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# Mobile contraceptive application use in a clinical setting in addition to standard contraceptive counseling: A randomized controlled trial☆,☆☆,★,★★,☆☆☆

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ABSTRACT

*Objective:* To evaluate the effect of miPlan, a waiting-room contraceptive counseling mobile application (app), on interest in discussing long-acting reversible contraception (LARC) during the clinical encounter and LARC uptake.
*Study design:* This randomized controlled trial evaluated the miPlan contraceptive counseling app. African American and Latina young women ages 15–29 years attending four family planning clinics in a large Midwestern city were randomized to either: (1) use miPlan (intervention) prior to the contraceptive clinic visit or (2) contraceptive clinic visit alone (control). Groups were compared on knowledge of contraceptive effectiveness, interest in discussing LARC, behavioral intentions to use LARC, and LARC uptake.
*Results:* From February 2015 to January 2016, 207 young women were randomized to intervention ($n$=104) or control ($n$=103) group. Immediately following app use, the intervention group had an increase in knowledge and interest in learning about the implant. Immediate post visit, there was no significant difference in uptake of LARC between the two groups ($p>.05$). At three months post intervention, app users reported more knowledge of IUD effectiveness (52.3% vs 30.8%, $p=.001$) compared to controls. There was no significant difference in LARC use.
*Conclusion:* App use was not associated with an increase in using LARC methods. It was associated with increased knowledge of contraceptive effectiveness, an interest in learning about the implant, and behavioral intentions to use LARC methods.
*Implications:* The miPlan app is a feasible clinic adjunct for increasing contraceptive knowledge and intentions, however, it is not associated with increased LARC use. Mobile applications can offer an accessible complement to the contraceptive counseling visit.



## 1. Introduction

Adolescents need information and access to all methods of contraception. The implant and intrauterine device (IUD), long-acting reversible contraception (LARC), are considered first-line contraceptive methods for adolescents [1–3]. Lack of awareness remains a barrier to method use, particularly among teenagers and young adults [4–6]. Nearly half of all young women (48%) have never heard of the implant, and 13% have never heard of the IUD [7]. Compared to women ages 20–29, teenagers ages 18–19 are less likely to be aware of LARC, and knowledge about contraceptive methods is lower among African American and Latino women compared to non-Latino white women [7,8]. In clinic settings with limited time for counseling, patient education-related gaps might be addressed through innovative approaches.

Mobile applications (apps) offer a scalable technology and have features that may be ideal for a clinic setting. Apps allow users to navigate and choose the information that is most relevant to them [9]. Apps can complement and enhance face-to-face counseling, building knowledge prior to the clinician visit [6,10]. This study was motivated by a prior study which determined that provider time constraints limited thorough counseling on all methods of contraception, particularly LARC

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methods. Patients' dislike of paper pamphlets and long waiting room times led collaborating with patients in the design and development of a mobile app providing information on all methods of contraception to be used in the waiting room prior to the clinical visit [11]. The current study evaluates the effect of the contraceptive app, miPlan, on interest in learning about LARC during the subsequent clinical visit. Its effects on knowledge about effectiveness of all methods of contraception, behavioral intentions to use contraception, and what method they actually used are also studied.

## 2. Materials and methods

The study was conducted in four family planning clinics in a large Midwestern city serving predominately African American and Latino local communities. While provider's perception of counseling deficits led to app development, the app itself was developed in collaboration with young African American and Latino patients using human-centered design in which patients participated throughout the app development process to help determine the content and ensure that the final product met their needs [12]. The Transtheoretical Model of Behavioral Change and the Theory of Planned Behavior informed app content, focusing on attitudes, norms, and behavioral intentions regarding contraceptive use [13–15]. The app and its development are described in detail elsewhere [12]. In brief, the app addressed all methods of contraception and included young people's ideas for content such as: images of each method, information on side effects of each method, contraceptive effectiveness rates rather than failure rates, and, information about men's experiences with each method. In addition, the app included short videos (less than 1 minute) about different LARC methods based on interviews with African American and Latino LARC users. Videos were based on interviews with young women who used these methods. Interviews informed videos describing the patient experience (e.g., side effects, the insertion process). Given the time constraints for a waiting room app (approximately 15–20 min of downtime per person), the decision was made to limit videos to LARC methods as the formative research identified counseling barriers with these methods in particular.

