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Respecting the circle of life: one year outcomes from a randomized controlled comparison of an HIV risk reduction intervention for American Indian adolescents

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Potential for widespread transmission of HIV/AIDS among American Indian (AI) adolescents exists, yet no evidence-based interventions (EBIs) have been adapted and evaluated with this population. Intensive psychoeducation may improve knowledge and decision-making which could potentially translate to reductions in HIV risk behaviors. A peer group randomized controlled comparison of an adapted EBI vs. control was delivered over an eight-day summer basketball camp in one reservation-based tribal community to adolescents ages 13–19. Outcome data were gathered immediately post-camp and at 6 and 12 months follow-up. Self-selected peer groups were randomized to intervention ($n = 138$) or control ($n = 129$) conditions for a total sample of 267 participants (56.2% female), mean age 15.1 years (SD = 1.7). Intervention participants had better condom use self-efficacy post-camp (Adjusted Mean Difference [AMD] = −0.75, $p < 0.005$) and at 6 (AMD = −0.44, $p < 0.005$) and 12 months (AMD = −0.23, $p < 0.05$) follow-up. Intervention participants also had higher HIV prevention and transmission knowledge (post-camp: AMD = 0.07, $p < 0.01$; 6 months: AMD = 0.06, $p < 0.01$) were more likely to believe condoms prevent sexually transmitted infections (post-camp: RR = 1.41, $p < 0.005$; 6 months: RR = 1.34, $p < 0.05$), to talk with an adult about HIV/AIDS (post-camp: RR=1.78, $p < 0.005$; 6 months: RR = 1.14, $p < 0.005$), had higher partner negotiation efficacy related to substance use during sex (post-camp: AMD = 0.37, $p < 0.01$), and were more likely to intend to use a condom (post-camp: RR = 1.39, $p < 0.01$). The adapted intervention had short- and medium-term impacts on AI adolescent risk for HIV/AIDS, but attenuated at 12 months. Intervention delivery through a community-based camp is feasible and acceptable with strong retention. Additional study is needed to evaluate the adapted intervention's impact on sexual risk behaviors and if booster sessions and parent involvement translate to long-term impacts.

Keywords: American Indian; adolescents; HIV/AIDS; evidence-based intervention; randomized controlled comparison

Introduction

American Indian (AI) adolescents are among the groups most vulnerable to sexually transmitted infections (STIs) including HIV/AIDS in the USA. According to recent surveillance (Centers for Disease Control and Prevention [CDC], 2012), AI/Alaska Natives (AN) were the only racial group in the USA in which HIV and AIDS incidence rates increased between 2007 and 2010. During this period AI/ANs also had the lowest survival rate compared to other races following a diagnosis of either HIV or AIDS (CDC, 2012).

Within AI/AN communities, adolescents are disproportionately impacted by behavioral risk factors for HIV/AIDS. AI/AN adolescents have the highest substance use and related morbidity and mortality of any US group (Baldwin, Maxwell, Fenaughty, Trotter, & Stevens, 2000; Beauvais, 1992; Blum, Harmon, Harris, Bergeisen, & Resnick, 1992; Substance Abuse and Mental Health Services Administration, 2004; Walters, Simoni, & Harris, 2000). They are more likely to initiate drug and alcohol use before the age of 13 and on average have higher rates of lifetime drug use than other adolescent groups (de Ravello, Everett Jones, Tulloch, Taylor, & Doshi, 2014). Substance use risk is compounded by risky sexual behavior and poor sexual health among AI/AN adolescents. In 2011, compared with all high-school aged US youth, AI/ANs were more likely to have ever had sex, have had sex in the last three months and ever been forced to have sex (Eaton et al., 2012). AI/ANs are diagnosed with STIs at four times the rate of Whites (Hamilton, Martin, & Ventura, 2010). Although declining from 1990 to the early 2000s, current data indicate that in the last decade, teen pregnancy rates have risen among AI/AN youth (Wingo, Smith, Tevendale, & Ferre, 2011).

A shortage of health-care providers, limited capacity of existing providers, and substantial access barriers to health care and education exacerbate HIV risk in rural, reservation-based populations. Recent reports indicate AI/ANs account for less than 1% of all HIV/AIDS cases nationwide (CDC, 2014). However due to racial misclassification and low

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HIV screening coverage rates, the actual number is likely higher (CDC, 2014).

