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Original article

# Empowerment Transformation Training Reduces Rape Among Girls and Young Women in South Sudan and the Kakuma Refugee Camp

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A B S T R A C T

**Purpose:** Rape occurs at high rates in South Sudan and Kakuma refugee camps, a region characterized by armed conflict, gender inequity, and economic crisis. To date, we know little about how to prevent rape in this region of the world. As such, the purpose of this study was to examine outcomes of Empowerment Transformation Training (ETT) (an adapted empowerment self-defense program; empowerment self-defense) among female participants in South Sudan and the Kakuma refugee camp.
**Methods:** Schools were assigned to the treatment (ETT) condition ($n = 7$) or control (life skills) condition ($n = 9$) and used as the unit of analysis given the cluster-randomized design. Female participants anonymously completed a baseline (T1) and 12-month follow-up (T2) paper and pencil survey.
**Results:** Annual rape victimization rates decreased from 10.7% to 5.5% in the ETT schools (risk ratio [*RR*] = 0.51); there was no change in the control schools (10.0%–9.0%). Empowerment Transformation Training (ETT) schools had increased confidence at T2 (T1: 42.4%; T2: 75.4%; *RR* = 1.79) and greater rates of confidence at T2 compared to control schools (54.3%; RR = 1.39). Knowledge of effective self-defense strategies (T2) was greater for ETT schools (47.4%) compared to control schools (30.1%) (*RR* = 1.57).
**Discussion:** The ETT program reduced rates of rape, increased confidence, disclosures of rape (among victims), and knowledge of effective self-defense strategies. Empowerment self-defense programs are a critical component to rape prevention across global communities, including those characterized by armed conflict, gender inequity, and economic crisis.


**IMPLICATIONS AND CONTRIBUTION**

Rape prevention programming is critically needed in regions of Africa with high rates of violence and conflict. Empowerment Transformation Training (an empowerment self-defense program) offers a promising approach for rape prevention for girls and young women (ages 9–35) in South Sudan and the Kakuma Refugee Camp.

Some of the highest rates of rape in the world are in sub-Saharan Africa, including South Sudan [1,2]. research in South Sudan has documented the strong associations between the rape of girls and women and armed conflict, gender inequity, and economic crisis in this region [2]. Despite high rates of rape of girls and women in these high conflict and refugee settings,

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research in this region of the world is nonexistent. Preventing rape in South Sudan and the Kakuma Refugee Camp—regions plagued by iterations of civil war, ongoing armed conflict, and intercommunal tensions coupled with extreme poverty and gender inequity—is thus a critical global public health priority [3]. The current study addresses a crucial gap in the literature, given there is no research to our knowledge that has examined an empowerment self-defense (ESD) approach to rape prevention among girls in these settings, which involve unique risk factors.

Perpetrators are solely responsible for all acts of rape, and comprehensive prevention initiatives are needed that target potential perpetrators. Yet, initiatives are also needed to reduce girls' and women's likelihood of experiencing a rape [4,5]. As such, researchers and practitioners have developed ESD programs that teach girls and women verbal and physical skills to prevent rape. Empowerment self-defense (ESD) programs also often include programming components that seek to enhance girls' and women's sense of self-worth and instill in them the value that their lives are worth defending [6,7]. Of note, girls are taught to use physical self-defense skills (e.g., eye poke, palm strikes) only if the situation necessitates it and their use of verbal skills does not de-escalate the situation or increase their risk for injury. Finally, ESD programs often provide program participants with information on help-seeking so that survivors in the room feel empowered to disclose to informal or formal sources, if they choose to do so and it feels safe.

Evaluations of ESD programs document increases in knowledge of effective self-defense strategies [4,8–11]. Moreover, research shows that ESD programs lead to reductions in rates of rape among girls [4,12], including girls in high-risk regions of the world, such as informal settlements in Nairobi, Kenya [13,14], urban and rural areas of Malawi [11], ESD programming also leads to rape disclosure [13], which is important because disclosure allows survivors to access supports to prevent/reduce deleterious outcomes associated with rape and may also enhance community responsibility to take action to prevent and respond to rape [15].

