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Adolescent HIV risk reduction in The Bahamas: Results from two randomized controlled intervention trials spanning elementary school through high school

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Abstract

To address global questions regarding the timing of HIV-prevention efforts targeting youth and the possible additional benefits of parental participation, researchers from the USA and The Bahamas conducted two sequential longitudinal, randomized trials of an evidence-based intervention spanning the adolescent years. The first trial involved 1360 grade-6 students and their parents with three years of follow-up and the second 2564 grade-10 students and their parents with two years of follow-up. Through grade-12, involvement in the combined child and parent-child HIV-risk reduction interventions resulted in increased consistent condom-use, abstinence/protected sex, condom-use skills and parent-child communication about sex. Receipt of the grade-6 HIV-prevention intervention conferred lasting benefits regarding condom-use skills and self-efficacy. Youth who had not received the grade-six intervention experienced significantly greater improvement over baseline as a result of the grade-10 intervention. The HIV-risk reduction intervention delivered in either or both grade-6 and grade-10 conferred sustained benefits; receipt of both interventions appears to confer additional benefits.

Keywords

HIV Prevention Intervention; Behavioral Intervention; Adolescents; Longitudinal Data; Condom-use

Introduction

Considerable global progress has been made in combating the HIV/AIDS epidemic. AIDS-related deaths and new cases of HIV/AIDS have decreased by over one-third and a steadily increasing number of persons worldwide have access to treatment[1].

However, the total number of persons living with HIV/AIDS continues to increase, annually over one million persons continue to succumb to AIDS, and over half of the global

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population with HIV/AIDS is still without access to treatment, especially children and adolescents[1,2]. Forty percent of new infections occur among individuals less than 25 years of age. In recent years AIDS related-deaths have increased among adolescents by an estimated 50% [3,4]. The United Nations General Assembly identified the pivotal role of adolescents/young adults in the epidemic, stating: “...*people between the ages of 15 and 24 years account for more than one third of all new HIV infections*” and calling for prevention and treatment efforts based on “...*comprehensive, evidence-based prevention approaches...*” [4].

Efforts to achieve such an approach in the context of rapidly changing HIV/AIDS treatment and prevention options and our evolving understanding of the complex interplay of experience, culture and biology influencing HIV susceptibility among adolescents have generated several critical questions. Included among these questions are issues about the timing of presenting HIV-prevention efforts to adolescents (e.g., early adolescence before the onset of most risk behavior or mid-adolescence when some risk-experimentation has been initiated) and whether adolescent risk reduction should continue to be conceptualized as a single intervention, rather than as multiple intervention efforts delivered as the youth progresses developmentally. [5-9]

These questions as to the timing and/or sustainability of intervention impact throughout adolescence are especially important in countries experiencing high rates of HIV. In the 1990's, the HIV seroprevalence of The Commonwealth of the Bahamas approached 4%; currently this rate is 2.2% [10,11]. Integral to this decrease has been an interagency approach led by the Bahamian Ministries of Health and of Education. In order to reach as many Bahamian youth as possible, the government supported: the adaptation of an existing evidence-based program to the Bahamian situation; introduction of the program through the school system prior to the anticipated onset of sex among most youth; exploration of involving parents in the program; and, experimentation with repetition of intervention efforts as youth developed physically, cognitively, and experientially. These decisions formed the foundation of a broad research platform seeking to address among myriad questions: Can HIV risk knowledge, perceptions, and behaviors be positively impacted by a school-based intervention; At what age(s) should such interventions be given; and, Is parental participation advantageous for youth outcomes?

The Bahamas selected an effective intervention from the Centers for Disease Control's “Diffusion of Effective Behavioral Interventions” portfolio [12]. In collaboration with the developers, the US-Bahamian research team produced a culturally adapted version of this intervention entitled *Focus on Youth in the Caribbean plus Caribbean Informed Parents and Children Together* (FOYC+CImPACT)[13]. Beginning in 2005, FOYC+CImPACT was evaluated through a randomized, controlled trial involving grade-6 students in 15 government elementary schools. These youth received periodic follow-up surveys for 36 months [13-16]. Youth receiving “FOYC+CImPACT” demonstrated higher HIV/AIDS knowledge and condom-use skills, intentions and use-rates at 36 months [15].

Subsequently, the Bahamian government implemented a randomized, controlled trial of a version of FOYC+CImPACT modified for older youth [Bahamian Focus on Older Youth

(BFOOY)] involving all grade-10 classes in eight government high schools with periodic follow-up over two years[17,18]. Through the beginning of grade-12, youth who received BFOOY with CImPACT exhibited higher HIV/AIDS knowledge, condom-use skills, and self-efficacy and marginally higher consistent condom-use [6]. A subset of youth were in both the grade-6 and grade-10 trials; follow-up through grade-11 revealed that youth who received early (grade-6) and repeated (grades-6 and 10) interventions demonstrated the greatest protection[19].

In this manuscript we report on results from the final assessment of the grade-10 HIV risk-reduction trial and its intersection with the earlier grade-6 trial: the 24-month follow-up of youth who were enrolled in the grade-10 study; the impact of prior receipt of the intervention in grade-6 on the response to intervention delivery in grade-10; and, the 72-month follow-up of the subset of youth who were enrolled in both the grade-6 and grade-10 studies. The results from these analyses inform the questions regarding the relative impacts of an evidence-based HIV risk-reduction intervention delivered in pre-adolescence (grade-6), mid-adolescence (grade-10) or both and the benefit of adding a parental component to an intervention delivered to high school students.

Methods

Overview

Two independent HIV prevention studies but with overlapping students generated the data used for these analyses: a grade-6 trial of the FOYC intervention beginning in 2005 involving students in 15 of the 26 government primary schools located on New Providence, the most populous island in The Bahamas; and, beginning four years later as the cohort of former grade-6 students entered grade-10, a trial of the version of FOYC adapted for mid-adolescents, *Bahamian Focus on Older Youth* (BFOOY), involving students in all eight of the government high schools located in New Providence. A subset of 598 students was enrolled in both of these studies [16-19] (Figure 1). In both the grade-6 and grade-10 studies, the youths' parents were invited to participate and randomized to receive a parental monitoring and communication intervention (CImPACT) or a dose-control intervention about career planning [Goal for It (GFI)], or no intervention.

