Outcomes of a Comprehensive Youth Program for HIV-infected Adolescents in Thailand

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Abstract

We developed an intervention program for HIV-infected Thai adolescents with two group sessions and two individual sessions, focusing on four strategies: health knowledge, coping skills, sexual risk reduction, and life goals. An audio computer-assisted self-interview (ACASI) was administered to assess knowledge, attitudes, and practices (KAP) regarding antiretroviral therapy management, reproductive health, and HIV-associated risk behavior. The program was implemented in two HIV clinics; 165 (84%) adolescents (intervention group) participated in the program; 32 (16%) completed the ACASI without participating in the group or individual sessions (nonintervention group). The median age was 14 years, and 56% were female. Baseline KAP scores of the intervention and nonintervention groups were similar. Two months after the intervention, knowledge and attitude scores increased ($p < .01$) in the intervention group, and the increase was sustained at 6 months. KAP scores did not change from baseline in the nonintervention group at 6 or 12 months after enrollment.

Keywords

adolescents; disclosure; Happy Teen; HIV; education; positive prevention program; transition to adult care

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With the successful scale-up of antiretroviral therapy (ART), perinatally HIV-infected children are surviving and reaching adolescence. These adolescents are at risk for mental health, cognitive, and adaptive difficulties. Studies in the United States have described sexual risk behaviors, including early onset of sexual intercourse and sex without condoms, as well as substance use problems in perinatally HIV-infected adolescents (Bauermeister, Elkington, Brackis-Cott, Dolezal, & Mellins, 2009; Brogly et al., 2007; Elkington, Bauermeister, Brackis-Cott, Dolezal, & Mellins, 2009; Ezeanolue, Wodi, Patel, Dieudonne, & Oleske, 2006; Murphy et al., 2001; Wiener, Battles, & Wood, 2007). A study in Uganda reported that sexually active HIV-infected adolescents in Kampala were less likely to use condoms and oral contraception than uninfected adolescents, and this had significant implications for pregnancy and HIV transmission (Beyeza-Kashesya et al., 2011). In a cohort of sexually active HIV-infected adolescents in Thailand, 47% reported sex with a partner who was uninfected or of unknown HIV status in the previous 30 days; 30% reported having unprotected intercourse (Naar-King et al., 2008).

Many studies have suggested poor virologic response in HIV-infected youth as a result of poor adherence (Mellins, Brackis-Cott, Dolezal, & Abrams, 2004; Rongkavilit et al., 2007; Van Dyke et al., 2002; Wiener, Riekert, Ryder, & Wood, 2004; Williams et al., 2006). Many perinatally HIV-infected adolescents were infected with drug-resistant viruses, requiring more complicated ART regimens that created additional adherence challenges. As these adolescents became sexually active, transmission of drug-resistant viruses was possible. A recent study in the United States found that 42% of sexually active HIV-infected adolescents

had viral loads of more than 5,000 copies/mL, and a quarter of them had resistance to three antiretroviral drug classes (Tassiopoulos et al., 2013).

Prevention with positive studies with adults have shown that interventions were more effective if they were integrated with treatment services in routine care settings (Centers for Disease Control and Prevention [CDC], 2003; Crepaz et al., 2006). A multidisciplinary care team at two large public tertiary care hospitals in Bangkok developed a clinic-based intervention program called the "Happy Teen Program" for HIV-infected adolescents who knew their HIV status. The program aimed to improve knowledge and attitudes in order to improve ART adherence and reduce behavioral risks. Our report describes the Happy Teen Program and the impact of the program on knowledge, attitude, practices, and self-esteem in HIV-infected adolescents participating in the program.

Method

The Intervention Program

The Happy Teen Program was developed with support from the Thailand Ministry of Public Health–U.S. Centers for Disease Control and Prevention Collaboration by a multidisciplinary group of health care providers at two large tertiary public hospitals in Bangkok: Queen Sirikit National Institute of Child Health and Siriraj Hospital. The process of program development included a literature review, focus group discussions with HIV-infected adolescents and caretakers, and several multidisciplinary team meetings to plan intervention activities and content. After pilot testing and internal training, the program was implemented.