We assessed the resulting "miPlan" app in a randomized controlled trial. Young women ages 15 to 29, presenting for contraceptive care, sexually active with a male partner in the past 6 months, not pregnant, not using a LARC method, self-identified African American or Latina/Hispanic, and English speaking were eligible to participate in the study. A trained research assistant screened women for eligibility and implemented all study procedures. Those meeting inclusion criteria completed informed consent procedures and were then randomized (1:1) to the app plus routine clinic visit (intervention) versus routine clinic visit (no app) alone (control).

All women completed a self-administered online survey via tablet computer. Study staff oriented participants in the intervention (app) arm to the tablet and gave them approximately 10 minutes to engage with the app. Next they completed a brief survey on app usability, contraceptive methods they were interested in learning about during their clinical visit, knowledge about contraceptive effectiveness, and behavioral intentions. They then proceeded to the contraceptive visit, including contraceptive counseling with a reproductive health assistant and a contraceptive visit with a clinician. Those randomized to the control (no app) condition completed an online survey, did not view the app, and proceeded directly to the routine clinic visit consisting of contraceptive counseling with a reproductive health assistant and the contraceptive administration visit with a clinician. All health care providers were blinded to study group assignment.

We conducted medical chart reviews for all participants to document which method, if any, they received at the end of their clinic visit. Three months post-enrollment, research staff contacted participants via telephone to complete follow-up surveys.

All study participants received a $10 gift card for completing baseline study procedures and a $20 gift card for completing the three month survey. The sample size for the study was based on interest in discussing LARC, with a baseline interest derived from a previous, pilot study [6]. We chose a sample size of 220 to detect an increase from 25.8% (baseline) to 45% (intervention) in the proportion of patients interested in discussing LARC during their clinical visit based on a power $(1\text{-}\beta) = 0.80$, with an alpha set at 0.05. Study procedures are shown in Fig. 1.

At baseline, we collected data on socio-demographic characteristics; relationship status; and sexual, reproductive, and contraceptive histories. Participants were also surveyed on contraceptive method awareness, current contraceptive use, knowledge of contraceptive effectiveness, which methods they were interested in discussing with a clinician, and behavioral intentions to use a LARC method.

In the intervention group, after the participants used the app, we collected data on: knowledge of contraceptive effectiveness, which methods they were interested in discussing with a clinician, and behavioral intentions to use a LARC method.

At three-months, all participants completed a follow-up telephone survey assessing knowledge about contraceptive effectiveness, current contraceptive use, and behavioral intentions to use a LARC method. Actual method use was documented for each participant, based on a chart review conducted by the clinic staff.

For interest in discussing a LARC method, the survey asked respondents to select from a list of which methods they were interested in discussing with a clinician. The survey measured knowledge of contraceptive effectiveness using three questions asking "Which birth control method do you think is more effective?" and presenting three comparisons: (1) oral contraceptive pill (OCPs) versus condoms; (2) IUD versus depo-medroxyprogesterone acetate (DMPA) injection; and (3) the implant versus IUD. We created a composite score combining responses to all three items to represent overall contraceptive effectiveness knowledge, with a range from zero to three; higher scores reflected greater knowledge of contraceptive effectiveness. The survey measured behavioral intentions to use LARC using two items asking how likely the respondent was to use the (1) implant or (2) IUD in the future using a five-point Likert response scale.

We used descriptive statistics to describe sample characteristics. We compared between group responses for baseline and follow-up surveys using chi-squared tests for categorical variables and Wilcoxon Mann–Whitney *U* tests for ordinal and continuous variables. Within the intervention group, we compared differences in knowledge of contraceptive method effectiveness and LARC behavioral intentions from pre-app use to post-app use using McNemar's chi-squared tests for dichotomous variables and the Wilcoxon signed-rank test for ordinal and continuous variables. We assessed between group differences in current method use using Fisher's exact tests. The University of Chicago Biological Sciences Division Institutional Review Board approved all study protocols and procedures, including a waiver of parental consent for minors.

## 3. Results

From February 2015 to January 2016, the research team screened 271 potential participants for the study; 25 were not interested in participating, 24 were ineligible, and one participant had been previously screened. We enrolled and randomized a total of 221 women (intervention=110; standard care=111). In subsequent chart review, we identified seven women as ineligible due to pregnancy discovered during the subsequent clinic visit and seven due to misinformation provided in response to screening questions regarding current LARC use. We present a per-protocol analysis. Fig. 2 shows the study participant flowchart.

### *3.1. Group comparisons at baseline (app intervention group vs. no app control group)*

There were no significant differences in the baseline demographics of the two groups and thus these are presented for the whole cohort. Participants had a mean age of 22.0 years, range 15–29 years.

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