The extent to which an ESD program may be an effective prevention tool in reducing rape among girls and women in South Sudan and the Kakuma Refugee Camp is unknown and represents an innovative topic of study with paramount public health impact. Although ESD has been shown to reduce sexual assault in regions of the world where sexual assault is especially pervasive (e.g., informal settings in Nairobi, Kenya), we know less about ESD in settings characterized by extreme levels of violence and humanitarian crisis among youth. As such, the purpose of the current study was to examine the efficacy of the Empowerment Transformation Training (ETT), an ESD program, with female participants (ages 9–35) in South Sudan (Juba and Wau) and the Kakuma Refugee Camp (Turkana County). We hypothesized that female participants who received Empowerment Transformation Training (ETT) would demonstrate reductions in rape, and increases in knowledge of self-defense strategies, confidence to defend themselves, and rape disclosure (among victimized participants), compared to female participants who received the standard of care (i.e., life skills programming).

## Methods

A cluster-randomized experimental design with two conditions and surveys collected at preintervention and postintervention was used to assess the effects of the ETT program. Geographically distinct schools ($N = 16$) were randomly assigned via matched pairs based on size and demographic composition to receive either ETT (intervention condition) or a 2-hour standard of care life skills training (control condition) (see Figures 1 and 2 for details). Both male and female participants in the schools received the respective programming for that condition. The current study focused only on the female participants' outcomes. Baseline data (T1) were collected in the schools' second term (between May and August of 2018). Post-test data (T2) were collected a year later (between May and August of 2019).

### *Sample and setting*

Participants were girls and young women (T1: $N = 2{,}907$; ages 9–35; $M = 15.56$, $SD = 2.19$; 97% < 19) from either South Sudan (Juba and Wau) ($n = 1{,}533$) or the Kakuma refugee camp ($n = 1{,}374$). The older participants (>19) were students in learning programs ("Catch Up" and "Accelerate"), which attempt to mitigate the negative impacts of prolonged disruption of education due to conflict in these regions. These programs allow older students to attend secondary schools; these accommodations are common. The number of students in the schools ranged from 111 to 299 ($M$ students per school = 182). Students were in class levels 3–8, with the majority in class 6 (31.8%), followed by class 7 (25.5%), class 5 (23.9%), class 4 (10.0%), class 8 (8.0%), and class 3 (0.2%); 0.6 did not report class level. At T2, there were $n = 2{,}612$ participants, ages 10–35 ($M = 15.62$, $SD = 2.34$).

Whereas South Sudan (Juba and Wau) and Kakuma refugee camp are two distinct geographic settings, residents in each setting have similar risk factors regarding sexual violence. In particular, the participants residing in South Sudan at the time of the study were from two different areas, Juba and Wau. These are two South Sudanese cities, approximately 250 miles apart, with 500K and 250K residents respectively. Both cities have experienced recent bouts of devastating violence and residents live in areas where infrastructure is minimal and government control is tenuous. The Kakuma refugee camp is in Northern Kenya approximately 50 miles from the South Sudan border. Kakuma is home to 160,000 refugees (January 2021) from South Sudan, Sudan, Somalia, the Democratic Republic of the Congo. Three fourths of the residents are from South Sudan, and it is important to note that the other countries represented also come from "conflict countries". Because such a high percentage of the residents are from South Sudan and the remainder represent a similar demographic, we included participants living in both South Sudan and Kakuma in the current study. For demographics by condition and site, see Table 1.

### *Experimental conditions*

The ETT *intervention* was culturally adapted for Africa from the ImPower program (an ESD program). Empowerment Transformation Training (ETT) is comprised of 6 weeks of weekly sessions (2 hours for each session) followed by two, 2-hour booster sessions conducted at 3 and 6 months. In ETT, are taught boundary recognition and setting, negotiation and diffusion tactics, verbal refusal skills (e.g., shouting NO), and physical defense skills (to implement when verbal resistance tactics do not work). Empowerment Transformation Training (ETT)