The program was based on four main strategies (Table 1), which were delivered in two group sessions and two individual sessions. Strategy 1 focused on health knowledge (i.e., knowledge about HIV and general health). Strategy 2 developed coping skills (i.e., self-esteem and stress management). Strategy 3 aimed to reduce sexual risk (i.e., by focusing on reproductive health, sex, and sexual risk). And Strategy 4 promoted positive life goals (i.e., by focusing on life skills, high-risk behaviors, and life responsibilities). The first group session included health knowledge and coping skills content and the second group session included sexual risk reduction and life goals content. Group sessions were followed by individual sessions tailored to the needs of each adolescent to discuss follow-up issues and concerns. The sessions were scheduled to take place on the day of routine clinic visits.

In an effort to make the program interesting for adolescents, each group session included game-based activities that took 60–90 minutes and contained several questions related to the targeted strategies. Adolescents of similar ages formed the groups. Each group was divided into two to three competing teams of three to five adolescents each to discuss and finalize their answers. A moderator facilitated the discussion, guiding groups to appropriate responses and delivering key messages related to the strategies. Individual sessions conducted by counselors or other trained personnel followed the group sessions at the subsequent clinic visit. Before the session, the adolescents were asked to complete a Youth Counseling Needs Survey Form, a short self-administered screening questionnaire used to identify troubling or interesting issues for discussion during individual sessions. Each

individual session took 30–45 minutes, depending on time availability and individual adolescent needs.

Before the program was implemented, the multi-disciplinary team developed a manual for health care providers and tools to be used in group and individual sessions, such as pamphlets, question cards, and booklets with inspiring stories for adolescents to read on their own. Training was provided for personnel conducting group and individual sessions. The manual of the program can be downloaded at www.cqihiv.com. Examples of the questions in each strategy for group and individual sessions are shown in Table 1.

Participating Population and Intervention

All HIV-infected youth receiving HIV care at the two hospitals and those in Bahn Dhamarak, an orphanage in Thailand, were invited to join the program if they met the eligibility criteria: (a) at least 12 years of age or older than 10 years with current or past sexual risks (i.e., Tanner stage 3, or with sexual risk behaviors, or in an environment that might lead to sexual risk); (b) absence of severe medical conditions that need urgent treatment; (c) absence of serious psychiatric conditions such as depression, suicidal ideation, psychosis, or severe mental retardation; and (d) have had their HIV status disclosed to them by a health care provider or caretaker.

After obtaining informed consent from the caregivers and assent from the adolescents, the adolescents were asked to complete a baseline survey using an audio computer-assisted self-interview (ACASI) to assess their knowledge, attitudes, and practices (KAP) regarding ART management, reproductive health, sexually transmitted infections, and risk behaviors. Participants also completed a self-administered Pictorial Thai Self-Esteem Scale (PTSS; Phattharayuttawat, Ngamthipwatthana, & Pitiyawaranun, 2011) before attending the intervention sessions. The content of the baseline survey and the results have been reported elsewhere (Lolekha et al., 2015). The PTSS was developed and evaluated with 1,039 secondary school students in Thailand. PTSS results strongly correlated with Rosenberg's self-esteem survey ($r = 0.81$), with high reliability coefficients of 0.82–0.89 and test-retest coefficients of 0.81–0.88 (Phattharayuttawat et al., 2011). However, prior to our study, PTSS had not been applied to HIV-infected adolescents.

Adolescents were encouraged to participate in both group and individual sessions. At the end of each group session, the adolescents were asked to complete a one-page satisfaction survey. The ACASI was repeated at 2 months (second ACASI) and 6 months (third ACASI) after the second individual session to evaluate the effects of the intervention sessions on the KAP of the adolescents who participated in any intervention sessions (intervention group). Those adolescents who did not participate in any intervention sessions (nonintervention group) were invited to complete the ACASI and PTSS at enrollment and approximately 6–12 months later (two times). They were the control group in this study.