Interventions

FOYC and BFOOY are age-appropriate versions based on the same 8-session behavioral intervention guided by Protection Motivation Theory[20]. FOYC and BFOOY consist of interactive discussions, role-plays, games, etc. to reinforce main messages seeking to increase knowledge and skills regarding sexual-risk avoidance. A decision-making model supports consequential thinking and action and a fictional family illustrates long-term consequences of actions. The importance of communication style is illustrated through several exercises [13]. The parental intervention, CImPACT, includes a 22-minute video illustrating parent-child conversation about sex, provides correct information about HIV prevention and concludes with a demonstration of condom-use. Following the video, the parent and child engage in role-play and discussion to improve communication about difficult subjects. The session concludes with the youth and parent practicing the correct use

of condoms. The “control” parent intervention, Goal for It (GFI) is a 22-minute video describing the process of career development, followed by a parent-child question and answer period. CImPACT and GFI were delivered to the parent and youth together after school hours at the youths' schools.

Grade-6 intervention (FOYC) exposure—The grade-6 effectiveness trial of FOYC involved 1360 youth at 15 of the 26 government elementary schools on the island of New Providence. Randomization at the level of the school was done by the primary investigator, using a random number table. Ten of the 15 involved schools were randomized to receive FOYC and the remaining five to receive the control condition. The parents in five of the 10 schools randomized to receive FOYC were randomized to receive CImPACT while those in the remaining five schools received GFI. (The dose control for FOYC was an ecology curriculum [“*The Wondrous Wetlands*” (WW)] involving the shoreline and wetlands.) Thus, five schools received the control youth condition (WW) and the control parent condition (GFI); five schools received the experimental youth condition (FOYC) and the control parent condition (GFI); and, five schools received the experimental youth condition (FOYC) and the experimental parent condition (CImPACT). Approximately two-thirds of the youth in each of the 15 study schools enrolled in the randomized controlled trial; however, *all* youths in the 10 intervention schools received FOYC and none of the youth in the remaining 16 schools received FOYC[13] (Figure 1).

Grade-10 intervention (BFOOY) exposure—The randomized, controlled evaluation of BFOOY was conducted among youths in grade-10 in all eight government high schools in New Providence. The cohort of students who had been in grade-6 at the time of the FOYC trial was entering grade-10 at the time of the BFOOY trial. The grade-10 control condition [the existing Bahamian Health and Family Life Education (HFLE) Curriculum], covers multiple health topics, including pregnancy and STD/HIV prevention, marriage and parenting. The 2564 participating students (and their parents) were randomized by the primary investigator at the level of the classroom via a random numbers table to one of four study conditions: *BFOOY-CImPACT*, *BFOOY-GFI*, *BFOOY-ONLY*, or *HFLE-ONLY* (Figure 1).

Both studies were approved by the Institutional Review Board of the Princess Margaret Hospital, The Bahamas and the Human Investigation Committee of Wayne State University. Parents and youth provided written, informed consent and assent.

Measures

Condom-use self-efficacy—A youth's self-perceived ability to perform tasks to achieve protection through condom-use was assessed by 5 items, measured on a 5-point Likert scale (1=strongly disagree to 5=strongly agree). Mean scores were calculated across the 5 items (range=1~5); Cronbach's alpha=0.77~0.81.

Condom-Use Skills Checklist—The Condom-Use Skills Checklist measures understanding of correct condom-use[21]. From among 16 items, students identified the 8 correct steps; correctly marked answers received 1 point, yielding a mean score of 0 to 1.

HIV knowledge—Sixteen true–false questions assessed knowledge of disease transmission, prevention, treatment, and symptoms of HIV/AIDS. Correct responses were scored 1, yielding a mean score of 0 to 1; Cronbach's $\alpha=0.55\sim0.62$. The items differed between the grade-6 and grade-10 studies to be age-appropriate.

Condom intention—Intention to use a condom was assessed through the item, “In the next six months I will use a condom if I have sex.” Responses were assessed on a 5-point Likert scale (1=Yes to 5=No).

Parent-adolescent communication—In the grade-10 trial questionnaire, students reported the amount of information transmitted to them by their parents about birth control, sexually transmitted diseases, condoms and handling sexual pressure. Responses to the 8-item scale were measured on a 5-point Likert scale (1=None to 5=Extensive); Cronbach's $\alpha=0.91\sim0.94$.

Self-reported protection—Sexual risk protection was assessed by the question “When you have sex, how often do you use a condom (always, sometimes, never, never had sex)?” *Consistent condom-use*, assessed only among sexually active youth, reflected the choice “always” using a condom. *Abstinence/Protection* indicated youth who reported never having had sex OR among sexually active youth, always used a condom.

Data Analysis

Our analysis includes four steps. **First**, descriptive statistics (mean and standard deviation) of the continuous outcome variables (HIV/AIDS knowledge, condom-use skills, condom-use self-efficacy, condom use intention and parent-adolescent communication) and proportions of consistent condom use and abstinence/protected sex) were calculated for the four groups at baseline. The baseline differences between the groups were examined using ANOVA and Chi-square. **Second**, given the hierarchical nature of our data (students clustered within classes in eight high schools), mixed-effects modeling (PROC MIXED) was employed to examine the effect of the intervention on knowledge, perceptions, and skills controlling for the dependence of repeated measures and the clustering effects of school. The mixed models included age, gender, intervention group, and the interaction between intervention group and time. For actual behaviors (condom-use and abstinence/protection) we conducted generalized liner mixed models (PROC GLIMMIX). **Third**, among the 2564 participating youth, 1579 had **not** been exposed to FOYC in grade-6 while the remainder **had** been exposed to FOYC.

Exploration of the question as to whether prior exposure to FOYC did or did not impact response to the BFOOY intervention was examined in three ways. First, we examined the group as a whole, to assess continued effects of the grade-6 intervention at baseline in grade-10 prior to receipt of the intervention among those who had and had not been exposed in grade-6 and then examined outcomes among each grade-10 intervention group by prior FOYC exposure. Next, we conducted separate analyses among the 1579 youth who had **not** been exposed to FOYC in grade-6 and the 530 youth who **had** been exposed. Finally, we examine grade-10 intervention effect overall among all 2564 youth, controlling for prior

FOYC exposure. **Fourth**, to explore over time from grade-6 through grade-12 whether exposure to both interventions appears more effective than exposure to either the grade-6 or grade-10 intervention or neither intervention, we repeated the above-mentioned mixed-effects modeling within a subgroup of youth enrolled in both the grade-6 and grade-10 studies. Youth received the grade-6 intervention (FOYC) or control (WW) and the grade-10 intervention (BFOOY) or control (HFLE) over 72 months. Possible combinations of exposure were **WW+HFLE** (no intervention exposure), **WW+BFOOY** (grade-10 exposure), **FOYC+HFLE** (grade-6 exposure), and **FOYC+BFOOY** (grade-6 and grade-10 exposure). All statistical analyses were conducted using the software SAS v.9.4 (SAS Institute Inc, Cary, NC).

