of sexual assault intervention versus control groups

	Intervention			Control		
	Baseline (N = 402)	Follow-up (N = 381)	*p*	Baseline (N = 120)	Follow-up (N = 108)	*p*
Age, mean (standard deviation)	16.7 (1.5)			16.9 (1.4)		.76[b]
Sexual assault in past year, n (%)	99 (24.6%)	35 (9.2%)	<.001[c]	29 (24.2%)	25 (23.1%)	.10
Perpetrator, n (% total students)[a]						
Boyfriend	50 (12.4%)	19 (5.0%)	.0004[c]	16 (13.3%)	12 (11.1%)	.76
Relative	19 (4.7%)	3 (.8%)	.002[c]	3 (2.5%)	3 (2.8%)	1.0
Neighbor	12 (3.0%)	4 (1.0%)	.08	6 (5.0%)	4 (3.7%)	.75
Stranger/gangster	10 (2.5%)	5 (1.3%)	.35	3 (2.5%)	4 (3.7%)	.71
Teacher/pastor	7 (1.7%)	2 (.5%)	.21	1 (.8%)	1 (.9%)	1.0
Other	8 (2.0%)	2 (.5%)		2 (1.7%)	4 (3.7%)	
Times it occurred, n (% total students)						
1	55 (13.7%)	15 (3.9%)	<.0001[c]	20 (16.7%)	19 (17.6%)	.99
2	22 (5.5%)	13 (3.4%)	.22	6 (5%)	4 (3.7%)	.75
3	11 (2.7%)	4 (1.0%)	.12	0 (0%)	1 (.9%)	.47
4	9 (2.2%)	3 (.8%)	.14	2 (1.7%)	1 (.9%)	1.0
Other	2 (.5%)	0 (0%)		1 (.8%)	0 (0%)	
Told someone, n (% assaulted students)						
Yes	55 (55.6%)	34 (97.1%)	<.0001[c]	21 (72.4%)	21 (84.0%)	.35
No	35 (35.4%)	0 (0%)		8 (27.6%)	3 (12.0%)	
No response	9 (9.1%)	1 (2.9%)		0 (0%)	1 (4.0%)	

[a] May have more than one response.
[b] Comparison between intervention and control groups at baseline.
[c] $p < .05$ comparing baseline and follow-up within groups.

percentage increases to 22.2% [24]. Any intervention that has the potential to reduce the incidence of sexual assault can therefore have important health, educational, and economic consequences.

Our study demonstrates that the No Means No Worldwide self-defense course is effective in reducing the incidence of sexual assault in adolescent girls in an urban slum in Nairobi, Kenya. The intervention was able to reduce the annual incidence of sexual assault by 62.6% over a 10-month period, whereas there was no change in incidence in those who received the didactic life skills program that is the current national standard. Over one half of girls in the intervention group had used the self-defense skills to avert sexual assault in the year after the training. Verbal skills alone were the first line of defense for most girls (83%) who thwarted an attack, and one half were successful using just verbal skills. Another one third of girls then added physical self-defense skills, whereas only 17% of the girls who successfully prevented rape used physical skills from the outset. These findings indicate that the girls' empowerment/self-defense course is effective in preventing sexual assault; and importantly, that physical skills are seldom the first or only line of defense. It is also encouraging that in the self-defense group, students were more likely to disclose assaults that occurred, thus opening the door to potential support and intervention.

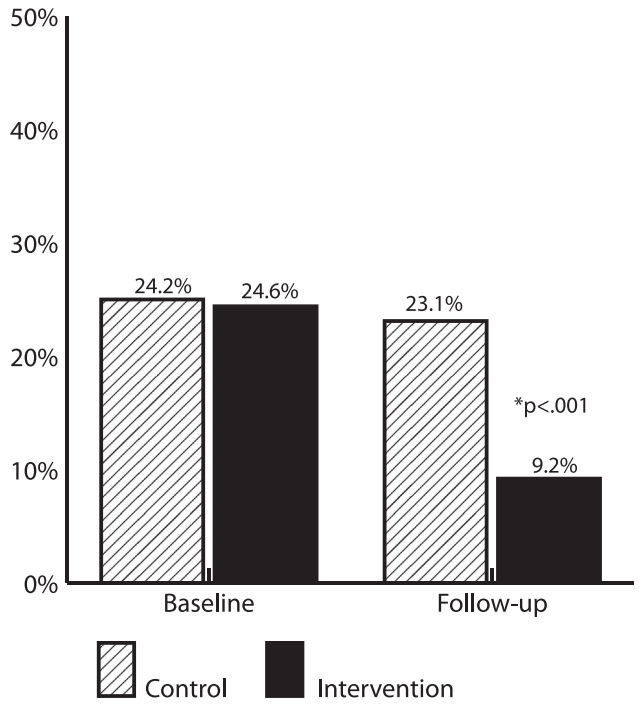

Figure 3. Change in incidence of sexual assault at 10-month follow-up: control versus intervention group. There was a significant reduction in the incidence of sexual assault in the intervention group ($p < .001$) but not in controls ($p = .10$).