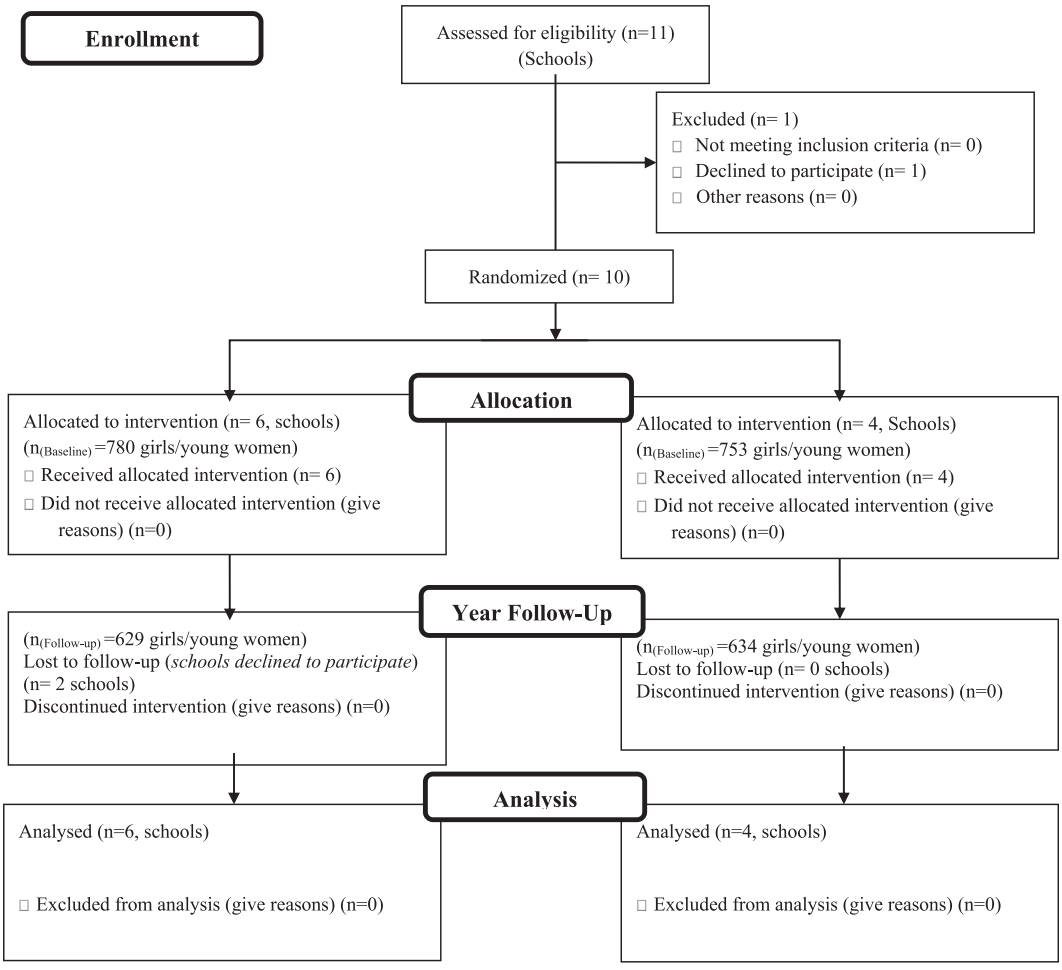


**Figure 1.** Consort flow diagram of South Sudan (Juba and Wau) school and participant recruitment and the random sample assignment.

programming components (e.g., chants) enhance self-efficacy to resist an attacker and instill feelings that one's life matters and is worth defending. The highly trained program facilitators were all women from Kenya (where the implementation agency, Ujamaa Africa, is located), who had at least 7 years of training and delivering ETT in schools in East Africa. Initially, the program facilitators received 3 weeks of intensive training that was followed by written, oral, and practical (i.e., in class teaching of students under observation) exams, along with 1 year of direct mentorship. Facilitators were selected based on having already participated in social and community work in the target communities. All had an indepth knowledge of and sensitivity towards cultural differences. To our knowledge, no girls were harmed while using self-defense skills; no adverse events were reported to program staff. The focus of ETT for boys and young men was on reducing gender inequitable attitudes and increasing bystander intervention skills [16].

Participants in the *control* schools received the standard of care, government approved (i.e., Kenyan Ministry of Education) life skills program. The standard 2-hour program covers adolescent health topics including puberty, hygiene, menstruation, sex education, STIs/HIV, and pregnancy prevention. Students in the control group also received booster sessions like those described above that focused on puberty and hygiene. The program facilitators for the control schools were also from the implementation agency.

### *Ethical considerations*

The current study was conducted as a secondary data analysis study by evaluators at a US University, University of Nebraska-Lincoln, who were external to the program implementation agency team. The University of Nebraska-Lincoln institutional review board deemed the secondary data analysis study as not meeting criteria as research needing approval, given the data were already collected and not identified. Permission to conduct the original research by the program implementation agency, Ujamaa Africa, was granted by NACOSTI, a Kenyan government department that approves research. Per Kenyan national guidance, students provided informed consent before the implementation of surveys and programming [17]. Students were able to decline participation. In this context, it is also standard practice that teachers, headmasters, and the parent-teacher association in each school are recognized as being able to officially grant consent for research on behalf of guardians for programs they believe are safe and will provide benefit to students. The current study followed this standard practice relevant to this cultural context.