For actual behaviors (condom-use and abstinence/protection) we first ran mixed-effects models as described above and then conducted generalized linear mixed models (PROC GLIMMIX) at each assessment controlling for age, gender, baseline condom-use and school clustering. We elected to analyze the behavioral data in this way because consistent with our guiding theoretic model, Protection Motivation Theory [20], we anticipate that intervention recipients will demonstrate changes in knowledge and skills shortly after the delivery of the intervention, followed by changes in perceptions and intentions, and only subsequently behavioral changes. This timeline may be brief (almost immediate) or prolonged. GLIMMIX model including all time points will calculate overall/average intervention effect on behavioral outcomes and thus might obscure significant effects at one or more times. Use of PROC GLIMMIX at each follow-up (with controlling for baseline difference) would enable identification of late effects.

Results

Comparison of BFOOY-CImPACT, BFOOY-GFI, BFOOY-ONLY and HFLE-ONLY over two years post-intervention

Baseline data—Of the 2564 youth who participated in the grade-10 trial (mean age=14.5 years, SD=0.7), 772 youth (339 males) were randomized to *HFLE-ONLY*, 664 (277 males) to *BFOOY-CImPACT*, 559 (247 males) to *BFOOY-GFI*, and 569 (254 males) to *BFOOY-ONLY*. Unless otherwise specified, *HFLE-ONLY* served as the reference group for comparison between groups. At baseline in grade-10 (see Supplemental Table A for means and SDs) the *BFOOY-ONLY* group had significantly higher condom-use skills [$F(3,2484)=3.49, p<0.05$] and significantly higher HIV knowledge [$F(3,2554)=3.31, p<0.05$]. The *BFOOY-CImPACT* and *BFOOY-GFI* groups had higher abstinence/protection ($\chi^2=8.23, p<0.05$). Otherwise the four groups did not differ on the basis of gender, age or risk or protective perceptions or behaviors at baseline.

Longitudinal follow-up—Mixed models, presented in Table 1a, demonstrate longitudinal change *in perceptions and knowledge* based on the grade-10 intervention received. The analyses reveal a significant effect of gender. Females were more likely to demonstrate higher HIV/AIDS knowledge and report higher parent-adolescent communication about sex related topics, while males had higher condom-use skills and self-efficacy. Overall, HIV/AIDS knowledge, condom-use skills, and condom-use self-efficacy significantly increased

with time. There was a significant main effect of higher condom-use skills for all groups and BFOOY-ONLY also showed higher HIV/AIDS knowledge. Analysis of the time*intervention group interaction revealed that *BFOOY-CImPACT* was the only group to show continued significant increases in condom-use skills over 24 months follow-up. *BFOOY-ONLY* youth reported declines in parent-adolescent communication about sex over time. *BFOOY-CImPACT* youth reported increasing parent-adolescent communication.

Results from mixed models (not controlling for prior FOYC exposure) assessing the *behavioral effects* of the grade-10 intervention exposure are shown in Table 2a and discussed in this paragraph. (Rates (percentages) at each follow-up period, are displayed in Supplemental Table B.) These analyses did not reveal significant intervention effects over the full 24 month period. However, as the youth advance in age, self-reported abstinence/protection decreased [$\beta=-0.17$, $SE=0.07$, $t=-2.56$, $p<0.01$]. Males were also more likely to report lower abstinence/protection [$\beta=-0.65$, $SE=0.11$, $t=-6.15$, $p<0.01$]. There was also a significant time effect in which both abstinence/protection [$\beta=-0.23$, $SE=0.06$, $t=-3.65$, $p<0.01$] and condom-use consistency decrease [$\beta=-0.15$, $SE=0.07$, $t=-2.00$, $p<0.05$]. To explore the possibility of significant differences at each follow-up, we then conducted analyses using PROC GLIMMIX (controlling for baseline difference, age, gender and school clustering effect). Generalized linear mixed models revealed that youth in the *BFOOY-CImPACT* group reported significantly greater condom-use consistency at 18 months [$\beta=1.18$, $SE=0.34$, $t=3.46$, $p<0.01$] and at 24 months [$\beta=0.87$, $SE=0.33$, $t=2.61$, $p<0.05$] and greater abstinence/protection at 24 months [$\beta=0.44$, $SE=0.16$, $t=2.74$, $p<0.01$]. The *BFOOY-GFI* youth reported greater abstinence/condom-use at 18 months [$\beta=0.45$, $SE=0.19$, $t=2.32$, $p<0.05$] and 24 months [$\beta=0.48$, $SE=0.17$, $t=2.81$, $p<0.01$]. [See Table 2a.]

Comparative effects of prior intervention exposure in Grade-6 on Grade-10 intervention effects

(While the data is presented in the text that follows, interested readers can find subgroups means and SD in Supplemental Table C (non-FOYC exposed) and Supplemental Table D (FOYC-exposed).

Persisting effects of FOYC exposure in general (FOYC Exposed compared to NON-FOYC exposed)—To address the question as to whether a child benefits from repeated receipt of an intervention (e.g., in *both* grade-6 and in grade-10), we examined the impact of BFOOY in grade-10 according to prior FOYC exposure in grade-6.

As previously reported [18,19], at baseline in grade-10, prior to receipt of either BFOOY or HFLE, those youth who had attended schools receiving FOYC in grade-6 (N=530) exhibited higher condom-use skills, HIV/AIDS knowledge, and condom-use self-efficacy than youth in schools not receiving FOYC (N=1579). In terms of *improvements* in HIV-prevention skills, youth who had not been exposed to FOYC in grade-6 demonstrated greater positive change as a result of receipt of BFOOY. However, in terms of the actual scores regarding HIV prevention skills, youth who had received FOYC in grade-6 demonstrated higher skills through grade-12 than those who had not. With regard to skill-change scores, at 24 months

follow-up in the grade 10 study (which corresponds to the 72 month follow-up for youth who were originally also in the grade-6 study), youth who had *not* (compared to youth who *had*) received FOYC in grade-6 displayed significantly higher change scores in condom-use skills [0.07 *vs* 0.10; $t(1567)=3.78, p<0.01$] and self-efficacy [0.69 *vs* 0.52; $t(1627)=3.30, p<0.01$]. Change scores in parent-adolescent communication about sex [0.02 *vs* 0.09; $t(1619)=-0.96, p=0.34$] and HIV/AIDS knowledge [0.07 *vs* 0.06; $t(1644)=1.30, p=0.20$] did not differ according to prior FOYC exposure. Condom-use intention change scores, while not significantly different based on prior FOYC exposure [0.26 *vs* 0.07; $t(1598)=1.88, p=0.06$] were marginally greater among those not previously exposed to FOYC. With regard to overall skill performance, after controlling for gender and age and grade-10 baseline differences, condom-use skills continued to be significantly higher for youth exposed to FOYC in grade-6 at the six month [$F(4,1658)=4.84, p<0.05$], 12 month [$F(4,1558)=10.98, p<0.01$], and 18 month follow-ups [$F(4,1528)=4.54, p<0.05$] as did HIV/AIDS knowledge at six months [$F(4,1754)=4.66, p<0.05$]. Condom-use self-efficacy, condom-use intention and parent-child communication about sex did not differ by FOYC exposure. Logistic regression did not identify significant differences in condom-use consistency or abstinence/protection between those who had and had not been exposed in grade-6.

