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# Self-efficacy and response-efficacy: critical components of sexual and reproductive health interventions targeting condom use intention among American Indian adolescents

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**ABSTRACT**

The Respecting the Circle of Life (RCL) intervention is a comprehensive, skills-based sexual/reproductive health program shown to be effective for reducing sexual risk among American Indian (AI) adolescents (13-19 years of age). This paper seeks to identify critical program components of the RCL intervention for replication of impacts on condom use intention (CUI) when scaling to additional communities. RCL was tested among AI adolescents through a cluster randomized controlled trial (N = 267) embedded in an 8-day basketball camp. Data were collected at baseline, immediately post-camp, at 6 and 12 months post-camp. Previously established predictors of CUI that were statistically significantly impacted by RCL at the post-camp time point were tested as mediators of RCL impact on CUI. Condom use self-efficacy and response efficacy fully mediated the effect of RCL on CUI. The indirect path through condom use self-efficacy had the greatest effect on CUI, explaining 79% of the direct effect. When stratified by gender, there was only evidence of mediation among girls. Results indicate condom use self-efficacy and response efficacy are critical components of the RCL intervention for AI girls, and sexual/reproductive health programs should include practical skills training to improve these constructs to maximize intervention impact on CUI.

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American Indian; adolescent; sexual health; condom use intention; condom use self-efficacy; response efficacy

## Introduction

American Indian (AI) adolescents and young adults experience large disparities in sexual/reproductive health. AI adolescents are more likely to initiate sex before age 13 than all other races/ethnicities in the United States, except African American youth, and early initiation has been associated with increased number of partners and unprotected sexual encounters (Centers for Disease Control, 2015; Heywood, Patrick, Smith, & Pitts, 2015). Studies also indicate that AI adolescents are more likely to use alcohol or drugs before sex than youth of other races/ethnicities (de Ravello, Everett Jones, Tulloch, Taylor, & Doshi, 2014). These risky sexual behaviors are contributing factors to the high rates of and large disparities in teen pregnancy and sexually transmitted infections (STIs) among AI adolescents (Centers for Disease Control, 2018; Kaestle, Halpern, Miller, & Ford, 2005; Martin, Hamilton, Osterman, Curtin, & Matthews, 2015).

Underlying these disparities are the impacts of historical trauma, current discrimination and poverty that have resulted in loss of life, land, language, and culture (Bombay, Matheson, & Anisman, 2014; Gone & Trimble, 2012; La Belle, Smith, Easley, & Charles, 2005; Sarche, Spicer, Farrell, & Fitzgerald, 2011; Mitchell, Kaufman, Whitesell, Beals, & Keane, 2017). This has led to the disruption of culture-based protective factors, community networks, and family structure that impact behavioral and physical health disparities experienced by AI communities today (Bombay et al., 2014; Gone & Trimble, 2012; La Belle et al., 2005; Sarche et al., 2011; Mitchell et al., 2017). While AI adolescents experience formidable disparities, they are also resilient, drawing on cultural strengths and connectedness to overcome difficult obstacles to success (Mitchell et al., 2017). Building on a community's cultural strengths is critical to maximizing effectiveness of behavioral health interventions. The Respecting the Circle of Life (RCL) intervention is a comprehensive skills-based sexual and reproductive health program, that builds on cultural strengths, specifically developed for AI youth. It was culturally adapted from an evidence-based HIV risk reduction intervention

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(EBI), called Focus on Youth (FOY) (Tingey et al., 2015a). The FOY program found positive impact on condom use up to 3 years after intervention delivery (Chen et al., 2010). A randomized controlled trial of RCL was conducted through an academic-tribal partnership. Since the majority of RCL participants were not sexually experienced at baseline, condom use intention (CUI) was selected as a primary outcome of interest.