In the broader US population, several evidence-based interventions (EBIs) have been shown to reduce risk for HIV (DiClemente et al., 2004; Jemmott, Jemmott, & Fong, 1992; Rotheram-Borus et al., 2003; St Lawrence et al., 1995). However, no rigorous evaluations of the EBIs documented by the CDC (http://www.cdc.gov/hiv/prevention/research/compendium/rr/complete.html) have been conducted with an exclusive sample of AIs. To avoid a potential HIV/AIDS epidemic in the AI/AN population, it is imperative to adapt or develop EBIs addressing the unique prevention needs in AI/AN communities.

The goal of this study was to adapt and evaluate an EBI for HIV/AIDS prevention for AI adolescents in partnership with one reservation-based tribal community. We hypothesized that intensive psychoeducation focusing on rewards and consequences of HIV-related risk behaviors and sexual health education as compared to a control condition would significantly (1) increase condom use self-efficacy (widely used as a proximal indicator of sexual behavior change, condom use self-efficacy is associated with one's ability to negotiate condom use with their partner, intention to use condoms and actual use of condoms; Hanna, 1999) and (2) improve HIV risk reduction knowledge, efficacy, and attitudes, as well as behavioral intent.

Methods

Participatory approach

We utilized a participatory research approach which builds trust and increases likelihood that interventions are conceived sensitively and appropriately (Agency for Healthcare Research and Quality, 2002; Davis & Reid, 1999; Minkler, Blackwell, Thompson, & Tamir, 2003; Wallerstein & Duran, 2006). A participatory process guided the study team (comprised of non-AI and AI researchers and community partners) in the selection of an EBI for adaptation, identification of key adaptation targets, and implementation and evaluation methods. In the study's formative phase we established a community advisory board (CAB) and conducted 14 focus groups. We found that the community preferred an intervention that was inclusive of protective factors, experiential, and which taught concrete skills. CAB members and focus group respondents preferred paraprofessionals from the tribal community fluent in English and the local language as interventionists.

The EBI "Focus on Youth" (FOY), developed for African-American adolescents and successfully implemented in various populations around the world, was selected for adaptation (Gong et al., 2009; Kaljee et al., 2005; Lerdboon et al., 2008; Lwin, Stanaland, & Chan, 2010). The Protection Motivation Theory (PMT) underpinning FOY posits that the perceived threat of HIV infection initiates two cognitive pathways: (1) threat-appraisal (risk) balances the threat of contracting HIV including intrinsic/extrinsic rewards vs. the severity of HIV and one's perceived vulnerability; (2) coping-appraisal (protective) balances one's ability to avoid the threat through self-efficacy and response efficacy vs. the relative cost of the adaptive behavior. These combine to create protection motivation: the intention to respond by engaging in either the risky or protective behavior (Stanton, Aronson, Borgatti, Galbraith, & Feigelman, 1993).

EBI adaptation

Based on the culture and context of this community, we made several adaptations to FOY curriculum content. Adolescents' lack of knowledge about sexual risk behaviors, reproduction, and sexual anatomy prompted the addition of educational information and related skills-based activities. Formative research showed a need to improve self-efficacy and communication skills among youth which called for a deeper focus on communication-based activities and facilitator training related to forced sex. We removed from the curriculum any activities that the community felt would compromise confidentiality, and changed names, situations and other surface items to ensure lesson scenarios were relatable. AI study partners renamed the adapted intervention "Respecting the Circle of Life: Mind Body and Spirit" (RCL) to reflect local understanding of the connection between mental, physical, and spiritual health.

Study design

The study was a peer group randomized controlled comparison of the RCL intervention vs. a control condition delivered over the course of a community-based eight-day summer basketball camp, and evaluated from baseline to 12 months follow-up (Moher et al., 2010; Schulz, Altman, Moher, & CONSORT Group, 2010). We conducted the study over two cohorts through summer basketball camps (cohort 1 in summer 2011 and cohort 2 in summer 2012). Each camp consisted of eight consecutive four-hour weekdays and to reduce the possibility for contamination, utilized two separate school gymnasium facilities (approximately one mile apart). Each day, there was 90 minutes of basketball, a 30-minute lunch, and a 90-minute educational lesson (RCL or control). The study was approved by relevant tribal, Indian Health Service (IHS), and University research review boards. This manuscript was approved by the Tribal Council and Health Advisory Board, the local governing bodies that provide regulatory oversight of all research conducted on the reservation. There was no Data Safety and Monitoring Board for this study.