Effect of prior FOYC exposure (yes/no) according to grade-10 intervention

exposure—To examine the question as to the contribution of the four grade-10 intervention categories (*BFOOY-CImPACT*, *BFOOY-GFI*, *BFOOY-ONLY*, and *HFLE-ONLY*) in the absence or presence of prior FOYC exposure, the data were stratified by grade-6 FOYC exposure and general linear modeling was employed to examine the differences between the four grade-10 intervention groups, at each timepoint.

No prior FOYC exposure in grade-6 (N=1579): At baseline in the grade-10 study, there were no significant differences in any outcome variable between the grade-10 intervention groups *among youth who had not received FOYC in grade-6* (see Supplemental Table C). As previously reported [6], through 18 months follow-up among these FOYC-naïve youth, compared to HFLE-ONLY youth, *BFOOY-CImPACT* youth consistently exhibited significantly higher condom-use skills and HIV/AIDS knowledge; *BFOOY-GFI* and *BFOOY-ONLY* youth performed better in these tasks on one or more occasions. In the present analysis, at 24 months, condom-use skills remained significantly higher for the *BFOOY-CImPACT* and *BFOOY-ONLY* youth [$F(6,1163)=8.80, p<0.01$]. Parent-adolescent communication about sex was significantly higher among *BFOOY-CImPACT* youth compared to those without CImPACT exposure (e.g., compared to *BFOOY-GFI* at six months [$F(6,1296)=2.85, p<0.05$], to *BFOOY-GFI* and *BFOOY-ONLY* at 12 months [$F(6,1224)=5.93, p<0.05$] and 18 months [$F(6,1201)=3.41, p<0.05$] and to *BFOOY-ONLY* at 24 months [$F(6,1208)=3.32, p<0.05$]. Intention to use a condom and condom-use self-efficacy did not differ between groups.

Logistic regression revealed that the effect of intervention group on condom-use consistency was marginally significant at 18 months ($\chi^2=6.30, p=0.098$); specifically, *BFOOY-CImPACT* had greater odds of reporting consistent condom use ($\chi^2=5.13, p<0.05$; OR=2.87

and 95% CI:1.19~6.95). The *BFOOY-ONLY* group reported lower abstinence/protection at six months ($\chi^2=7.67, p<0.01$; OR=0.44; 95% CI:0.25~0.76).

Prior FOYC exposure was received in grade-6 (N=530): Among youth who had all received FOYC in grade-6, analyses did not reveal baseline differences between the grade-10 intervention groups (see Supplemental Table D). *BFOOY-CImPACT* youth expressed greater intention to use a condom compared to *BFOOY-GFI* youth at six months follow-up [$F(6,413)=2.88, p<0.05$], and greater condom-use skills at 12 months [$F(6,380)=2.83, p<0.05$] compared to the *HFLE-ONLY* youth. *BFOOY-CImPACT* youth displayed higher parent-adolescent communication at 18 months [$F(6,370)=2.88, p<0.05$]. There were no differences in condom-use self-efficacy, HIV/AIDS knowledge, condom-use consistency or abstinence/protection at any follow-up period among this subset of youth.

Grade-10 intervention exposures on outcomes accounting for FOYC exposure

—The purpose of these analyses was to determine if apparent effects of grade-10 exposure to the various intervention conditions remained after controlling for grade-6 exposure to FOYC. As presented in Table 1b, the analytic approach was identical to that conducted for the analyses shown in Table 1a, *except that exposure to FOYC in grade-6 (yes/no) was also included in the mixed models*; that is the models were conducted as to account for both grade-6 and grade-10 intervention exposures on *perceptions and skills*. Having been exposed to FOYC in grade-6 was a significant predictor of condom-use skills, HIV/AIDS knowledge, and condom-use self-efficacy. After controlling for FOYC exposure, condom-use skills increased among only those exposed to *BFOOY-CImPACT* through 24-months follow up. The *BFOOY-ONLY* group showed significant decreases in parent-adolescent communication about sex, while the *BFOOY-CImPACT* showed significant increases through 24 months.

With regard to actual behavioral effects after controlling for prior FOYC exposure, longitudinal generalized linear mixed model analyses were similar to models without FOYC. Age [$\beta=-0.17, SE=0.07, t=-2.56, p<0.05$], gender [$\beta=-0.65, SE=0.11, t=-6.15, p<0.01$], and time [$\beta=-0.23, SE=0.06, t=-3.46, p<0.01$] significantly decreased abstinence/protection. The intervention groups continued to demonstrate no overall significant behavioral differences. However, when we then conducted generalized linear mixed models at each timepoint controlling for baseline differences, age, gender, school clustering *and prior FOYC exposure*, we again found significant effects at 18 and 24 months follow-up. As shown in Table 2b, *BFOOY-CImPACT* youth displayed higher condom-use consistency in the 18-month model [$\beta=1.19, SE=0.35, t=3.42, p<0.01$] and the 24-month model [$\beta=0.87, SE=0.34, t=2.56, p<0.05$]. Abstinence/protection was higher among *BFOOY-CImPACT* youth at 24 months [$\beta=0.41, SE=0.16, t=2.52, p<0.05$] and among *BFOOY-GFI* youth at 18 months [$\beta=0.44, SE=0.20, t=2.20, p<0.05$] and 24 months [$\beta=0.47, SE=0.18, t=2.64, p<0.01$].