### Condom use intention as a primary outcome

The use of CUI as a primary outcome in the RCL trial is consistent with past trials with samples of younger adolescents, where direct measurement of condom use is difficult, and is an established predictor of condom use behavior (Albarracín, Johnson, Fishbein, & Muellerleile, 2001; Buhi & Goodson, 2007; Rijsdijk et al., 2012). This relationship, in which intention precedes behavior, is consistent with several behavior change theories that serve as frameworks for evaluating interventions delivered to adolescents prior to sexual debut (i.e., When outcomes such as condom use may not be observed) (Buhi & Goodson, 2007).

### Gender differences

Although the literature is not extensive, studies have shown gender differences among youth in sexual knowledge, self-efficacy, intentions, and behaviors. These differences can vary across populations and socio-cultural context. Girls have reported higher sexual self-efficacy, greater intention to use contraception, and better condom use negotiation skills, but decreased condom use decision making power than boys (Farmer & Meston, 2006; Muñoz-Silva, Sánchez-García, Nunes, & Martins, 2007; Nahom et al., 2001; Redmond & Lewis, 2014; Rostosky, Dekhtyar, Cupp, & Anderman, 2008). Historical trauma and intimate partner violence have been associated with decreased control over condom use during sexual encounters among AI girls (Simoni, Sehgal, & Walters, 2004; Walters, Simoni, & Harris, 2000; Walters, Simoni, & Evans-Campbell, 2002). Boys tend to more often use condoms despite lower reported intention, and report greater peer pressure to have sex at a younger age than girls (Farmer & Meston, 2006; Muñoz-Silva et al., 2007; Nahom et al., 2001; Redmond & Lewis, 2014; Rostosky et al., 2008). However, boys have also reported higher self-efficacy and greater intention to use condoms with steady partners (Farmer & Meston, 2006; Nahom et al., 2001). Because gender differences vary across populations, it is critical to understand the role of gender among AI adolescents for tailoring sexual health interventions.

### RCL evaluation Leading to current study

In the randomized controlled trial (RCT) of RCL, CUI was statistically significantly higher immediately post-camp in the RCL group compared with the control group (69.6% vs. 50.3%, *p*-value: 0.008), despite the two groups being comparable at baseline (52.7% vs. 58.3%, *p*-value: 0.443) (Tingey et al., 2017). Multiple regression analyses from the RCL RCT also showed that condom use self-efficacy and the Protection Motivation Theory construct response efficacy were predictive of CUI (Tingey et al., 2017). Both were impacted by the RCL intervention over time. Condom use self-efficacy and response efficacy showed statistically significant improvements in the RCL group between baseline and post-camp and these differences were statistically significantly greater than what was observed in the control group (Tingey et al., 2017).

### Study objectives

Given the impacts of the RCL program on condom use self-efficacy and response efficacy, and these factors' ability to predict CUI, this paper tests a theoretical model exploring whether one or both of these variables mediate the effect of the RCL intervention on CUI overall and by gender (Tingey et al., 2017). Results will inform better understanding of whether these constructs are critical ingredients to improving condom use intention in sexual health programs targeting AI adolescents and whether such critical components differ by gender. Specifically, results will inform replication and scaling of RCL, as well as the development of new sexual/reproductive health programs for AI youth who suffer marked sexual/reproductive health disparities and for whom few evidence-based interventions (EBI) exist (Tingey et al., 2015a).

## Methods

### Study population

A total of 267 AI youth, ages 13–19 years, participated in a cluster randomized controlled trial to evaluate the RCL intervention from June 2011 to July 2013 (Tingey et al., 2015a, 2015b, 2017). Eligible youth had to self-identify as American Indian and be between the ages of 13 and 19 years of age at enrollment. Participants were recruited at public events and through local schools.

### Ethical review and informed consent

Written informed consent was obtained from potential participants ages ≥18; those ages 13–17 gave assent and required parental permission. The study was approved by the relevant tribal and University research

review boards. This manuscript was approved by the governing body of the participating tribal community.