The study was approved by the institutional review boards of the Faculty of Medicine Siriraj Hospital and the Thai Ministry of Public Health.

Data Analysis

Pre- and post-intervention ACASI KAP and PTSS scores of adolescents in the intervention group were compared to the scores of adolescents in the nonintervention group. Questions were divided into KAP categories based on the nature of the questions, and scores were calculated for each. Knowledge scores were calculated from the number of correct answers (with a maximum score of 18). Attitude scores were calculated using a four-point Likert scale (1 = *strongly disagree* to 4 =*strongly agree*), with negative attitude questions scored reversely (1 = *strongly agree* to 4 = *strongly disagree*). Practice scores were calculated from the percentage of desirable practices chosen. The content of the questions has been published elsewhere (Lolekha et al., 2015).

Chi-squared or Fisher's exact tests were used to test for differences in proportions for demographic characteristics based on the adolescent group (no intervention, partial intervention, and full intervention). Kruskal-Wallis test was used to test for differences in sample distribution of adolescent responses by groups when an assumption of normal distribution was not valid.

We used a Wilcoxon two-sample test and Z-test for proportion to test for a difference in distribution of ACASI scores between the intervention and nonintervention groups. The Wilcoxon signed rank test was used to test for an improvement of ACASI scores over time (1st vs. 2nd, 1st vs. 3rd, and 2nd vs. 3rd), and the McNemar chi-squared test was used to assess changes in practice.

Baseline characteristics related to changes in attitude and knowledge scores after interventions (or at last visit, for the nonintervention group) were estimated by log-binomial regression. Changes were defined as the difference between baseline and after-intervention results (or at last visit, for the nonintervention group) higher than the overall mean of the difference. Bivariate analysis for crude risk ratio used Epi Info 2*2 (95% CI Taylor Series; CDC, Atlanta, GA). Potential exposures with a *p*-value < .10 in univariate analysis were included in the multivariate analysis. Analysis was performed using SAS 9.3 (SAS Institute Inc., Cary, NC).

Results

There were 220 adolescents invited to participate. Of these, 197 (90%) completed the questionnaire; 23 youth or their caretakers declined to participate. Of the 197 adolescents enrolled in the study, 196 were perinatally infected with HIV, 32 (16.2%) did not participate in any intervention session (nonintervention group), 107 (54.3%) participated in all sessions (full intervention group), and 58 (29.4%) participated in some sessions (partial intervention group, Figure 1). The most common reasons given for not joining the sessions were inconvenience for the caretakers or the unwillingness of adolescents to participate. The baseline CD4+T cell count and viral load were not different between the groups; however, adolescents in the nonintervention group were typically older, more likely to be male, in secondary school or higher, cared for by their parents, and had not previously attended an HIV education class arranged by the clinic (Table 2).

Each intervention group session took an average of 85 minutes. The median number of adolescents in each group session was 10 (range 6–14). The results of the satisfaction survey after the first group session was *good* (choices included: *good, no impression,* or *bad*) for 97 (74.6%) of the adolescents, and after the second group session, was *good* for 105 (80.8%). A total of 104 participants (80.0%) felt that the first group session was useful and adaptable to their lives, and 96 (73.8%) felt this way about the second group session. After completing all intervention sessions, 46 (35.7%) adolescents who completed the satisfaction survey responded that the program had changed their thinking and the way they would act, while 56.6% responded *not sure*.

Individual sessions took an average of 30 minutes. The most common issues reported in the Youth Counseling Needs Survey Form were communication problems with caretakers and adherence to ART.

Impact of Intervention Sessions

The ACASI was administered three times to 130 adolescents in the full and partial intervention groups with the median (range) interval from the first (baseline) to the second time of 10 (8–13) months, and to the third time of 14 (12–18) months. In the nonintervention group, ACASI was administered twice to 26 adolescents with the median (range) interval of 9 (7–12) months.