Comparison of no grade-6 (FOYC) exposure or no grade-10 (BFOOY) exposure or neither intervention exposure versus both (FOYC+BFOOY) interventions among youth followed from grade-6 (n=598)

These analyses, in which we follow youth from grade-6 through grade-12, take advantage of the fact that 598 youth were enrolled in both the grade-6 and the grade-10 studies and thus we have data on the youth at roughly six-month intervals throughout the seven years. Therefore, to be included in this subanalysis youth must have participated in both longitudinal trials. Of those youth, 51 (19 males) were assigned to **WW+HFLE**, 179 (72 males) to **WW+BFOOY**, 88 (46 males) to **FOYC+HFLE**, and 280 (129 males) to **FOYC+BFOOY** group. Groups did not differ at baseline in grade-6 prior to receipt of either FOYC or BFOOY on measured outcomes (See Figure 2).

Table 3 demonstrates the incremental effects of the various combinations of the grade-6 and grade-10 interventions over time. Gender effects were also found among this subsample. Males exhibited significantly higher condom-use skills and condom-use self-efficacy and females show higher HIV/AIDS knowledge. For all youth, condom-use skills, HIV/AIDS knowledge, condom-use self-efficacy, and condom-use intention displayed significant increases with time [18, 19]. Significant main effects for intervention showed that compared to youth who received both FOYC and BFOOY, **WW+BFOOY** had significantly lower condom use skills, HIV/AIDS knowledge, condom use self-efficacy and intention and **WW+HFLE** had lower HIV/AIDS knowledge. Compared to the **WW+HFLE**, **FOYC+HFLE** had higher condom-use skills, HIV/AIDS knowledge and condom-use intention.

To examine the effect of intervention exposure and the rate of change over time we analyzed the time*intervention group interaction. Youth in groups exposed to FOYC and/or BFOOY (**FOYC+BFOOY**, **WW+BFOOY**, **FOYC+HFLE**) displayed significant increases in condom use skills up to 72 months follow-up compared to the **WW+HFLE** group. Youth receiving **FOYC+BFOOY** and **WW+BFOOY** displayed significantly higher rates of change in condom-use self-efficacy up to the 72-month follow-up compared to youth having received both control conditions, **WW+HFLE**; however, when compared to the **WW+BFOOY** group the rate of change for **FOYC+BFOOY** was significantly lower. The **WW+BFOOY** also showed significant increases in condom-use intention. Behavioral effects were not seen; models would not converge with baseline responses in the model.

Discussion

Seeking to address global questions as to the timing of HIV-prevention efforts targeting youth and the possible additional benefits of parental participation, Bahamian health educators embarked on a research platform involving two sequential longitudinal trials of an evidence-based intervention spanning the adolescent years.

Through grade-12, involvement of parents as part of the HIV-risk reduction intervention confers additional protective benefits including increased rates of consistent condom-use and abstinence/protected sex and increased condom-use skills. Receipt of BFOOY in grade-10 has previously been shown to result in improvements in condom-use skills, condom-use efficacy and HIV knowledge at six months and some continued benefits at 12 and 18 months

[6]. The current results show the inclusion of the parent intervention (CImPACT) sustained condom use skills through the 24 month follow-up period. We speculate that this enduring effect may result from increases in parent and adolescent communication about sex. Furthermore, as previous results [18, 19] have shown, the current findings reveal that receipt of the grade-6 HIV-prevention intervention conferred lasting benefits regarding condom-use skills. By the beginning of grade-10 youth who had received FOYC have higher skills and knowledge. Youth who had not received the grade-6 intervention do not have the same protection during the middle school years; however, these youth experienced significantly greater improvement over baseline as a result of the grade-10 intervention, suggesting that “catch-up” can occur. As the descriptive data shows, the youth who were enrolled in both studies but only received the intervention in grade-6 demonstrated increased skills and self-efficacy throughout junior-high-school and to a lesser extent, high-school, while those receiving it in grade-10 enjoyed this benefit only in the high-school years. Thus, if for curricular-time, cost or other considerations, the intervention could be delivered in only one grade, delivery in grade 6 would be the preferred time. However, the rate at which condom-use skills and self-efficacy increased from grade-10 to grade-12 among the youth who only received the intervention in grade-10 is more pronounced than that seen among the youth who received it in grade-6. Despite the “natural” increases that occur over time as a function of age and exposure among the control youth, youth who received either or both interventions had greater protection. Thus, even though receipt of the intervention in grade-6 seems to be more impactful than in grade-10, older youth who have not previously received it (and to a lesser extent those for whom it is a ‘booster’) also derive benefit. Given that some youth may not receive the intervention in grade-6, it appears prudent to provide the training in both.

The intervention impact on HIV/AIDS knowledge was more marked in the early years, perhaps suggesting that in countries with considerable public health education about HIV, the general population will become aware of HIV facts during their adolescent years. By contrast, condom-use skills were consistently higher in the intervention groups, especially the group including the parents, suggesting the overall need for such education and that parental involvement in this aspect of HIV education can be reinforcing [22,23]. The behavioral effects were more apparent over time, probably reflecting the normative increase in sexual activity, but underscoring the importance of enduring intervention effects such as condom-use skills. The fact that these effects were not immediately apparent (e.g. in months 6 or 12) is consistent with our guiding theoretic model, Protection Motivation Theory, which posits a “chain” of events beginning with acquisition of knowledge, leading to new skills and perceptions, then intentions and finally behaviors.

The fact that all four groups experienced high condom-use intentions, but only those with parent interventions experienced significantly higher protected sex suggests the importance of the role of parents. The parent-adolescent communication intervention, but *not* the career-planning intervention, increased condom-use skills and parent-adolescent communication about sex. However, both parent interventions were impactful on behavior, suggesting that involvement of the parents in the sexual education of their youth has an enduring effect. The finding that the GFI parent intervention had a positive impact on abstinence/protection at 18 and 24 months follow-up was not predicted and had not been seen in the grade-6 FOYC trial

[15]. We speculate that in contrast to parents of younger children, parents of high school youth may have used the GFI video to discuss career planning with their youth. The youth may have made the appropriate connection to the BFOOY curriculum discussion about the negative impact of an unintended pregnancy or HIV infection on an individual's career. It is noteworthy that the BFOOY-ONLY youth, in contrast to the two-groups receiving a parent intervention, experienced decay over time in terms of protected sex, suggesting the role of parents in maintaining vigilant behavior on the part of the youth.

Finally, also worth noting are the significant baseline differences between males and females; condom-use skills and self-efficacy are higher among males, while HIV/AIDS knowledge is higher among females. As reported previously through 18 months follow-up [6], both genders responded to the three grade-10 intervention options, although males continued to demonstrate greater condom-use skills and self-efficacy and females greater knowledge. Despite the theoretic prediction of our guiding model of behavior (Protection Motivation Theory [20]) the increased condom-use skills and self-efficacy seen among males did not lead to more consistent use of condoms compared to females; this lack of expected association has been noted by others using different theoretic models [24].