## Intervention & data collection

Details of the RCL program and its evaluation were previously described (Tingey et al., 2015a, 2017). Briefly, RCL consists of 8 sessions, with a special emphasis on skills-based training in condom use, taught to age- and sex-specific peer groups (13-15 or 16-19). RCL covers a variety of domains impacting sexual/reproductive health behaviors including knowledge, attitude/perceptions, beliefs, practical skills and intentions. Control participant sessions included content and activities unrelated to the RCL curriculum (e.g., Nutrition, safety, and traditional arts and crafts). RCL and the control program were embedded in an 8-day summer basketball camp. After randomization, study groups attended gyms at separate locations to prevent cross-exposure of intervention and control content.

Youth completed a culturally adapted version of the Youth Health Risk Behavior Inventory (YHRBI), which collects data on sociodemographics, risk/protective factors, behaviors, and the seven Protection Motivation Theory (PMT) constructs undergirding the RCL program (self-efficacy, response efficacy, response cost, intrinsic reward, extrinsic reward, severity and vulnerability) (Maddux & Rogers, 1983; Tingey et al., 2015a). Data were collected at baseline, immediately post-camp, and at 6- and 12-months post-camp in a private location.

CUI, a primary study outcome, was defined as intention to use a condom if having sex in the next 6 months. Originally scored on a Likert Scale (1-5: yes, maybe, don't know, probably not, no), the variable was dichotomized for this and prior analyses as yes = 1 and all other responses = 0.

The models presented in this paper test whether condom use self-efficacy and/or response efficacy mediate the effect of the RCL intervention on CUI. Condom use self-efficacy is the belief that one has the ability to correctly use condoms (Hanna, 1999). Response efficacy is a PMT construct that is defined as: belief that an adaptive response (such as condom/contraceptive use) will be effective in protecting against STIs and/or pregnancy (Casey, Timmermann, Allen, Krahn, & Turkiewicz, 2009; Maddux & Rogers, 1983). The variables included in the models are defined in Table 1.

## Statistical analyses

Statistical analyses were carried out using MPlus V.8 (Muthén & Muthén, 2017). A multiple mediator model was used to simultaneously test whether condom use self-efficacy and/or response efficacy mediated the impact of RCL on CUI (MacKinnon, 2008). Direct and indirect effects were estimated using standardized coefficients for all pathways. MLR estimation was used and a logit link was specified. Models were adjusted for cluster randomization. Indirect effects were estimated using the product of coefficients method; coefficients were all standardized with respect to Y(MacKinnon, 2008). Due to the non-normality of product statistics, R Mediation was used to calculate asymmetric confidence intervals for indirect effects (MacKinnon, 2008; Tofighi &

**Table 1.** Variable Definitions.

| Variable | Items in Scale | Scoring | Cronbach's α |
|---|---|---|---|
| Condom Use Intention | In the next six months I will use a condom if I have sex. | Originally coded as a 5-point Likert scale (yes, maybe, don't know, probably not, no), this variable was dichotomized as Yes = 1 and all other answers = 0 for this analysis. | N/A |
| Response Efficacy (Maddux & Rogers, 1983) | If a girl says she won't have sex, a boy would say it's okay.<br>Condoms are an important way to prevent pregnancy.<br>Condoms are an important way to prevent you from getting a STD.<br>Condoms are an important way to prevent you from getting HIV/AIDS. | Average of a 4-item Likert scale (Range 1-5: 1 = strongly disagree, 5 = Strongly agree) | Overall: 0.69<br>Boys: 0.74<br>Girls: 0.63 |
| Condom Use Self-Efficacy (Hanna, 1999) | I could get condoms.<br>I could put a condom on correctly.<br>I could convince my partner that we should use a condom even if he or she doesn't want to.<br>I could ask for condoms in a store.<br>I could ask for condoms in a clinic.<br>I could refuse to have sex if my partner will not use a condom. | Average of a 6-item Likert scale (Range 1-5: 1 = no, 5 = yes) | Overall: 0.83<br>Boys: 0.89<br>Girls: 0.77 |

MacKinnon, 2011). A full model was first tested, followed by gender stratified models.