At baseline, there were no differences in KAP scores between adolescents in intervention and nonintervention groups. At the second ACASI, the intervention group had significantly increased knowledge and attitude scores from baseline in most aspects, and the increased scores were sustained in the third ACASI. However, the scores for practice in the intervention group were unchanged between baseline and the second ACASI. During the third ACASI, adolescents reported less regular exercise, more substance abuse, and more sexual risk behavior. In contrast, no change in KAP scores was found in the nonintervention group. The KAP scores were not statistically different between the intervention and nonintervention groups at the second ACASI (Table 3).

The baseline PTSS indicated that 75.4% of adolescents in the intervention group scored in the range of high self-esteem and 24.6% scored moderate self-esteem. The corresponding percentages in the nonintervention group were 88.5% and 11.5% (nonsignificant). None of the adolescents in either group was scored in the low self-esteem range. After the intervention, the self-esteem score of 13% of adolescents in the intervention group and 4% in the nonintervention group ($p = .18$) changed from moderate to high.

Factors Associated With Improved Knowledge and Attitude Scores

In multivariate analysis, the only factor associated with improved knowledge and attitude scores after the intervention program was having baseline knowledge or attitude scores, respectively, below the median (Table 4).

Discussion and Conclusions

The Happy Teen Program provides knowledge, guidance, and counseling to help prevent high-risk behaviors and improve self-esteem and life skills in adolescents that would result in a positive impact on HIV care and future life achievement. We found the program was well accepted by the predominantly perinatally infected adolescents in our study and was feasible to conduct in outpatient clinic settings. The program significantly improved knowledge and attitude scores from baseline scores.

Currently, more than one third of perinatally HIV-infected children in Asia are older than 12 years of age (Chokephaibulkit et al., 2013). Adolescents in all settings, with or without HIV, have psychological, emotional, and behavioral challenges. Adolescents with HIV infection face additional challenges related to their health and stigma. High-risk behaviors in sexually active HIV-infected adolescents could result in poor long-term disease outcomes and may contribute to the spread of HIV, including drug-resistant HIV (Tassiopoulos et al., 2013; Viani et al., 2006). Effective intervention programs that reflect local culture and are adaptable to adolescents are needed. To date, no comprehensive programs for HIV-infected adolescents are available in this region.

The baseline ACASI results of our study cohort have been reported elsewhere (Lolekha et al., 2015). We found that being at the orphanage, more than 15 years of age, and having low attitude scores were associated with low knowledge scores. Being male, with a Tanner stage less than II and low HIV knowledge scores, were associated with low attitude scores (Lolekha et al., 2015). We did not find that any of these factors, however, affected the response to interventions in our study, except for low baseline scores. Despite the improvement in knowledge and attitude score, we did not find improvements in practice scores. Questions in the practice section may be relevant to reaching adulthood (e.g., having a boyfriend/girlfriend, having sexual intercourse) and these scores may naturally decline with age. On the other hand, changing practice may require more intensive and effective interventions of longer duration.

In the United States, two programs for HIV-infected adolescents have been shown to reduce high-risk sexual behavior. The Together Learning Choices program, previously referred to as Teens Linked to Care, is a 23-session (2 hours each) intervention provided by program facilitators to HIV-infected adolescents in small groups (CDC, 2001). Choosing Life: Empowerment, Action, Results (CLEAR) is an 18-session (1.5 hours each) program designed to be delivered by program facilitators working one-on-one with HIV-infected adolescents (CDC, 2013). CLEAR reported significant increases in the proportion of protected sex acts with all sex partners ($p < .01$) and proportion of protected sex acts with HIV-uninfected partners ($p < .05$) than in control participants. However, other targeted outcomes (e.g., substance use, ART adherence, health behaviors, and emotional distress) were not significantly improved by the intervention (CDC, 2013).