Participants

The study was conducted in a rural and isolated reservation-based tribal community with a population of approximately 17,000. Participants were eligible if ages 13–19, AI, and residing in the participating community at time of consent. We recruited through local schools, IHS clinics, public events, and word of mouth. We provided written informed consent after participants received a complete description of the study. For those under age 18, we obtained informed consent from a parent/guardian and assent from the participant.

Randomization

On the first day of camp, participants formed self-selected same-sex peer groups of 8–10 participants within the same age range (13–15 or 16–19 years). Groups were then allocated to the RCL intervention or control condition through a stratified randomization sequence created by the study data manager in Stata 9.0 (StataCorp, 2005). Stratification occurred by gender and age range.

RCL intervention

RCL consisted of eight structured lessons delivered to peer groups of 8–10 participants of the same sex and age (Stanton et al., 1996). Six RCL lessons was considered minimum for adequate intervention dosage.

Control condition

The control condition consisted of eight educational lessons on topics not targeted by RCL (i.e., nutrition, fitness, tribal history, etc.), delivered in a large group setting (~50 participants) of mixed sex and age. Control content was taught through lecture and hands-on activities.

Quality assurance

Three categories of research staffing included: (1) RCL Facilitators who delivered RCL and did not interact with control participants, (2) Control Facilitators, who were not trained in RCL and administered the control condition, and (3) Research Assistants who monitored participants' self-report assessments. All staff and participants were unmasked to randomization assignments. RCL Facilitators and Research Assistants were male and female AI paraprofessionals ages 25–50 from the community and employed by the partnering University. Control Facilitators were paid volunteers from local agencies and tribal departments.

RCL Facilitators completed a one-week, 40-hour training in the adapted curriculum for certification to facilitate, and the study team conducted booster trainings. A curriculum specialist observed 50% of RCL lessons during camp to ensure fidelity. We trained study staff in-person and through teleconferencing in study policies and procedures and certified them in research with human subjects.

Outcome measures

We used the Youth Health Risk Behavior Inventory (YHRBI) to measure intervention outcomes; it measures psychosocial and behavioral intent outcomes and the seven theoretical constructs (self-efficacy, response efficacy, response cost, intrinsic reward, extrinsic reward, severity, and vulnerability). We selected it for its cross-cultural validity and strong psychometric properties across past evaluations of FOY with other populations (Stanton et al., 1995). We adapted the YHRBI during our formative research; we modified five questions to include definitions and detail regarding sexual behaviors, added 11 questions about alcohol and drug use prior to and during sex, and removed 72 questions assessing urban crime, violence, and weapon carrying. We pilot tested the adapted version with 15 local youth.

We administered the adapted YHRBI at four time points: (1) either upon signing consent or the first day of camp ("baseline"), (2) on the last day of camp ("post-camp"), (3) 6 months after camp, and (4) 12 months after camp. Baseline and post-camp surveys were administered at camp; follow-up surveys were administered in participants' homes.

We used confirmatory factor analysis (CFA) to examine and maximize the reliability of the YHRBI subscales for the study sample (Table 1). Specifically, we used CFA to confirm if individual scale items corroborated previously hypothesized constructs and to compare the reliability of different factor versions. If a particular item appeared to diminish the Cronbach's alpha value for a factor and did not contribute to its overall variance, we removed that item from that particular factor.

Statistical methods

Condom use self-efficacy at 12 months follow-up was the study's primary outcome and was used to calculate the required sample size. In calculating our sample size, we aimed to detect with 80% power a 1-point between-group difference in the 5-point condom use self-efficacy scale. Assuming alpha = 0.05 and baseline mean (SD) = 2.5 (2.5), we estimated a total sample size of $n = 198$ at 12-months follow-up. Accounting for up to 25% attrition, we aimed to recruit a total of $n = 265$ participants.

We fit population-averaged panel-data models to the data using generalized estimating equations (STATA's xtgee command). All models accounted for within-team correlation structures. Given statistically significant differences in mean age and extrinsic rewards scale score between study groups at baseline, we adjusted models for these variables. Participants with complete data were

Table 1. Subscales for assessing PMT constructs.