The model tested is presented in Figure 1. Coefficient a represents the association between study group (RCL vs. Control) and each potential mediator. Coefficient b represents the relationship between each mediator and CUI. Coefficient c represents the direct effect of study group on CUI (this is equivalent to running a mixed effects logistic regression adjusting for team clusters). Coefficient c' represents the direct effect of study group on CUI adjusted for the indirect effects. The specific indirect effects are calculated as the product of a*b for each pathway.

## Results

### Sociodemographic data and gender differences in study variables

Mediation analyses included 257 of the 267 study participants; 10 were missing the post-camp assessment. A little more than half of the study population were girls (56.8%, $n = 146$). The control group was slightly younger than the RCL group (Control: Mean Age −14.90 years (SD: 1.57); RCL: Mean Age – 15.44 years (SD: 1.69), $p = 0.008$). Mean age did not differ by gender within study group. There were no between gender differences in CUI at baseline, however girls reported statistically significantly higher CUI post-camp in the RCL group (girls: 80% ($n = 59$); boys: 60.0% ($n = 33$), $p = 0.009$). Condom use self-efficacy did not differ by gender in either study group at baseline or post-camp. Boys and girls both showed large improvements baseline to post-camp in condom use self-efficacy in the RCL group, but not the control group (Control- Baseline: girls: 3.26 (SD: 0.93), boys: 3.57 (SD: 1.03); Control – Post-Camp: girls 3.40 (SD: 0.96), boys: 3.55 (SD: 1.55); Intervention – Baseline: girls: 3.37 (SD: 0.94), boys: 3.59 (SD: 1.18); Intervention – Post-Camp: girls 4.29 (SD: 0.78), boys: 4.32 (SD: 0.75)). Girls reported statistically significantly higher mean response efficacy than boys in the RCL and control group at baseline (Control: girls: 4.39 (SD: 0.68), boys: 4.05 (SD: 0.68), $p = 0.005$; RCL: girls: 4.54 (SD: 0.55), boys: 4.04 (SD: 0.74), $p < 0.0001$) and post-camp (Control: girls: 4.28 (SD: 0.75), boys: 3.88 (SD: 0.83), $p = 0.005$; RCL: girls: 4.60 (SD: 0.50), boys: 4.28 (SD: 0.61), $p = 0.001$).

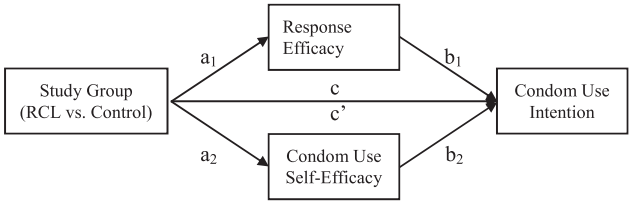


**Figure 1.** Proposed Mediation Model of Study Group on CUI (N = 257).

### Mediation analyses

The direct effect (c) between study group (RCL vs. Control) and CUI post-camp was statistically significant, with higher CUI in the RCL group compared to the control group. The standardized estimate is presented in Table 2 (standardized coefficient: 0.261, 95% CI: 0.131 - 0.390). On average, RCL participants had statistically significantly better response efficacy (standardized coefficient: 0.252, 95% CI: 0.116 - 0.389) and condom use self-efficacy (standardized coefficient: 0.419, 95% CI: 0.329 - 0.509) post-camp than control participants.

Both mediators were also statistically significantly associated with CUI (response efficacy - standardized coefficient: 0.149, 95% CI: 0.052 - 0.246; condom use self-efficacy – standardized coefficient: 0.493, 95% CI: 0.340 - 0.645). The indirect effect, the impact of RCL via the mediator on CUI, was marginally statistically significant for the study group →response efficacy→CUI path (standardized coefficient: 0.038, 95% CI: 0.006 - 0.083). The indirect effect through condom use self-efficacy, study group→condom use self-efficacy→CUI, was strongly statistically significant (standardized coefficient: 0.207, 95% CI: 0.120 - 0.307), and explains 79% of the direct effect. Finally, the mediated effect of study group on CUI (c') was not statistically significant. See Table 2. Results indicate the impact of RCL on CUI was mediated to a large extent by condom use self-efficacy and to a lesser extent by response efficacy (PMT construct) at the post-camp time point in the full model.