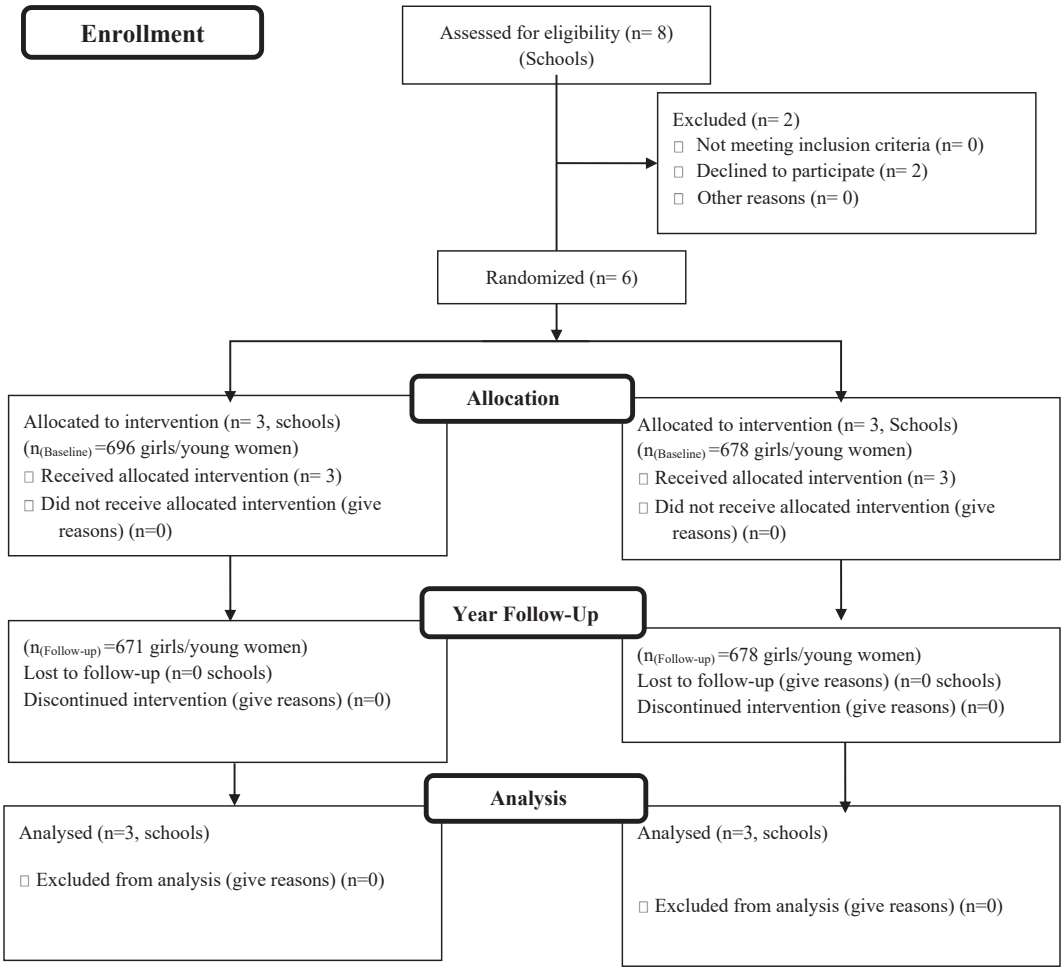


**Figure 2.** Consort flow diagram of Kakuma Refugee Camp (Kenya) school and participant recruitment and the random sample assignment.

*Data collection*

Surveys were administered before and 12 months following baseline in treatment schools. The same self-report surveys were administered at similar time points in the control schools. To encourage honest responding, surveys were anonymous; no names or identifiers were collected; thus, precluded matching the data over time. Two data collectors (who were study staff,