Subscale	Scoring	Cronbach's α	Items within subscale
Coping appraisal pathway			
Self-efficacy (lower score = higher risk)	*Range 1–5:*	0.67	I want to wait until I'm married before I have sex.*
	1 = Strongly agree		If didn't want to have sex with someone going out with, I wouldn't be able to say no.*
	5 = Strongly disagree		If my sexual partner offers me drugs or alcohol I should take them.
			If my sexual partner uses drugs or alcohol before sex I should use them too.
Response efficacy (lower score = higher risk)	*Range 1–5:*	0.68	If a girl says she won't have sex, a boy would say it's okay.*
	1 = Strongly disagree		Condoms are an important way to prevent pregnancy.
	5 = Strongly agree		Condoms are an important way to prevent you from getting a STD.
			Condoms are an important way to prevent you from getting HIV/AIDS.
Response cost (higher score = higher risk)	*Range 1–5:*	0.61	My friends expect me to try drugs.
	1 = Strongly disagree		My friends would think I was scared if I didn't try alcohol or drugs.
	5 = Strongly agree		If a girl carries condoms people think she is having sex.
			Condoms make sex hurt for a girl.
			Condoms make sex feel less good.
			When a guy and a girl are in a serious relationship they don't use condoms.
			Kids don't want other kids to think they are using condoms.
			Boys think it is important to have sex to feel like a man.
			Girls think it is important to have sex to feel like a woman.
Threat appraisal pathway			
Intrinsic reward (higher score = higher risk)	*Range 1–5:*	0.86	IF FOLLOWING HAPPENED IN THE NEXT 6 MONTHS, I WOULD FEEL …:
	1 = Very bad		Smoke marijuana (pot, grass, weed).
	5 = Very good		Get an HIV infection.
	Range 1–5:		Drink alcohol (beer, whiskey, liquor, wine)
	1 = Strongly disagree		Get an STD, (sexually transmitted disease, e.g., gonorrhea, herpes)
	5 = Strongly agree		Use cocaine
			Get pregnant or get a girl pregnant.
			Get suspended from school
			Have sex.
			I would like to know what it feels like to take drugs.
Extrinsic reward (higher score = higher risk)	*Range 1–5:*	0.70	It is important that my friends respect me.
	1 = Strongly disagree		Everyone my age has sex.
	5 = Strongly agree		My friends would lose respect for me if they thought I had an STD.
	Range 1–5:		How many of your close friends have sex.
	1 = None		How many of the boys you know have sex?
	5 = Most		How many of the girls you know have sex?
Severity (higher score = higher risk)	*Range 1–5:*	0.32	People who use drugs get HIV/AIDS.
	1 = Strongly disagree		If two people are going together and one gets an STD, they would break up.
	5 = Strongly agree		If my mother knew I had an STD, she would be really upset.
Vulnerability (higher score = higher risk)	*Range 1–5:*	0.79	IN THE NEXT SIX MONTHS I WILL:
	1 = No		Smoke marijuana (pot, grass, weed) (including just trying it once)
	2 = Probably not		Become infected with HIV.
	3 = Don't know		Drink alcohol, (beer, whiskey, liquor, wine) including just trying it once.
	4 = Maybe		Get an STD, (sexually transmitted disease, e.g., gonorrhea, herpes)
	5 = Yes		Get pregnant/get a girl pregnant.

*Values were re-coded in opposite direction.

similar to those missing data, with the exception of those missing the 12-month assessment being less sexually active and less likely to use alcohol. Findings are presented by study group and time point.

Results

We recruited youth in May–July 2011 for the first camp and in March–June 2012 for the second camp. We approached a total of 475 youth and 208 were unable to participate due to summer scheduling conflicts (i.e., other commitments, not in town, etc.). A final sample size of 267 completed the baseline assessment and were randomized by peer group to receive the RCL intervention (n = 138) or control condition (n = 129). Within the RCL intervention group, 115 participants (83%) received six or more lessons. Six-month assessments were completed by 234 (88%) and 12-month assessments were completed by 239 participants (90%), resulting in 10% overall attrition.

At baseline (Table 2), the majority of participants had been enrolled in school the previous academic year (93%), and 30% reported past school suspension. More than half were female (56%), and mean age was 15.1 years (SD = 1.7). Past sexual intercourse was reported by 22% and 35% reported a current boy/girlfriend. Participants in both study groups attended an average 6.7 days of camp. Study groups had similar socio-demographic characteristics at baseline with the exception of age (control participants were younger; $p < 0.001$). Participants receiving less than six RCL lessons were more likely to be sexually active and have used alcohol in the past six months.