Among boys there was no between study group difference in CUI post-camp. Thus, there was no RCL effect on CUI to mediate in this model (See Table 2). The mediation model for girls mirrors the results of the full model. The direct effect of RCL on CUI post-camp in the full model is driven by statistically significant improvements in CUI among intervention girls compared to control girls. Girls in the RCL group also had statistically significantly better response efficacy (standardized coefficient: 0.247, 95% CI: 0.084 - 0.409) and condom use self-efficacy (standardized coefficient: 0.461, 95% CI: 0.310 - 0.611) than girls in the control group post-camp.

Response efficacy and condom use self-efficacy were both statistically significantly associated with CUI among girls (response efficacy - standardized coefficient: 0.209, 95% CI: 0.041 - 0.377; condom use self-

**Table 2.** Proposed Mediation Model of Study Group on CUI by Gender.

| | Full Model. (N=257) | | Boys (N=111) | | Girls (N=146) | |
|---|---|---|---|---|---|---|
| | Est. (SE) | 95% CI | Est. (SE) | 95% CI | Est. (SE) | 95% CI |
| **Study group→Med (a)** | | | | | | |
| **Study group →Response Efficacy ($a_1$)** | 0.252 (0.083)** | 0.116, 0.389 | 0.265 (0.129)* | 0.013, 0.518 | 0.247 (0.083)** | 0.084, 0.409 |
| **Study group →Condom Use Self-Efficacy ($a_2$)** | 0.419 (0.055)*** | 0.329, 0.509 | 0.371 (0.073)*** | 0.228, 0.515 | 0.461 (0.077)*** | 0.310, 0.611 |
| **Med→CUI (b)** | | | | | | |
| **Response Efficacy→CUI ($b_1$)** | 0.149 (0.059)* | 0.052, 0.246 | 0.037 (0.095) | −0.148, 0.222 | 0.209 (0.086)* | 0.041, 0.377 |
| **Condom Use Self-Efficacy→CUI ($b_2$)** | 0.493 (0.093)*** | 0.340, 0.645 | 0.620 (0.097)*** | 0.430, 0.810 | 0.416 (0.143)** | 0.136, 0.696 |
| **Direct Effect** | | | | | | |
| **Study group →CUI (c)** | 0.261 (0.079)** | 0.131, 0.390 | 0.047 (0.100) | −0.149, 0.244 | 0.431 (0.091)*** | 0.252, 0.610 |
| **Mediated Direct Effect** | | | | | | |
| **Study group →CUI (c′)** | 0.016 (0.085) | −0.124, 0.156 | −0.193 (0.100) | −0.389, 0.004 | 0.188 (0.106) | −0.019, 0.396 |
| **Indirect Effects (a*b)** | | | | | | |
| **Study group→Response Efficacy→CUI** | 0.038 (0.019)$^{+}$ | 0.006, 0.083 | 0.010 (0.028) | −0.045, 0.073 | 0.052 (0.031) | 0.006, 0.116 |
| **Study group→Condom Use Self-Efficacy→CUI** | 0.207 (0.042)*** | 0.120, 0.307 | 0.230 (0.058)*** | 0.126, 0.354 | 0.191 (0.068)** | 0.059, 0.349 |

$^{+}p = 0.05$, $*p < 0.05$, $**p < 0.01$, $p < 0.001$.

efficacy – standardized coefficient: 0.416, 95% CI: 0.136 - 0.696). While the indirect effect for the study group →response efficacy→CUI path was not statistically significant among girls, the indirect path through condom use self-efficacy was strongly statistically significant (standardized coefficient: 0.191, 95% CI: 0.059 - 0.349). This emulates the full model and explains 44% of the direct effect. As in the full model, the mediated effect of study group on CUI was not statistically significant (Table 2). Among girls, the impact of RCL on CUI was partially mediated by condom use self-efficacy. Although response efficacy mediates to a lesser extent in the full model, it does not reach statistical significance in the model tested for girls at the post-camp time point.