This study used a strict definition of sexual assault. However, a significant amount of gender-based violence is outside this rigid definition and is of a sexual nature. It would follow that empowerment/self-defense training could help with these additional behaviors. Although this study did not quantitatively study these additional behaviors, anecdotal evidence from the girls indicates that a substantial majority of girls in the intervention group found the self-defense skills useful in stopping other forms of sexual harassment. This may warrant further investigation in future research.

The self-defense intervention was able to be implemented in a high-risk area, despite limitations in classroom time and financial resources. Prevention of sexual assault through self-defense has sometimes been construed to involve complex martial arts techniques. Martial arts take years of training to master. In contrast, the basic self-defense program evaluated in this study was taught in < 12 hours, followed by several additional booster sessions. Training was provided at a cost equivalent of $1.75 USD per student, a fraction of the estimated $86 currently spent on immediate medical aftercare services for each

sexual assault victim treated in Africa [30]. Importantly, this figure only includes immediate medical care and does not include the cost of mental health treatment or treatment of unwanted pregnancy, sexually transmitted infections, or HIV/AIDS. With adequate resources, this standardized, manual-based intervention could be replicated at multiple sites.

As noted in other sexual assault studies conducted in the United States and other countries [3,20,31], in our study most perpetrators (90%) were individuals known to the victim. The self-defense intervention significantly reduced the number of assaults by individuals known to the adolescent (boyfriends and relatives). Intuitively, the likelihood of an adolescent, or even an adult woman, using physical self-defense strategies would be expected to vary depending on the nature of her relationship with the potential assailant, with physical defense skills less likely to be used on a dating partner or someone well known to the potential victim.

The major strength of this study is the large sample size in a region with a high prevalence of sexual assault; thus, we could readily assess a reduction in sexual assault at the 10-month follow-up. We were also able to observe all adolescent girls attending high school in these two Kasaroni district locations during the 2011 academic year. In addition, use of the previously validated BBM method to administer and collect the questionnaires reassured participants that their responses would be kept anonymous, and ensured confidentiality, increasing likelihood of disclosure. Reported rates of sexual assault in this study were significantly higher than the official rates reported through government sources [24,32]. This suggests that the BBM was effective in providing assurance to students that their responses would remain anonymous. The persistently high rate of sexual assault in the control schools suggests that the study was successful in minimizing cross-contamination between intervention and control populations, and that sexual assault rates did not decrease spontaneously over time without intervention.

A major limitation of the study is that it was not a cluster-randomized trial, but was a census-based longitudinal cohort study. Surveys were anonymous, precluding linking of baseline data to follow-up data, so individual subjects were not observed longitudinally. Some subjects were not in school on the day the follow-up questionnaires were administered 10 months later, but we do not know the specific reasons why they were not in school on that day, or whether those lost to follow-up differed from the remainder of the cohort. We used only a single question to assess sexual assault, which could have resulted in lower disclosure rates than may have been achieved with multiple questions. Finally, this study was conducted in an urban slum in Nairobi, Kenya, and the findings may not be applicable to other populations.

Recommendations for future research include replicating this study in other populations, both within high-risk areas and in regions with lower rates of sexual assault. Follow-up surveys could also assess whether reductions in assault rates are sustained, and whether booster sessions are necessary. Given the high baseline rates of sexual assault in both the control and intervention groups, it is recommended that a form of this self-defense intervention be developed for younger-aged adolescents, and evaluated within that population.

The significant reduction noted in sexual assault rates would be expected to be associated with a decrease in number of unplanned pregnancies and sexually transmitted infections, including HIV. This could be confirmed with further studies designed to assess the effect of this program on these outcomes. In future studies, it would be helpful also to assess the impact of the intervention on the psychological and emotional health of participants. Factors such as self-efficacy have been found to be increased in self-defense training [21], and self-efficacy has been found to affect other health-protective behaviors. If self-efficacy improves with this intervention, it may act to further decrease rates of sexually transmitted diseases or unplanned pregnancy.

Sexual assault reflects the complex interaction of various individual, situational, societal, and cultural elements [19,33,34]. Ideally, this intervention would be delivered as part of a broader intervention that also targets the knowledge, attitudes, and social norms that contribute to perpetration by adolescent males. Such interventions are best delivered within the context of a community-based program addressing the multiple other individual, intrapersonal, social, cultural, and political factors that contribute to gender-based violence, including sexual assault [35,36].

This study demonstrates that a standardized 6-week self-defense program is feasible and is effective in reducing the incidence of sexual assault in slum-dwelling high school girls in Nairobi, Kenya. If it is replicated in other populations with a high prevalence of sexual assault, such a program may have the potential to reduce the incidence of sexually transmitted infections, including HIV/AIDS, reduce the number of unwanted pregnancies, prevent premature school dropout, and reduce lifelong psychological distress.

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