Condom use self-efficacy

RCL participants had significantly improved mean condom use self-efficacy scores compared to controls at post-camp (range 1–5, lower score indicates higher efficacy; 1.69 vs. 2.53, $p < 0.005$), 6 months (1.78 vs. 2.34, $p < 0.005$), and 12 months (1.67 vs. 2.01, $p < 0.05$; Table 3). Stratified analyses indicated improved self-efficacy scores among male intervention participants only immediately post-camp and improved scores among female intervention participants at all time points, suggesting a more long-term impact among girls.

Among participants ages 13–15, condom use self-efficacy scores were better in the RCL intervention group at post-camp (1.68 vs. 2.63, $p < 0.005$) and 6 months (1.83 vs. 2.34, $p < 0.005$), but not at 12 months. Among older participants (ages 16–19), RCL participants had improved condom use self-efficacy compared to controls at post-camp (1.72 vs. 2.13, $p < 0.01$) and 12 months (1.45 vs. 1.80, $p < 0.005$), but not at 6 months.

Knowledge

RCL intervention group participants had higher knowledge scores regarding prevention and transmission of HIV/AIDS than controls at post-camp (0.84 vs. 0.76, $p < 0.01$) and 6 months (0.84 vs. 0.77, $p < 0.01$), but not at 12 months (Table 4). They were also more likely to

Table 2. Baseline characteristics of participants, by randomization assignment and intervention dosage.

		Randomization group		RCL session dosage (intervention group only)	
	Total	Control (N = 129)	RCL (N = 138)	<6 RCL sessions	≥6 RCL sessions
Number (%)	267 (100)	129 (48.3)	138 (51.7)	23 (16.7)	115 (83.3)
Age, years – mean (SD)	15.1 (1.7)	14.8 (1.5)***	15.4 (1.7)	16.3 (2.1)	15.3* (1.6)
Gender, n (%)					
Male	117 (43.8)	58 (45.0)	59 (42.8)	9 (39.1)	50 (43.5)
Female	150 (56.2)	71 (55.0)	79 (57.3)	14 (60.9)	65 (56.5)
Ever had sex, n (%)	59 (22.2)	23 (18.0)	36 (26.1)	10 (43.5)	26 (22.6)*
Have boyfriend/girlfriend, n (%)	92 (35.4)	42 (33.3)	50 (37.3)	11 (47.8)	39 (35.1)
Currently in school, n (%)	236 (93.3)	113 (94.2)	123 (92.5)	20 (90.9)	103 (97.8)
Ever suspended school, n (%)	77 (29.8)	37 (29.8)	40 (29.9)	9 (39.1)	31 (27.9)
Drug use past 6 months, n (%)					
Alcohol	52 (19.6)	22 (17.2)	30 (21.9)	10 (43.5)	20 (17.5)**
Cigarettes	27 (10.1)	12 (9.3)	15 (10.9)	5 (21.7)	10 (8.7)
Marijuana	59 (22.2)	24 (18.8)	35 (25.4)	9 (39.1)	26 (22.6)
Number days attended camp, mean (SD)	6.7 (2.0)	6.7 (2.0)	6.7 (2.0)	2.8 (1.5)	7.5 (0.7)**
Attended ≥6 days of camp, n (%)	221 (82.8)	106 (82.2)	115 (83.3)	–	–

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$ for test of between-group differences.

Table 3. Mean (SD) scores on condom use self-efficacy scale and adjusted mean differences, by time point and study group.