Potential limitations

With the exception of the condom-use skills and HIV/AIDS knowledge, these data are self-reported. The youth followed from grade-6 through grade-12 represent only a subset of those youth who were present in both studies. However, a prior analysis assessing demographic and risk profiles indicated that the subset was representative of the sample as a whole [17]. The finding among the subset of youth enrolled in both the grade-6 and grade-10 studies that condom-use skills and self-efficacy remained strong throughout high school among those youth who received FOYC in grade-6 with or without receipt of BFOOY in grade-10 is encouraging and speaks to the importance of early intervention. However, given the small sample size of this subset and lack of any behavioral effect in these subgroups, the data should not be taken to indicate that a high school intervention is not needed among youth who received a previous intervention in elementary school. The increase in unprotected sex noted among *BFOOY-ONLY* youth at six months post-intervention is perplexing but may reflect the higher risk propensity noted in this group of youth at baseline; it did not reappear in subsequent follow-ups.

Conclusions

These results are informative for nations using research to guide resource investment for HIV-prevention and sexual risk-reduction in general. The HIV-risk reduction intervention delivered in either or both grade-6 and grade-10 had protective effects which were sustained over time; receipt of both interventions appears to confer additional benefits spanning a greater time period. This finding suggests that school-based programs delivered at different developmental periods are important both for youth who may have missed the intervention earlier in adolescence and to reinforce waning intervention effects, especially self-efficacy. These results support the recommendation of the United Nations and others to offer HIV prevention interventions at several points across the developmental continuum. [7-9]. Of interest, condom-use skills are high in all groups by late adolescence regardless of

intervention exposure although through middle school, receipt of FOYC offered substantial protection. Condom-use intentions, at least as far as our single item measure can detect, appear to converge at a high plateau among all four groups. These data also provide strong support the United Nations General Assembly's recommendation that parents be included in HIV prevention efforts targeting adolescents [3].

A cost-benefit analysis of HIV-prevention at repeated intervals beginning in elementary school with parental involvement compared to other more limited strategies is needed. As well, greater understanding of the mechanisms of intervention effect and how these mechanisms change over time could be obtained through a longitudinal mediation analysis.

The original interventions from which FOYC(BFOOY)+CimPACT were adapted [12] were developed for American youth living in public housing in a US city a decade ago. Despite these differences in audience and time, as well as the substantially lower HIV prevalence in the US setting compared to that in the Bahamian setting and differences in intervention administration (small groups of same-gender friends in community settings rather than mixed-gender classrooms and one-on-one delivery of the parent intervention rather than in small groups) the intervention impacts were generally quite similar [26-28]. The fact that intervention impacts are transferable across time, distance and culture is encouraging news for the global effort against the HIV/AIDS epidemic [2-4].

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Figure 1.
CONSORT flowchart for grade-10 HIV prevention intervention randomized control trial and intersection with grade-6 HIV prevention intervention trial

Figure 2.

Variables by grade-6 (WW or FOYC) and grade-10 exposure (HFLE or BFOOY) among through 72 months follow up among 598 students enrolled in both trials in New Providence, The Bahamas

Note: BFOOY=Bahamian Focus on Older Youth (grade 10 HIV experimental intervention); FOYC= Focus on Youth in the Caribbean (grade six HIV experimental intervention); HFLE= Health and Family Life Education (standard of care condition for grade 10); WW=Wondrous Wetlands (standard of care for grade six)

Table 1
Mixed Effect Models for youth (BFOOY or HFLE) and parent intervention (CImPACT or GFI) exposure (time as continuous) in grade-10 among 2564 students attending the eight government high schools in New Providence, The Bahamas: 1a) without controlling for prior FOYC exposure; and 1b) with controlling for prior FOYC exposure)

	Condom-Use Skills			HIV/AIDS Knowledge			Condom Use Self-Efficacy			Condom Use Intention			Parent-Adolescent Communication		
	β	SE	t	β	SE	t	β	SE	t	β	SE	t	β	SE	t
A. Not controlling for prior FOYC exposure															
<i>Fixed effects</i>															
Intercept	0.63	0.03	19.43**	0.82	0.03	27.72**	1.95	0.20	9.55**	4.04	0.29	13.74**	2.56	0.27	9.37*
Age	0.00	0.00	-0.08	0.00	0.00	-1.88	0.10	0.01	6.73**	0.02	0.02	0.91	0.01	0.02	0.63
Gender	0.02	0.00	5.38**	-0.03	0.00	-7.03**	0.52	0.03	18.35**	0.06	0.03	1.67	-0.19	0.04	-4.56**
Time (Continuous)	0.02	0.00	9.54**	0.02	0.00	10.96**	0.12	0.01	9.88**	0.02	0.02	0.87	0.00	0.02	0.19
<i>Intervention Group¹</i>															
BFOOY-ONLY	0.02	0.01	2.74**	0.02	0.01	2.96**	0.07	0.05	1.38	0.04	0.08	0.57	0.04	0.07	0.54
BFOOY-GFI	0.02	0.01	2.11*	0.02	0.01	1.94	-0.02	0.05	-0.37	-0.10	0.08	-1.33	0.05	0.07	0.68
BFOOY-CImPACT	0.02	0.01	2.08*	0.01	0.01	0.88	0.04	0.05	0.71	-0.09	0.07	-1.18	0.01	0.07	0.10
<i>Intervention Group*Time</i>															
BFOOY- ONLY	0.00	0.00	0.42	0.00	0.00	-0.68	-0.01	0.01	-0.76	-0.02	0.02	-0.75	-0.03	0.02	-2.10*
BFOOY-GFI	0.00	0.00	0.59	0.00	0.00	-0.74	0.01	0.01	0.70	0.03	0.02	1.39	-0.02	0.02	-1.03
BFOOY-CImPACT	0.01	0.00	3.87**	0.00	0.00	0.75	0.01	0.01	1.18	0.02	0.02	0.93	0.03	0.02	2.04*
<i>Random Effects</i>															
School	0.00	0.00	2.11*	0.00	0.00	1.90*	0.00	0.00	0.83	0.00	0.00	0.33	0.00	0.00	1.17
Student (nested w/in school)	0.01	0.00	25.18**	0.01	0.01	26.35**	0.39	0.01	27.10**	0.39	0.02	19.34**	0.85	0.03	29.35**
B. Controlling for prior FOYC exposure															
<i>Fixed effects</i>															
Intercept	0.64	0.03	19.38**	0.77	0.03	25.74**	2.40	0.21	11.60**	4.02	0.30	13.34**	2.39	0.28	8.54**
Age	0.00	0.00	0.06	0.00	0.00	-1.34	0.10	0.01	7.06**	0.03	0.02	1.20	0.01	0.02	0.51
Gender	0.02	0.00	5.29**	-0.03	0.00	-6.80**	0.53	0.03	18.66**	0.06	0.03	1.69	-0.19	0.04	-4.49**