**Table 1**
Baseline demographic characteristics of the sample by condition and site

| | Control | | | Intervention | | |
|---|---|---|---|---|---|---|
| | Total | Juba/Wau[a] | Kakuma Refugee Camp[b] | Total | Juba/Wau[a] | Kakuma Refugee Camp[b] |
| Schools | 7 | 4 | 3 | 9 | 6 | 3 |
| Students | 1,431 | 753 | 678 | 1,476 | 780 | 696 |
| Age, *M* (*SD*) | 15.7 (2.1) | 15.2 (1.6) | 16.1 (2.3) | 15.6 (2.3) | 14.8 (2.1) | 16.1 (2.3) |
| Age, range | 11–31 | 11–20 | 11–31 | 9–35 | 9–35 | 11–31 |
| Class level, % | | | | | | |
| Class 3 | 0.2 | | 0.4 | 0.2 | | 0.4 |
| Class 4 | 10.3 | | 21.8 | 10.0 | | 21.2 |
| Class 5 | 24.3 | 27.8 | 20.4 | 23.8 | 27.2 | 19.9 |
| Class 6 | 30.9 | 39.4 | 21.3 | 32.9 | 42.0 | 22.7 |
| Class 7 | 26.1 | 32.8 | 18.6 | 25.2 | 30.7 | 18.9 |
| Class 8 | 8.2 | | 17.4 | 7.9 | | 16.9 |

$j = 16$ schools. $k = 2{,}907$ students.
[a] South Sudan.
[b] In Kenya—50 miles from the South Sudan border.

unknown to students, and trauma counseling certified) were designated in every class to help with data collection: one of the data collectors read out the questions and answer choices in both English and the local language understood well by the participants, whereas the other promoted confidentiality among participants by monitoring the class to make sure participants were not looking at others' surveys. These data collectors were not the same staff who teach the program/classes. The participants were encouraged to seek clarification or ask questions before selecting their answer. Participants deposited their survey in a locked ballot box, so that there was no possibility of instructors unintentionally viewing responses. Participants in both conditions had the option to self-refer to study staff and/or teachers for violence-related support and connection to local services. Participants did disclose to study staff or teachers for additional support, though, we did not gather data on rates of disclosure for reasons of confidentiality.

### Measures

Given the limited time that schools allowed for survey completion, the selected measures needed to be brief and focused on the primary outcome constructs (e.g., incidence of rape) targeted by the intervention.

*Rape victimization.* Participants were asked if they had been forced against their will to have sex in the past 12 months with response options "yes" or "no". Participants were coded at both time points as no sexual assault (0) or any sexual assault (1).

*Rape disclosure.* Participants who reported that they had experienced a rape were asked if they told someone about it. Participants with past 12-month rape histories at baseline were coded as did not disclose (0) or disclosed (1). Similarly, girls with past 12-month rape histories at the 12-month follow-up were coded as did not disclose (0) or disclosed (1).

*Confidence.* At baseline and the 12-month follow-up, participants reported on whether they felt confident to defend themselves if attacked ("If I am attacked by a strong man, I feel confidence that I can defend myself"). Participants reported on a response scale of true (1), false (2), or not sure (3). Responses were coded to represent true (1) or false/not sure (0).

*Knowledge of effective self-defense strategies.* Modeled after previous research [10,14], girls were asked at both survey administrations to answer seven questions to assess their knowledge of effective self-defense strategies (e.g., "What are the four main areas to hit an attacker?"; for additional items see Table 2). Questions were coded as correct (1) or incorrect (0) and summed to create a proportion of the items answered correctly.

### Statistical analysis

Consistent with our cluster-randomized experimental design in which the schools (clusters) are the experimental units of randomization, we used a cluster-level analysis, has been shown to be robust, providing valid results including for samples with a small number of clusters [18]. The cluster-level analyses consisted of two steps: a) cluster-level summary measures were created to represent prevalence at the school level and b) cluster-level summary variables were used in the analyses. As a preliminary step, we tested baseline equivalence on outcomes across the experimental groups and calculated condition group standardized differences at follow-up. To test for intervention efficacy, we used a 2 (time) × 2 (condition) repeated measures analysis of variance. We also examined the effects of setting and age. To understand differences by setting, we calculated effect sizes separately (see Table 2). We included setting as a strata variable in the descriptive statistics (Table 2). For age, given our analysis was at the cluster-level, we re-ran our primary analyses excluding those older than 19 ($n$ = 152) and those in class 3