Condom use self-efficacy (range 1–5; lower score = higher efficacy)	Baseline			Post-camp			6 month follow-up			12 month follow-up			
	RCL Mean (SD) N = 138	Control Mean (SD) N = 129	Adjusted mean difference	RCL Mean (SD) N = 131	Control Mean (SD) N = 126	Adjusted mean difference	RCL Mean (SD) N = 123	Control Mean (SD) N = 111	Adjusted mean difference	RCL Mean (SD) N = 124	Control Mean (SD) N = 115	Adjusted mean difference	Cronbach's α
Overall	2.54 (1.05)	2.60 (0.98)	0.10	1.69 (0.76)	2.53 (1.05)	−0.75***	1.78 (0.83)	2.34 (0.95)	−0.44***	1.67 (0.76)	2.01 (0.78)	−0.23*	0.85
Male	2.40 (1.18)	2.43 (1.03)	0.21	1.68 (0.75)	2.45 (1.15)	−0.66***	1.70 (0.71)	2.13 (1.17)	−0.29	1.57 (0.68)	1.82 (0.83)	−0.12	0.90
Female	2.63 (0.94)	2.74 (0.93)	0.01	1.70 (0.76)	2.60 (0.96)	−0.87***	1.85 (0.91)	2.51 (0.70)	−0.58***	1.73 (0.81)	2.15 (0.71)	−0.33***	0.82
13- to 15-year-olds	2.74 (1.0)	2.71 (0.97)	0.15	1.68 (0.72)	2.63 (1.05)	−0.85***	1.83 (0.81)	2.34 (0.92)	−0.45***	1.94 (0.82)	2.12 (0.73)	−0.12	0.84
16- to 19-year-olds	2.16 (1.05)	2.19 (0.95)	0.05	1.72 (0.86)	2.13 (0.97)	−0.54**	1.72 (0.86)	2.34 (1.07)	−0.46	1.45 (0.63)	1.80 (0.84)	−0.36***	0.86

Note: All models adjusted for group correlation and for age and mean score on extrinsic rewards subscale of PMT at baseline.
$^*p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.005$.

believe condoms prevent transmission of HIV and STIs at post-camp (RR = 1.41, p < 0.005) and 6 months (RR = 1.34, p < 0.05), but not at 12 months.

Behavioral intent

RCL participants were more likely to have spoken with a family member or adult about HIV/AIDS at post-camp (RR = 1.78, p < 0.005) and 6 months (RR = 1.14, p < 0.005), but not at 12 months (Table 4). Several other behavioral intent risk variables were significantly improved among RCL participants post-camp, but not sustained through 6 or 12 months. RCL participants reported increased efficacy around partner negotiation skills related to substance use during sex (4.65 vs. 4.25 on a 5-point efficacy scale, p < 0.01) and were more likely to intend to use a condom at next sex (RR = 1.39, p < 0.01) at post-camp, but not at later time points (Table 4).

Protection motivation theory

We observed significant between-group differences at post-camp for all three theoretical constructs comprising the coping-appraisal pathway and none comprising the threat appraisal pathway (Table 5). Immediately post-camp, RCL participants had higher self-efficacy (range 1–5, 1 = strongly agree, 5 = strongly disagree; 4.46 vs. 4.10, p < 0.01), response efficacy (range 1–5, 1 = strongly disagree, 5 = strongly agree; 4.23 vs. 3.66, p < 0.005), and response cost (range 1–5, 1 = strongly disagree, 5 = strongly agree; 2.76 vs. 2.99, p < 0.01). Significantly improved scores among RCL participants were only sustained for response efficacy at 6 months (4.03 vs. 3.76, p < 0.05) and 12 months (4.08 vs. 3.80, p < 0.01).

Discussion

Implications

This is the first methodologically rigorous evaluation to indicate efficacy of an adapted EBI to address risks for HIV/AIDS among a sample of exclusively AI adolescents. Results demonstrate the short- and medium-term intervention impact of the RCL intervention on AI adolescents' risks for HIV across age groups, with greater response among females. This study also supports the innovation, feasibility, and acceptability of conducting a randomized controlled comparison in a community-based setting (Stanton et al., 1996). The study's overall strong retention rate (90%) and demonstrated knowledge gains among participants support acceptance of the RCL intervention.

The significant between-group differences observed on all coping-appraisal theoretical constructs reinforce

Table 4. HIV-prevention knowledge, efficacy, intention, and behavioral intent outcomes, by time point and study group.