Both of those programs required multiple sessions and significant resources that may not be feasible in Thailand and other resource-limited settings. The Happy Teen program is less intensive, easier to implement, and the content of the program may be more appropriate for

early adolescents. Hospital-based programs are challenging to implement due to the workload of the health care team and their lack of adolescent-focused counseling skills. But the advantage of hospital-based interventions is that it allows the intervention to be integrated into routine HIV care. Moreover, in Thai culture, health care providers are respected and influential and may be the most relevant people to provide knowledge about health and HIV. With a clear manual and ready-to-use tools, together with brief training, health care personnel were able to successfully conduct the sessions. The Happy Teen program has currently been adapted for use in several hospitals in Thailand.

An interesting finding in our report was that none of the adolescents in the cohort had low self-esteem, as measured by PTSS. A study in India found that HIV-infected adolescents, many of whom had a sexually acquired infection, had low self-esteem (Mohan & Bedi, 2010) as evaluated by Eysenck's Personality Inventory, Anger Expression Inventory, and Self-Esteem Scale. Low self-esteem has been associated with risk behaviors (Fisher, Schneider, Pegler, & Napolitano, 1991; Stokes & Peterson, 1998) and linked to HIV stigma (Woods, 2012). In contrast, all but one of the adolescents in our study were perinatally infected with HIV and had received counseling and support in routine care for several years during follow-up at HIV clinics.

Our study had several limitations. The intervention and nonintervention groups were not randomized and the sample size was small. In fact, members of the control group were typically older, further along in school, and more likely to be cared for by parents. These differences could have resulted in better baseline ACASI and PTSS score improvements in the nonintervention group, especially in light of the small sample size. Because of the short-term outcome study design, a third ACASI was not completed by the control group and, therefore, precluded the comparison of behavior scores during longer follow-up. With the different baseline ages between groups, it may be difficult to compare scores that were affected by age. Despite these limitations, we were able to demonstrate increased knowledge and attitude scores with the intervention, which were not found in the nonintervention group. Lastly, because the majority of the adolescents in our study were perinatally infected, it is unknown if the program would have impacted behaviorally acquired infections.

In conclusion, an intervention program for HIV-infected adolescents developed in the Thai context and delivered through two group and two individual sessions every 2 to 3 months along with routine clinic visits was feasible. The program was well accepted by adolescents and was able to improve knowledge and attitudes, particularly among those who had low baseline scores. The long-term impact on behavioral outcomes needs further study. Although the long-term impact of the program is unknown, the results are encouraging and suggest that the program could be incorporated into routine comprehensive care for HIV-infected adolescents.

Acknowledgments

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Key Considerations

- The "Happy Teen Program" was developed for perinatally HIV-infected Thai adolescents. The program provided knowledge, guidance, and counseling to help prevent high-risk behaviors and improve self-esteem and life skills that could result in a positive impact on HIV care and future life achievement.

- The program consisted of two group sessions and two individual sessions focusing on four strategies: health knowledge, coping skills, sexual risk reduction, and life goals.

- The interventions were well accepted by adolescents and improved knowledge and attitude, particularly for those who had low baseline knowledge and attitude scores.

- The program could be incorporated into routine comprehensive care for HIV-infected adolescents.
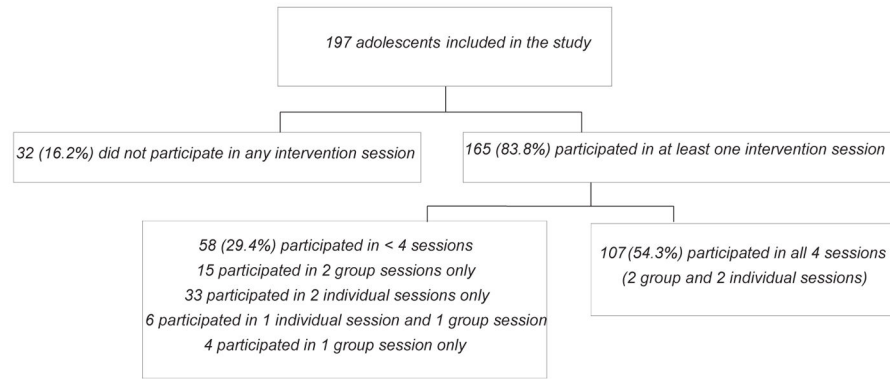
Figure 1.
HIV-infected adolescents included in the study.