**Table 2**
Cluster-level raw descriptive statistics by intervention and control arms of the study

| Outcome | Control | | ETT | | *t*-test *p* | Effect size | | |
|---|---|---|---|---|---|---|---|---|
| | % (*SD*) | 95% CI | % (*SD*) | 95% CI | | All Settings $g^2$ | Kakuma[b] $g^2$ | South Sudan[b] $g^2$ |
| Primary | | | | | | | | |
| Rape victimization | | | | | | | | |
| Baseline | 10.0 (4.1) | [7.0, 12.9] | 11.6 (4.5) | [9.1, 14.5] | .453 | | | |
| Follow-up | 9.0 (4.6) | [5.8, 12.3] | 5.5 (4.6) | [2.3, 8.9] | | −0.73 | −1.08 | −0.54 |
| Secondary | | | | | | | | |
| Rape disclosure | | | | | | | | |
| Baseline | 67.1 (21.2) | [52.8, 80.7] | 57.3 (23.0) | [42.3, 70.2] | .391 | | | |
| Follow-up | 60.0 (20.9) | [46.8, 73.5] | 70.8 (18.6) | [57.3, 83.4] | | 0.52 | 0.36 | 0.93 |
| Confidence | | | | | | | | |
| Baseline | 40.7 (8.0) | [35.7, 46.5] | 45.7 (12.3) | [38.8, 54.4] | .342 | | | |
| Follow-up | 54.3 (12.8) | [45.5, 63.0] | 75.4 (18.7) | [63.4, 85.7] | | 1.23 | 0.08 | 3.93 |
| Correct knowledge[a] | | | | | | | | |
| Baseline | 27.3 (3.9) | [24.7, 29.9] | 24.8 (3.1) | [23.0, 26.7] | .185 | | | |
| Follow-up | 30.2 (3.3) | [27.9, 32.2] | 47.3 (14.6) | [38.9, 55.1] | | 1.52 | 0.82 | 6.39 |

$N$ = 16 schools (cluster level). CI = stratified bootstrapped (samples = 1,000) confidence intervals. We included setting as a strata variable in the full sample analyses. The effect size presented is the bias corrected Hedges' $g$; represents the standardized difference between the experimental groups at follow-up. Small effect ≥ 0.20; medium effect ≥ 0.50; large effect ≥ 0.80.
CI = confidence interval; SD = standard deviation.
[a] Knowledge items: "What are the four main areas to hit an attacker?" "If I am grabbed by an attacker, what should I use to free myself?"; "The main aim of self-defense is to?"; "Which are the best ways to defend yourself if you are attacked?"; "Which of these are the most important to use in an assault"; "If there are many attackers and I need to fight, whom should I fight first"; "Is it 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]?"
[b] The Kakuma setting refers to Kakuma refugee camp. The South Sudan setting refers to the regions of Juba and Wau.

($n = 12$). The patterns of findings held, and thus, the conclusions remained robust as presented in the next section.

## Results

### *Primary outcome: rape victimization*

Descriptive statistics suggested that upon enrollment, lifetime rape victimization prevalence was 16.4% in the intervention (ETT) group and 14.1% in the control group, $\chi 2\,(1) = 2.73$; $p = .10$. *T*-tests suggested baseline (T1) equivalence in annual rape victimization rates for the ETT and control schools (Table 2). One year following intervention (T2), prevalence in the ETT schools was lower than the control schools ($g^2 = -0.73$; moderate effect). The effect was greatest for Kakuma schools.

Primary analyses examining ETT efficacy using a 2 (time) × 2 (condition) analysis of variance revealed a main effect of time, with reports of rape victimization lower at T2. Post hoc tests for the C × T interaction suggested a decrease in reports of rape victimization from T1 to T2 for the ETT group, $f\,(1, 12) = 9.45$, $p = .010$, but not for the control group, $f\,(1, 12) = 0.35$, $p = .568$ (Table 3). Practical significance suggests the risk of rape victimization for ETT schools at T2 was 49% lower relative to T1 (risk ratio [*RR*] = 0.51). Moreover, the risk of rape victimization for ETT schools at T2 was 39% lower relative to control schools (*RR* = 0.61).

### *Secondary outcomes*

*Rape disclosure.* Girls reporting rape victimization at baseline or follow-up were asked whether they disclosed their assault to anyone. *T*-tests suggested baseline equivalence in disclosure for the ETT and control schools (Table 2). One year following intervention, effect sizes suggest rates of disclosure in ETT schools were higher than control schools ($g^2 = 0.52$; moderate effect). The effect was greatest for South Sudan schools.

Primary analyses revealed no main or interaction effects (Table 3). Practical significance suggests the rate of disclosure for ETT schools at T2 was 22% higher relative to T1 (*RR* = 1.22). Moreover, the rate of disclosure for ETT schools at T2 was 18% higher relative to control schools (*RR* = 1.18).