	Baseline			Post-camp			6 month follow-up			12 month follow-up			
	RCL Mean (SD) $N = 138$	Control Mean (SD) $N = 129$	Adjusted mean difference	RCL Mean (SD) $N = 131$	Control Mean (SD) $N = 126$	Adjusted mean difference	RCL Mean (SD) $N = 123$	Control Mean (SD) $N = 111$	Adjusted mean difference	RCL Mean (SD) $N = 124$	Control Mean (SD) $N = 115$	Adjusted mean difference	Cron-bach's α
Knowledge of HIV prevention/transmission (range 0–1; higher score = higher knowledge)	0.79 (0.17)	0.78 (0.12)	−0.01	0.84 (0.16)	0.76 (0.17)	0.07**	0.84 (0.15)	0.77 (0.16)	0.06**	0.83 (0.17)	0.81 (0.16)	0.01	0.74
Partner negotiation on condom use (range 1–4; higher score = higher efficacy)	2.53 (0.98)	2.45 (0.97)	−0.03	2.60 (0.86)	2.63 (0.86)	−0.09	2.82 (0.86)	2.66 (0.90)	0.05	2.89 (0.89)	2.87 (0.78)	−0.08	0.93
Partner negotiation on drug use during sex (range 1–5; higher score = higher efficacy)	4.48 (0.81)	4.46 (0.79)	0.01	4.65 (0.71)	4.25 (0.98)	0.37**	4.55 (0.76)	4.34 (0.90)	0.21	4.52 (0.82)	4.29 (0.94)	0.14	0.82
	n (%)	*n* (%)	RR	*n* (%)	*n* (%)	RR	*n* (%)	*n* (%)	RR	*n* (%)	*n* (%)	RR	
Belief condoms prevent HIV/STIs (Yes/No)	77 (55.8)	67 (51.9)	1.00	104 (79.4)	67 (53.2)	1.41***	89 (72.4)	55 (49.6)	1.34*	88 (71.0)	69 (60.0)	1.18	NA
Belief abstinence prevents HIV/STIs (Yes/No)	49 (35.5)	54 (41.9)	0.78	83 (63.4)	49 (38.9)	0.43	58 (47.2)	41 (36.9)	1.21	69 (55.7)	45 (39.1)	1.40	NA
Talked with family member/adult about HIV/AIDS in past six months (Yes/No)	35 (25.6)	30 (23.3)	1.05	57 (43.5)	29 (23.0)	1.78***	49 (39.8)	14 (12.6)	1.14***	49 (39.5)	29 (25.4)	1.51	NA
Intend to use condom at next sex (Yes/No)	76 (56.7)	72 (57.1)	0.90	92 (71.9)	62 (49.6)	1.39**	80 (66.7)	60 (54.1)	1.16	85 (69.1)	68 (59.7)	1.09	NA
Had vaginal sex in past 6 months (Yes/No)	29 (21.0)	18 (14.2)	0.90	30 (22.9)	17 (13.5)	1.25	34 (27.9)	18 (16.2)	1.08	45 (36.6)	24 (21.7)	1.34	NA

Note: All models adjusted for group correlation and for age and mean score on extrinsic rewards subscale of PMT at baseline.
*$p < 0.05$, **$p < 0.01$, ***$p < 0.005$.

Table 5. Mean (SD) scores on PMT constructs and adjusted mean differences, by time point and study group.

	Baseline			Post-camp			6 month follow-up			12 month follow-up		
	RCL Mean (SD) $N = 138$	Control Mean (SD) $N = 129$	Adjusted mean difference	RCL Mean (SD) $N = 131$	Control Mean (SD) $N = 126$	Adjusted mean difference	RCL Mean (SD) $N = 123$	Control Mean (SD) $N = 111$	Adjusted mean difference	RCL Mean (SD) $N = 124$	Control Mean (SD) $N = 115$	Adjusted mean difference
Coping appraisal												
Self-efficacy	4.32 (0.68)	4.24 (0.69)	0.11	4.46 (0.67)	4.10 (0.81)	0.37**	4.33 (0.63)	4.17 (0.72)	0.19	4.33 (0.63)	4.13 (0.76)	0.16
Response efficacy	3.72 (0.73)	3.83 (0.76)	−0.14	4.23 (0.60)	3.66 (0.76)	0.55***	4.03 (0.67)	3.76 (0.80)	0.24*	4.08 (0.75)	3.80 (0.77)	0.26**
Response cost	2.96 (0.45)	3.00 (0.50)	−0.05	2.76 (0.58)	2.99 (0.48)	−0.22**	2.79 (0.54)	2.87 (0.42)	−0.08	2.84 (0.52)	2.92 (0.47)	−0.08
Threat appraisal												
Intrinsic reward	1.61 (0.68)	1.67 (0.78)	−0.06	1.55 (0.58)	1.64 (0.69)	−0.07	1.57 (0.69)	1.50 (0.58)	0.08	1.51 (0.55)	1.60 (0.57)	−0.07
Extrinsic reward	3.29 (0.78)	3.06 (0.73)	0.10*	3.30 (0.69)	3.11 (0.76)	0.11	3.42 (0.69)	3.10 (0.65)	0.22	3.46 (0.71)	3.28 (0.76)	0.12
Severity	3.65 (0.65)	3.64 (0.67)	−0.01	3.58 (0.73)	3.46 (0.67)	0.06	3.61 (0.63)	3.60 (0.53)	−0.02	3.54 (0.66)	3.49 (0.64)	0.01
Vulnerability	1.62 (0.75)	1.70 (0.80)	−0.14	1.66 (0.79)	1.70 (0.84)	−0.04	1.49 (0.68)	1.63 (0.80)	−0.13	1.55 (0.71)	1.68 (0.77)	−0.12