Table 1

Example of Questions Used in the Group Sessions Targeted to Each Strategy

Strategies		Sample Questions
Group session 1: Strategies		
1: Health Knowledge (Knowledge about HIV and general health)	**1**	What are the results of good ARV treatment?
	2	What makes an HIV-infected person develop AIDS?
2: Coping Skills (Self-esteem and stress management)	**1**	Judi is angry after being scolded by her caretaker about having to be reminded to take ARV. She feels irritated and does not want to take ARV. What should she do?
	2	Jim woke up late and hurried to school. When he got to school, he realized he forgot to take the morning ARV. What should he do?
Group session 2: Strategies		
3: Sexual Risk Reduction (Reproductive health, sex, and sexual risk)	**1**	John is in the 9th grade and became closer to Jane, a classmate. Before the summer break, John asked her to be his girlfriend. What should Jane do?
	2	On Valentine's Day, your boyfriend asks to have sex with you. What would you do?
4: Life Goals (Life skills, high-risk behaviors, and life responsibilities)	**1**	It's European Football season. Your friend is persuading you to make a bet. What would you do?
	2	Your whole group of friends skips a boring class to go to the mall. What would you do?

Note: ARV = antiretroviral.

Table 2

Baseline Demographic Characteristics of Adolescents Enrolled in the Happy Teen Program ($N = 197$)

Characteristics	*n* (%)			*p* Value (Chi-squared)
	No Intervention (*n* = 32)	Partial Intervention (*n* = 58)	Full Intervention (*n* = 107)	
Site				.22
Home	30 (93.7)	47 (81.0)	87 (81.3)	
Orphanage	2 (6.3)	11 (19.0)	20 (18.7)	
Sex				.01
Male	21 (65.6)	26 (44.8)	39 (36.4)	
Female	11 (34.4)	32 (55.2)	68 (63.6)	
Age median (range)	15 (12–18)	14 (12–18)	14 (11–18)	.02[a]
Age (years)				.03
<15 years	10 (31.2)	34 (58.6)	58 (54.2)	
15 years	22 (68.8)	24 (41.4)	49 (45.8)	
Median CD41 T cell count/mm^3 (IQR)	555 (389–777)	637 (361–804)	662 (489–928)	.29
CD41 T cell count				.215
<350 cells/mm^3	7 (21.9)	14 (24.6)	15 (14.0)	
350 cells/mm^3	25 (78.1)	43 (75.4)	92 (86.0)	
Viral load				.466
<50 copies/mL	23 (71.9)	38 (66.7)	81 (75.7)	
50 copies/mL	9 (28.1)	19 (33.3)	26 (24.3)	
Education				<.01
< Secondary school	18 (56.2)	48 (82.8)	91 (85.0)	
Secondary school	14 (43.8)	10 (17.2)	16 (15.0)	
Primary caretaker				.02
Parents	20 (62.5)	29 (50.0)	39 (36.4)	
Others	12 (37.5)	29 (50.0)	68 (63.6)	
Ever attended HIV education class held by the clinic				<.01
Yes	13 (40.6)	37 (63.8)	79 (73.8)	
No/no answer	19 (59.4)	21 (36.2)	28 (26.2)	
Tanner stage				.98
1–2	9 (30.0)	18 (32.1)	33 (30.8)	
3	21 (70.0)	38 (67.9)	74 (69.2)	
Girl only: Have menarche				.25[b]
No	1 (9.1)	8 (25.0)	21 (30.9)	
Yes	9 (81.8)	24 (75.0)	46 (67.6)	
No information	1 (9.1)	0 (0.0)	1 (1.5)	
Boy only: Ever had a wet dream				.72[b]
Yes	7 (33.3)	7 (26.9)	15 (38.5)	
No/Don't know	7 (33.3)	13 (50.0)	14 (35.9)	

Characteristics	n (%)			p Value (Chi-squared)
	No Intervention (n = 32)	Partial Intervention (n = 58)	Full Intervention (n = 107)	
No information	7 (33.3)	6 (23.1)	10 (25.6)	

Note: IQR = interquartile range.