*Confidence.* Girls' confidence in their ability to defend themselves if attacked did not differ between the ETT and control schools at baseline (Table 2). One year following the intervention, ETT schools had higher rates of confidence compared to control schools ($g^2 = 1.23$; large effect). The effect was greatest for South Sudan schools.

Primary analyses revealed an effect of time and a C × T interaction (Table 3). Post hoc tests suggested ETT was higher relative to control schools at T2, $F\,(1, 12) = 6.09$, $p = .030$. Confidence increased from T1 to T2 for both ETT, $F\,(1, 12) = 46.29$, $p = .001$, and the control, $F\,(1, 12) = 7.76$, $p = .016$, schools, but at a greater rate for ETT schools. Practical significance suggests the rate of confidence for ETT schools at T2 was 78% higher relative to T1 (*RR* = 1.79). Moreover, the rate of confidence for ETT schools at T2 was 39% higher relative to control schools (*RR* = 1.39).

*Knowledge.* *T*-tests suggested baseline equivalence in knowledge of effective self-defense strategies for the ETT and control schools (Table 2). One year following the intervention, ETT schools had higher rates of knowledge compared to control schools ($g^2 = 1.52$; large effect). The effect was greatest for South Sudan schools.

Primary analyses revealed an effect of time and a condition × time interaction (Table 3). Post hoc tests suggested knowledge in ETT schools was higher relative to control schools at T2, $F\,(1, 12) = 9.28$, $p = .010$. Knowledge increased from T1 to T2 for the ETT schools, $F\,(1, 12) = 21.20$, $p = .001$, but not the control schools, $F\,(1, 12) = 0.57$, $p = .572$. Practical significance suggests the rate of confidence for ETT schools at T2 was 89% higher relative to T1 (*RR* = 1.89). Moreover, the rate of confidence for ETT schools at T2 was 57% higher relative to control schools (*RR* = 1.57).

## Discussion

Results supported hypotheses; participants in the intervention schools (ETT), compared to those in the control schools (life skills program), demonstrated over a 12-month period reduced

**Table 3**
Results from the cluster-level 2 (time) × 2 (condition) repeated measures ANOVA testing intervention (ETT) efficacy

| Outcome | Control | | ETT | | ANOVA | | | |
|---|---|---|---|---|---|---|---|---|
| | Incidence | 95% CI | Incidence | 95% CI | Effect | *F* (1, 12) | *p* | $\eta^2$ |
| Primary | | | | | | | | |
| Rape victimization | | | | | C | 0.53 | .483 | 0.04 |
| Baseline | 10.0[a] | [6.5, 13.6] | 10.7[a] | [7.1, 14.2] | T | 6.70 | **.024** | 0.36 |
| Follow-up | 9.0[a] | [5.3, 12.8] | 5.5[b] | [1.7, 9.2] | C × T | 3.09 | .104 | 0.21 |
| Secondary | | | | | | | | |
| Rape disclosure | | | | | C | 0.01 | .938 | 0.00 |
| Baseline | 67.1 | [48.0, 86.1] | 57.8 | [38.7, 76.9] | T | 0.33 | .575 | 0.03 |
| Follow-up | 59.9 | [43.6, 76.2] | 70.8 | [54.6, 87.1] | C × T | 3.95 | *.070* | 0.25 |
| Confidence | | | | | C | 3.72 | *.078* | 0.24 |
| Baseline | 40.7[a] | [33.8, 47.6] | 42.4[a] | [35.5, 49.3] | T | 45.99 | **.001** | 0.79 |
| Follow-up | 54.3[b] | [41.0, 67.5] | 75.4[c] | [62.2, 88.6] | C × T | 8.07 | **.015** | 0.40 |
| Correct knowledge | | | | | C | 9.37 | **.010** | 0.44 |
| Baseline | 27.3[a] | [24.5, 30.2] | 25.1[a] | [22.2, 27.9] | T | 13.44 | **.003** | 0.53 |
| Follow-up | 30.1[a] | [21.4, 38.9] | 47.4[b] | [38.7, 56.1] | C × T | 8.09 | **.015** | 0.40 |

$N = 14$ schools (2 schools had missing data at follow-up and were not included in the analysis). CI = 95% confidence interval. C = condition. T = time. Prevalence estimated marginal means presented. Values with different subscripts (a, b, c) differ at the $p < .05$ level. Bold = $p < .05$. Effect size used is partial eta squared ($\eta^2$). Small ≥ 0.01; medium ≥ 0.06; large ≥ 0.14.
ANOVA = analysis of variance; CI = confidence interval; ETT = Empowerment Transformation Training.

rates of rape, and increased disclosures of rape (among victims), self-confidence in defending oneself, and knowledge of effective self-defense strategies. Findings were robust across all age groups. Of significance, the largest intervention effect on rates of rape were for ETT schools in the Kakuma refugee camp.