Note: All models adjusted for group correlation and for age and mean score on extrinsic rewards subscale of PMT at baseline.
*$p < 0.05$, **$p < 0.01$, ***$p < 0.005$.

past research suggesting promotion of protective factors may bear greater importance in AI populations than a focus on risk (Borowsky, Resnick, Ireland, & Blum, 1999). These findings extend the literature on delivery of HIV/AIDS prevention interventions to self-selected groups of peers and further support the role of trained AI paraprofessionals in teaching sensitive behavior change information (Barlow et al., 2006, 2013; Fang, Stanton, Li, Feigelman, & Balwin, 1998; Galbraith et al., 1996; Kelly et al., 1991; Mullany et al., 2012; Romer et al., 1994; Stanton et al., 1993, 1994; Walkup et al., 2009). Our evaluation shows that a behavioral health intervention rooted in PMT and adapted for an AI community can improve condom use self-efficacy, but it does not provide evidence of long-term intervention impact on high-risk behaviors. Attenuation of initially strong intervention effects is consistent with past evaluations of the original EBI, FOY (Gong et al., 2009; Kaljee et al., 2005; Lerdboon et al., 2008; Li, Stanton, Feigelman, & Galbraith, 2002; Lwin et al., 2010; Stanton et al., 1996, 1997).

Limitations

First, as in other HIV risk reduction interventions, self-reported outcomes may not be accurate and/or may be impacted by participants' altering their responses based on social desirability. While the randomized design of this study helps mitigate this limitation, future studies could use data collection methods that decrease response bias such as Audio Computer Assisted Self Interview technology and biological outcome measures (Mullany et al., 2013). Second, there is potential for attrition bias. The strong retention rate of participants seen in the study diminishes this concern. Intervention participants who received less than adequate RCL dosage were more likely to be sexually active and use alcohol at 12 months follow-up. This challenge is faced in behavioral health intervention studies as those most in need of the intervention are difficult to retain.

Third, baseline inequalities between RCL intervention and control participants could theoretically confound results; statistical adjustment for these differences in the analyses minimizes this concern. Fourth, the intervention and control conditions differed in delivery format including group size and facilitator type (i.e., interventionists employed by the partnering University vs. paid volunteers). Limited resources precluded our ability to determine to what degree differences in delivery mode vs. actual program content resulted in RCL intervention impact. Also, despite using separate gymnasium facilities it is impossible to prevent all potential contamination between-groups in a small, rural community. Finally, findings are not necessarily generalizable to the heterogeneous US tribal population, as the

RCL intervention was adapted for and evaluated in one tribal community. Limitations aside, behavioral health risks challenging the participating community also impact other rural and reservation-based AI populations; the RCL intervention may be more amenable to replication in these communities than other EBIs which have not been evaluated with AI/AN samples.

Future directions

Booster sessions may be needed to sustain short- and medium-term intervention gains and would be feasible given the ability of local study staff to maintain contact with the majority of participants at later evaluation time points. Other evaluations of the original EBI which incorporated an additional curriculum lesson called Informed Parents and Children Together (ImPACT) demonstrated sustained and enhanced intervention impact at long-term follow-up (Stanton et al., 2004; Wu et al., 2003). In AI/AN communities, family has been shown to influence adolescents' behavioral health choices; therefore the addition of ImPACT may enhance the intervention impact of RCL (MacPhee, Fritz, & Miller-Heyl, 1996; West, Williams, Suzukovich, Strangeman, & Novins, 2012). Given known behavioral health disparities and increasing HIV rates in AI communities, advancing this and similar lines of research is urgent.

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