[a] Kruskal-Wallis test.

[b] Fisher's exact test.

Table 3

Changes of Scores in KAP of Adolescents Who Completed ACASI 3 Times (Baseline, and 2 and 6 Months After Intervention Sessions Ended) in the Intervention Group, and 2 Times (Baseline and 6–12 Months Later) for the Nonintervention Group ($N = 156$)

Changes of Scores in Knowledge, Attitude, and Practice by ACASI	Participated in At Least One Session ($n = 130$)						Did Not Participate in Any Intervention Sessions ($n = 26$)			p^a Intervention vs. Nonintervention	
	Median (IQR) scores by each ACASI			p^b 1st vs. 2nd	p^b 1st vs. 3rd	p^b 2st vs. 3rd	Median (IQR) scores by each ACASI		p^b 1st vs. 2nd	1st	2nd
	1st	2nd	3rd				1st	2nd			
Knowledge (number of correct answers)	8 (5, 10)	9 (6, 12)	10 (6, 12)	<.01	<.01	.05	9 (6, 11)	9.5 (8, 13)	.15	.21	.29
Attitude (scores by grading of desirable attitude)	69 (60, 83)	75 (66, 83)	74.5 (65, 82)	<.01	.03	.53	77 (69, 83)	75.5 (66, 87)	1.0	.21	.61
Practice (percentage of desirable answers)				p^c 1st vs. 2nd	p^c 1st vs. 3rd	p^c 2nd vs. 3rd			p^c 1st vs. 2nd	p^d 1st	p^d 2nd
Not missed ARV in the past week	50	46	42	.49	.10	.44	54	42	.45	.77	.86
No alcohol, smoking, or drug/substance abuse[e]	67	59	51	.13	<.01	.05	65	54	.51	1.0	.77
Never had sexual intercourse	95	91	86	.07	<.01	.07	96	92	1.0	1.0	1.0
Discuss sex or reproductive health with caregiver/parents/close relative	68	58	61	.03	.11	.55	61	69	.77	.65	.38
Discuss sex or reproductive health with health care provider	47	48	52	1.0	.32	.42	38	31	.75	.56	.17

Note: KAP = knowledge, attitude, and practice, ACASI = audio computer-assisted self-interview, IQR = interquartile range, ARV = antiretroviral.

[a] Nonparametric test for independent sample (Wilcoxon two-sample test).

[b] Nonparametric test for dependent sample (Wilcoxon signed rank test) Ho: Diff between measurement = 0.

[c] McNemar chi-squared test.

[d] Z-test.

[e] Marijuana, stimulants, glue sniffing, and solvent sniffing.

Table 4

Bivariate and Multivariate Analysis of Baseline Characteristics Associated With Increase in Knowledge or Attitude Scores After Intervention Sessions, by Second or Third ACASI ($N = 156$)