In addition to reducing rape, ETT schools had greater rates of disclosure of rape among girls and women victimized following their participation based on the medium standardized difference ($g^2$) and the RR, though not supported in the analysis of variance. This is a promising given that disclosure of rape may help survivors to access supports to prevent/reduce deleterious outcomes associated with rape, including repeated rape victimization [15,19]. However, the ways in which disclosure recipients responded to girls and women's rape disclosures is unknown, and research suggests that negative social reactions (e.g., blaming the victim) to rape disclosures increases risk for deleterious outcomes (e.g., depression, post-traumatic stress disorder) [20,21].

Knowledge of effective self-defense strategies and resulting self-efficacy (i.e., confidence) in being able to effectively defend oneself are critical mechanisms through which ESD programs are believed to lead to reductions in rape [11]. Whereas much of ETT focuses on the acquisition of verbal skills (which are effective at thwarting the majority of attempted rapes [22]), program participants received training in physical self-defense skills that can be used if verbal skills are not initially effective in thwarting the assault. Empowerment Transformation Training (ETT) led to increase in both knowledge and confidence related to self-defense. Of note, there was an increase in the confidence for control group girls. This could have been because the surveys may have conveyed information or developmental changes increasing confidence; yet intervention schools had even a greater increase in confidence over normative changes occurring in the control schools. Although not measured in the current study, ETT also includes programming components to enhance program participants' feelings of empowerment and that their lives are worth defending, which may increase the likelihood that skills are put into action.

Despite the critically important information gleaned from the current study, several limitations should be noted. First, although the 12-month follow-up is longer than many other rape prevention evaluation studies [23], the extent to which ETT led to positive impacts past this time point is unknown. Second, data were matched at the school-level and not the individual-level, which precluded within-person repeated measures analyses. Third, our measurement of rape was limited to a single item indicator; we did not assess other forms of sexual assault such as unwanted contact and sexual harassment which ESD has shown to reduce in other settings [10]. Fourth, we did not obtain data on the safety of ETT, specifically if use of resistance skills increased risk for harm or injury among girls and young women. Although research in other settings suggests that the use of resistance strategies in situations of attempted rape does not increase risk for harm or injury in the vast majority of cases, most of this research has been done in high-income, western settings [22]. Fifth, we did not collect in depth information on rape disclosure, specifically to whom victimized girls and women disclosed to as well as how they responded and how responses impacted girls and women. Sixth, the dosage of the control group intervention was lower than the dosage of the treatment group intervention. However, it is unlikely that outcomes are the result of greater exposure time as opposed to the curriculum given that the control group intervention does not teach skills specific to self-defense and there is no evidence that broad skills courses would lead to increased use of self-defense skills and reductions in rape.

### *Conclusion*

The ETT program reduced rates of rape, and increased disclosures of rape (among victims), confidence, and knowledge of effective self-defense strategies. These highly significant findings highlight the promise of the ETT program, considering the extreme conditions that characterize the implementation settings. More broadly, ESD programs are a critical component to rape prevention across global communities, including those characterized by armed conflict, gender inequity, and economic crisis.

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Statements of authorship: Dr. Lorey Wheeler conceptualized study analyses, cleaned and scored data, conceptualized, and conducted study analyses, wrote the parts of the method section and all of the results section, and critically reviewed the manuscript for important intellectual content. Dr. Katie Edwards wrote the introduction and discussion sections, wrote portions of the method section, and assisted with conceptualizing the study analyses. Mr. Benjamin Omondi provided the overall oversight of the implementation of the Research Project and participated in research design and drafting of parts of the manuscript. Beth Kaeke was the lead research officer on the ground that supervised consenting, data collection and archiving at the site level and coordinated process of data entry. Martin Ndirangu participated in the design of research protocol of this multicountry study and contributed to the design of data collection tools. Dr. Jake Sinclair led the process of research design, data tools design, and coordination with academic and other partners. Mr. Nickson Langat Lead the process of in country research implementation, institutional review board clearance database management across the two study sites and part of data analysis.

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