	Condom-Use Skills			HIV/AIDS Knowledge			Condom Use Self-Efficacy			Condom Use Intention			Parent-Adolescent Communication		
	β	SE	t	β	SE	t	β	SE	t	β	SE	t	β	SE	t
FOYC Exposure															
Exposed	0.05	0.01	8.65**	0.02	0.01	4.30**	0.11	0.04	3.20**	0.04	0.04	0.85	-0.05	0.05	-0.88
Exposure Unknown	0.00	0.01	0.73	0.00	0.01	-0.31	-0.01	0.04	-0.13	0.03	0.05	0.56	0.05	0.06	0.77
Time (continuous)	0.02	0.00	9.35**	0.02	0.00	10.18**	0.11	0.01	8.98**	0.00	0.02	0.24	0.00	0.02	0.13
Intervention Group¹															
BFOOY-ONLY	0.02	0.01	2.91**	0.02	0.01	2.81**	0.05	0.05	0.91	0.02	0.08	0.27	0.04	0.07	0.60
BFOOY-GFI	0.02	0.01	2.11*	0.02	0.01	2.04*	-0.03	0.05	-0.58	-0.13	0.08	-1.59	0.04	0.08	0.58
BFOOY-CImPACT	0.02	0.01	2.07*	0.00	0.01	0.61	0.01	0.05	0.29	-0.11	0.07	-1.41	0.02	0.07	0.24
Intervention Group*Time															
BFOOY- ONLY	0.00	0.00	0.49	0.00	0.00	-0.20	0.00	0.01	-0.16	-0.01	0.02	-0.31	-0.03	0.02	-2.04*
BFOOY-GFI	0.00	0.00	0.59	0.00	0.00	-0.79	0.01	0.01	1.06	0.04	0.02	1.81	-0.01	0.02	-0.76
BFOOY-CImPACT	0.01	0.00	3.78**	0.00	0.00	1.24	0.02	0.01	1.66	0.03	0.02	1.31	0.03	0.02	2.12*
Random Effects															
School	0.00	0.00	2.10*	0.00	0.00	1.96*	0.00	0.00	0.00	0.00	0.00	0.54	0.00	0.00	1.14
Student (nested w/in school)	0.01	0.00	24.41**	0.01	0.00	25.98**	0.38	0.01	26.57**	0.39	0.02	18.96**	0.85	0.03	28.86**

Note: BFOOY=Bahamian Focus on Older Youth; GFI=Goal for It; CImPACT= Caribbean Informed Parents and Children Together; HFLE= Health and Family Life Education (standard of care condition); ONLY=Parents did not receive an intervention; FOYC=Focus on Youth in the Caribbean

¹Reference group = HFLE-ONLY

* p<0.05,

** p<0.01

Table 2

Generalized Mixed Effect Models for youth (BFOOY or HFLE) and parent intervention (ClimPACT or GFI) on Condom use consistency and abstinence/protected up to 24 months follow-up by BFOOY and parent intervention exposure in grade-10 among 2564 students attending the eight government high schools in New Providence, The Bahamas: 2a) without controlling for prior FOYC exposure; and b) with controlling for prior FOYC exposure

	a. Not controlling for prior FOYC				b. Controlling for prior FOYC exposure			
	Condom-Use Consistency		Abstinence/Protect		Condom-Use Consistency		Abstinence/Protect	
	B	SE	t-value	B	SE	t-value	B	SE
6 months								
<i>Fixed Effects</i>								
Intercept	0.98	2.74	0.36	2.67	1.80	1.48	0.30	2.81
Age	0.04	0.17	0.23	-0.14	0.11	-1.26	0.08	0.18
Gender (ref girls)	-0.17	0.26	-0.66	0.49	0.16	2.98**	0.16	0.26
Baseline	1.35	0.24	5.60**	1.99	0.20	10.03**	-1.30	0.25
Intervention Group								
BFOOY-ONLY	-0.15	0.33	-0.46	-0.35	0.23	-1.5	-0.23	0.33
BFOOY-GFI	-0.12	0.36	-0.33	-0.02	0.25	-0.07	-0.18	0.37
BFOOY-ClimPACT	-0.01	0.34	-0.04	0.01	0.24	0.02	-0.10	0.34
FOYC Exposure								
Exposed							-0.33	0.29
Exposure uncertain							-0.16	0.36
<i>Random Effects¹</i>								
School	0.10	0.11	0.92	0.13	0.08	1.48	0.09	0.11
12 months								
<i>Fixed Effects</i>								
Intercept	2.80	2.55	1.10	3.30	1.54	2.14*	3.17	2.63
Age	-0.14	0.16	-0.91	-0.18	0.09	-1.90	-0.13	0.16
Gender (ref girls)	0.54	0.24	2.21*	-0.16	0.14	-1.17	-0.51	0.25
Baseline	1.12	0.24	4.59**	1.57	0.20	7.90**	1.12	0.25
Intervention Group								
BFOOY-ONLY	-0.08	0.30	-0.28	-0.15	0.19	-0.77	-0.12	0.30
							-0.17	0.19