Factors	n (%)	Increase Attitude Score After Intervention Sessions[a]		Increase Knowledge Score After Intervention Sessions[b]	
		RR (95% CI)	Adjusted RR (95% CI)	RR (95% CI)	Adjusted RR (95% CI)
Setting					
Home	139 (89.1)	0.8 (0.3–2.5)		0.9 (0.3–2.7)	
Orphanage	17 (10.9)	1		1	
Age					
<15 years	86 (55.1)	1.5 (0.8–3.1)		1.0 (0.5–2.1)	
15 years	70 (44.9)	1		1	
Sex					
Male	66 (42.3)	1.1 (0.5–2.1)		0.5 (0.2–1.0)[c]	0.8 (0.6–1.1)
Female	90 (57.7)	1		1	1
CD41 T cell count					
<350 cells/mm^3	23 (14.7)	1.3 (0.8–2.0)		0.8 (0.5–1.3)	
350 cells/mm^3	133 (85.3)	1		1	
Education					
< Secondary	127 (81.4)	1.1 (0.4–2.6)		0.9 (0.4–2.2)	
Secondary	29 (18.6)	1		1	
Primary caretakers					
Blood relative	56 (35.9)	1.6 (0.8–3.5)		0.7 (0.3–1.5)	
Other (nonblood relative or no caretakers)	24 (15.4)	1.7 (0.6–4.9)		0.8 (0.3–2.1)	
Parents	76 (48.7)	1		1	
Time since aware of HIV status					
1 year	42 (30.0)	0.9 (0.4–1.9)		1.0 (0.4–2.2)	
>1 year	98 (70.0)	1		1	
Tanner stage					
II	49 (31.6)	1.6 (0.8–3.3)		0.7 (0.3–1.4)	
> II	106 (68.4)	1		1	

Factors	n (%)	Increase Attitude Score After Intervention Sessions[a]		Increase Knowledge Score After Intervention Sessions[b]	
		RR (95% CI)	Adjusted RR (95% CI)	RR (95% CI)	Adjusted RR (95% CI)
Receiving ARV treatment					
NNRTI-based ART	65 (44.5)	0.6 (0.3–1.3)		0.5 (0.2–1.0)[c]	1.1 (0.6–2.2)
PI-based	81 (55.5)	1		1	1
Viral load					
<50 copies/mL	118 (75.6)	0.8 (0.4–1.7)		0.7 (0.3–1.6)	
50 copies/mL	38 (24.4)	1		1	
Ever attended HIV education class in hospital					
Yes	101 (64.7)	0.4 (0.2–0.9)[d]	0.8 (0.6–1.1)	0.7 (0.3–1.5)	
No	55 (35.3)	1	1	1	
Ever attended kid's camp					
Yes	12 (7.7)	0.9 (0.2–3.5)		0.8 (0.2–2.8)	
No	144 (92.3)	1		1	
Attitudes score at baseline					
< Median (70.5)	77 (49.4)	8.9 (4.0–20.0)[e]	3.4 (2.1–5.5)[e]	0.8 (0.4–1.5)	
Median	79 (50.6)	1	1	1	
Knowledge score at baseline					
< Median (8)	67 (42.9)	1.1 (0.6–2.3)		3.9 (1.9–8.4)[e]	1.7 (1.3–2.2)[e]
Median	89 (57.1)	1		1	1
Intervention					
Yes	130 (83.3)	1.2 (0.5–3.2)		1.4 (0.5–3.4)	
No	26 (16.7)	1		1	
Participated in session					
Completed 2 individuals and 2 groups	103 (66.0)	1.3 (0.5–3.4)		1.4 (0.5–3.6)	
Partial[f]	27 (17.3)	1.1 (0.3–3.8)		1.2 (0.4–4.2)	
No intervention	26 (16.7)	1		1	

Note: ARV = antiretroviral, ACASI = audio computer-assisted self-interview, ART = antiretroviral therapy, NNRTI = non-nucleoside reverse transcriptase inhibitor, PI = protease inhibitor.

[a]Difference between BL score and 6-month score 5 (Mean [SD] difference of attitude scores = 4.4 [15.0]).

[b]Difference between baseline score and 6-month score 2 (Mean [SD] difference of knowledge scores = 1.8 [3.7]).

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$^{c}_{p}$ Value < .10.

$^{d}_{p}$ Value < .05.

$^{e}_{p}$ Value < .01.

^{f}Partial includes participated in 2 group sessions (n =15) or 2 individual sessions (n =33) or one group only (n =4) or 1 individual and 1 group (n = 6).