## Discussion

### *Summary*

The full model indicates that efficacy beliefs (self and response) work together to mediate the majority of the direct effect between the RCL intervention and CUI, with the mediated path through condom use self-efficacy having the greatest impact. Research conducted with men in South Africa and African American women corroborate our results, finding that self-efficacy mediated improvement in condom use intention over the course of an intervention (O'Leary et al., 2015; O'Leary, Jemmott, & Jemmott, 2008).

The mediation models tested provide evidence that condom use self-efficacy is a critical intervention component for improving CUI among AI girls, but not AI boys. Other studies have suggested that improved skills and perceived self-efficacy may be enough to impact intentions and behaviors among girls, but that additional factors such as perceived invincibility, peer influence and relationship control may play an important role in improving intentions and behaviors for boys (Redmond & Lewis, 2014). Additional research is needed within this population to understand why improvements in condom use self-efficacy did not translate to improvements in condom use intentions among boys.

### *Implications*

To promote condom use self-efficacy and response efficacy, sexual and reproductive health programs for AI adolescents should go beyond established sexual/reproductive health education, emphasizing role playing scenarios and skills training (Casey et al., 2009; Mitchell & Kaufman, 2002). Specifically, these programs should teach AI youth, and especially AI girls, how to use condoms properly, underscore their effectiveness for prevention, include hands-on condom demonstration activities, and time to practice acquired skills (Buhi & Goodson, 2007; Casey et al., 2009). Condom use self-efficacy and to a lesser extent response efficacy are critical programmatic components of the RCL intervention for AI girls and are necessary to replicate impacts on CUI when scaling the program to other AI communities. Building sexual self-efficacy among AI girls will empower young AI women, giving them the skill set they need to take control of their sexual health.

### *Limitations & considerations*

This study has limitations. RCL impact was measured by self-report and is subject to social desirability bias that may not be completely mitigated by the RCT study design. The program was implemented and evaluated with one tribal community and results should be generalized with caution. Ideally, variables included in mediation models would be collected at different time

points to establish temporality, allowing for conclusive evidence of causality (MacKinnon, Fairchild, & Fritz, 2007). However, the mediators and outcome in this analysis were collected cross-sectionally, as improvements in self-efficacy and response efficacy are expected to impact CUI immediately. This analysis does not aim to establish causality, but rather to determine whether improvements in CUI require practical skills measured through improved self-efficacy and response efficacy. Cross-sectional mediation models have been widely used to test theoretical models such as this, despite their limitations in establishing causality (Choi, LeGrand, Dong, Muessig, & Hightow-Weidman, 2019; MacKinnon et al., 2007). Finally, we were not able to look at factors mediating the actual behavior of condom use, due to the small proportion of sexually active participants; future analyses should examine factors mediating impacts on condom use.

## Conclusions

While research has consistently shown that increases in condom use self-efficacy and response efficacy are associated with improvements in CUI and actual condom use, these findings specifically delineate the role of these factors among AI girls as mediators in the path between the RCL intervention and CUI (Buhi & Goodson, 2007; Casey et al., 2009; Rijsdijk et al., 2012). This study grows the general research literature by identifying differences in mechanisms by gender for improving sexual health, establishing the importance of self-efficacy and response efficacy for influencing intention among AI girls, and establishing the science specific to AI adolescents. Results demand that new and existing sexual/reproductive health programs for AI youth examine how to improve program content for boys and provide skills training opportunities for girls to maximize impacts and reduce accumulated disparities.

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