b. Controlling for prior FOYC exposure									
a. Not controlling for prior FOYC									
Condom-Use Consistency		Abstinence/Protect		Condom-Use Consistency		Abstinence/Protect			
B	SE	t-value	B	SE	t-value	B	SE	t-value	B
BFOOY-GFI	0.49	0.34	1.45	0.34	0.21	1.61	0.43	0.35	1.25
BFOOY-CImPACT	0.52	0.32	1.63	0.10	0.19	1.10	0.45	0.32	1.39
FOYC Exposure									
Exposed						-0.17	0.28	-0.62	0.06
Exposure uncertain						0.05	0.35	0.13	0.35
<i>Random Effects</i>									
School				0.05	0.05	1.03			0.03
18 months									
<i>Fixed Effects</i>									
Intercept	1.33	2.79	0.48	3.16	1.56	2.02	1.54	2.87	0.54
Age	-0.07	0.17	-0.40	-0.17	0.09	-1.80	-0.06	0.17	-0.36
Gender (ref girls)	0.24	0.25	-0.96	0.22	0.13	1.64	-0.25	0.25	-0.98
Baseline	0.70	0.25	2.80*	1.14	0.20	5.58**	0.70	0.26	2.75*
Intervention Group									
BFOOY-ONLY	0.58	0.32	1.82	0.01	0.18	0.08	0.62	0.33	1.91
BFOOY-GFI	0.63	0.34	1.87	0.45	0.19	2.32*	0.64	0.34	1.87
BFOOY-CImPACT	1.18	0.34	3.46**	0.23	0.18	1.28	1.19	0.35	3.42**
FOYC Exposure									
Exposed							-0.34	0.29	-1.17
Exposure uncertain							0.02	0.37	0.04
<i>Random Effects</i>									
School	0.10	0.11	0.85	0.04	0.04	0.99	0.12	0.13	0.94
24 months									
<i>Fixed Effects</i>									
Intercept	-1.18	2.56	-0.46	3.62	1.36	2.65**	1.27	2.62	0.48
Age	0.02	0.15	0.15	-0.21	0.08	-2.67**	-0.04	0.15	-0.24
Gender (ref girls)	0.57	0.24	2.40*	0.07	0.13	0.56	-0.58	0.24	-2.39*
Baseline	0.85	0.24	3.51**	1.34	0.20	6.80**	-0.81	0.25	-3.27**

	a. Not controlling for prior FOYC						b. Controlling for prior FOYC exposure					
	Condom-Use Consistency			Abstinence/Protect			Condom-Use Consistency			Abstinence/Protect		
	B	SE	t-value	B	SE	t-value	B	SE	t-value	B	SE	t-value
Intervention Group												
BFOOY-ONLY	0.43	0.32	1.34	0.04	0.16	0.24	0.45	0.33	1.37	0.03	0.16	0.21
BFOOY-GFI	0.34	0.34	1.02	0.48	0.17	2.81**	0.35	0.34	1.02	0.47	0.18	2.64**
BFOOY-ClimPACT	0.87	0.33	2.61*	0.44	0.16	2.74**	0.87	0.34	2.56*	0.41	0.16	2.52*
FOYC Exposure												
Exposed							-0.37	0.29	1.30	-0.13	0.15	-0.85
Exposure uncertain							0.35	0.36	0.97	0.07	0.18	0.39
Random Effects												
School	0.15	0.15	1.02				0.20	0.17	1.16			

Note: BFOOY=Bahamian Focus on Older Youth; GFI=Goal for It; ClimPACT= Caribbean Informed Parents and Children Together; HFLE= Health and Family Life Education (standard of care condition); ONLY=Parents did not receive an intervention.

*Where variance components of the random effect equaled zero school clustering was removed from the model

Table 3
Mixed Effects Models examining the effect of exposures to BFOOY or HFLE in grade-10 and FOYC of GFI in grade-6 among 598 students enrolled in both trials in New Providence, The Bahamas

	Condom Use Skills			HIV/AIDS Knowledge			Condom Use Self-Efficacy			Condom Use Intention		
	β	SE	t	β	SE	t	β	SE	t	β	SE	t
<i>Fixed Effects</i>												
Intercept	0.45	0.04	12.24**	0.73	0.04	20.13**	1.74	0.25	6.90**	2.44	0.37	6.55**
Age	0.00	0.00	1.11	-0.01	0.00	-2.45*	0.05	0.02	1.99*	0.04	0.03	1.14
Gender	0.02	0.01	2.80**	-0.03	0.01	-4.48**	0.36	0.05	6.68**	0.04	0.06	0.65
Time (continuous)	0.01	0.00	4.59**	0.04	0.00	14.55**	0.14	0.02	7.28**	0.14	0.03	4.41**
Intervention Group												
FOYC+BFOOY (ref=WW+HFLE)	0.04	0.02	1.86	0.06	0.02	3.10**	0.12	0.14	0.85	0.36	0.19	1.85
FOYC+HFLE (ref=WW+HFLE)	0.05	0.02	2.14**	0.06	0.02	2.90**	0.27	0.16	1.74	0.51	0.22	2.36*
WW+BFOOY (ref=WW+HFLE)	-0.01	0.02	-0.62	0.01	0.02	0.59	-0.22	0.13	-1.68	-0.13	0.18	-0.71
FOYC+HFLE (ref=FOYC+BFOOY)	0.01	0.01	0.76	0.00	0.01	0.21	0.15	0.10	1.55	0.15	0.14	1.14
WW+BFOOY (ref=FOYC+BFOOY)	-0.05	0.01	-3.37**	-0.05	0.01	-3.47**	-0.34	0.10	-3.38**	-0.48	0.14	-3.46**
WW+HFLE (ref=FOYC+BFOOY)	-0.04	0.02	-1.86	-0.06	0.02	-3.10**	-0.12	0.14	-0.85	-0.36	-0.19	-1.85
Intervention Group *Time												
FOYC+BFOOY (ref= WW+HFLE)	0.01	0.00	4.58**	0.00	0.00	-0.35	0.03	0.01	1.99*	-0.02	0.02	-0.88
FOYC+HFLE (ref= WW+HFLE)	0.01	0.00	2.66**	0.00	0.00	-1.00	0.01	0.01	0.97	-0.04	0.02	-1.76
WW+BFOOY (ref= WW+HFLE)	0.01	0.00	3.85**	0.00	0.00	0.60	0.05	0.01	3.61**	0.01	0.02	0.61
FOYC+HFLE (ref=FOYC+BFOOY)	0.00	0.00	-1.94	0.00	0.00	-1.01	-0.01	0.01	-1.09	-0.02	0.02	-1.44
WW+BFOOY (ref= FOYC+BFOOY)	0.00	0.00	-0.91	0.00	0.00	1.58	0.02	0.01	2.85**	0.03	0.01	2.45*
WW+HFLE (ref= FOYC+BFOOY)	-0.01	0.00	-4.58**	0.00	0.00	0.35	-0.03	0.01	-1.99*	0.02	0.02	0.88
Study				-0.14	0.01	-25.24**						
<i>Random Effects</i>												
School	0.00	0.00	1.62	0.00	0.00	1.59	0.01	0.01	1.41	0.03	0.02	1.64
Student (nested w/in school)	0.00	0.00	11.60**	0.01	0.01	14.46**	0.36	0.02	14.30**	0.38	0.03	11.39**

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10.01
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p<0.05
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BFOOY=Bahamian Focus on Older Youth (grade-10 HIV experimental intervention); FOYC= Focus on Youth in the Caribbean (grade-6 HIV experimental intervention); HFLE= Health and Family Life (standard of care condition for grade-10); WW=Wondrous Wetlands (standard of care for grade-6)