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Mapping Long-acting Reversible Contraceptive Interventions to the Social Ecological Model: A Scoping Review

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Abstract

Introduction: Long-acting reversible contraception (LARC) is one option for preventing unintended pregnancies and short interpregnancy intervals. Efforts to increase access to contraception may benefit from applying the social ecological model (SEM), a framework that considers individual, interpersonal, organizational, community, and policy influences on behavior. We aimed to summarize findings from interventions on LARC use and map interventions to SEM levels.

Methods: We conducted a scoping review of the 2010–2020 literature in PubMed/MEDLINE and Embase databases to summarize interventions that did and did not increase LARC use. Although increasing LARC use is not an appropriate goal from a reproductive autonomy standpoint, it is the stated goal of much of the research conducted to date and typically indicates an improvement in access. We mapped these interventions to SEM levels and categorized their strategies: cost support, patient counseling, administrative support, provider training, and other.

Results: Of 27 interventions reviewed, 17 (63%) increased LARC use. We observed a greater proportion of interventions that increased LARC uptake among those with strategies implemented at policy (8/10 [80%]) or organizational (14/19 [74%]) SEM levels compared with interventions implemented at other SEM levels. When both individual and organizational SEM-level components were implemented, five of six interventions (83%) increased uptake. All five interventions with both organizational- and policy-level components increased LARC use. Among the 27 interventions, patient counseling ($n = 12$) and cost support ($n = 12$) were common strategies. Five of 12 interventions (42%) involving patient counseling and 11 of 12 (92%) involving cost support increased LARC use.

Conclusions: Organizational and policy SEM components and cost support strategies were most prevalent in interventions that increased LARC use. Future interventions to improve access to contraception, while respecting patient autonomy, could incorporate more than one SEM level.

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Supplementary Data

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Unintended (i.e., mistimed or unwanted) pregnancies and short interpregnancy intervals (i.e., periods between the birth of one child and conception of the next child) are associated with increased risks of preterm birth and other adverse pregnancy outcomes (Conde-Agudelo, Rosas-Bermudez, Castaño, & Norton, 2012; Gemmill & Lindberg, 2013; Shah et al., 2011). Contraceptive methods such as long-acting reversible contraception (LARC) (i.e., intrauterine devices and subdermal implants) can prevent unintended pregnancies and short interpregnancy intervals (Harney, Dude, & Haider, 2017; Peipert, Madden, Allsworth, & Secura, 2012; Winner et al., 2012; Wu, Eisenberg, Negassa, & Levi, 2020).

From 2017 to 2019, 65% of U.S. women ages 15 to 49 years used any method of contraception and 10% used a LARC method (Daniels & Abma, 2020). LARC use has been increasing in recent years (Beshar, Chelvakumar, Cahill, Shaw, & Shaw, 2021). This increase may be partly due to federal policies or laws that have expanded access (Carlin, Fertig, & Dowd, 2016; Darney et al., 2020; Law et al., 2016; Snyder, Weisman, Liu, Leslie, & Chuang, 2018; Weisman, Chuang, Snyder, Liu, & Leslie, 2019). The Affordable Care Act (ACA) requires many insurance plans to provide in-network coverage without cost sharing of certain recommended clinical preventive services, including all U.S. Food and Drug Administration (FDA)–approved contraceptive methods (Fox & Shaw, 2015). The ACA also enabled states, effective January 2014, to expand Medicaid eligibility to low-income adults with effective incomes of up to 138% of the federal poverty level, most of whom were not previously eligible (Ranji, Bair, & Salganicoff, 2016). Under the ACA, Medicaid expansion plans also are required to provide in-network coverage without cost sharing for all FDA-approved contraceptive methods and contraceptive counseling (Fox & Shaw, 2015). In addition, states have several options for covering family planning services through Medicaid for individuals who have relatively low incomes but are not otherwise eligible for traditional or expanded Medicaid (e.g., include in its State Plan Amendment an optional family planning eligibility group established under the ACA, and/or use a Medicaid section 1115 waiver to develop demonstration projects that provide greater flexibility in benefits or eligibility) (Centers for Medicare & Medicaid Services, 2010).

Barriers to LARC access include low levels of reimbursement, acquisition and stocking costs, and facility protocols that limit same-day initiation (Bergin, Tristan, Terplan, Gilliam, & Whitaker, 2012; Committee on Gynecologic Practice Long-Acting Reversible Contraception Working Group, 2015; Committee on Health Care for Underserved Women, 2015; Orris, Mauser, Bachrach, & Grady, 2019; Vela et al., 2018; Wachino, 2016). Other barriers include limited availability of providers trained and comfortable with contraceptive counseling and LARC insertion (Phillips & Sandhu, 2018; Thompson et al., 2020) as well as patient concerns about side effects of LARC methods (Daniele, Cleland, Benova, & Ali, 2017).

In addition to these barriers, people at risk of unintended pregnancies can also face reproductive injustices. According to Ross and Solinger (2017), reproductive justice has three primary principles: 1) the right not to have a child, 2) the right to have a child, and 3) the right to parent children in safe and healthy environments. It is important to be mindful that, when implementing interventions to increase LARC use, characteristics of LARC methods that are desirable to some may be undesirable to others (Kaitz, Mankuta,

& Mankuta, 2019). Although a major advantage of LARC compared with other reversible contraceptive methods is that they do not require ongoing effort from patients for long-term and effective use (American College of Obstetricians and Gynecologists, 2017), removal of LARC typically requires a clinician visit, which may be a barrier to some patients. Being intentional about respecting patients and their autonomy is necessary for avoiding any type of harm, including inadvertent harm, that may arise from well-meaning providers promoting individual-level interventions (e.g., LARC uptake) as solutions to structural problems (e.g., lack of transportation, child care, and insurance coverage) (Moniz et al., 2022). According to the American College of Obstetricians and Gynecologists (2019), the method of contraception should be chosen by the individual, after discussion with the clinician, regardless of the patient's social, medical, or situational circumstance.

Increased LARC use is a positive outcome of interventions only to the extent that it indicates people who desired LARC methods are finding it easier to obtain them. However, many of the intervention studies that sought to remove barriers to LARC had increased LARC use as the stated goal or a primary outcome. We, therefore, examined these interventions while acknowledging that to respect reproductive autonomy, investigators should not set increased LARC use as a goal.

The literature on interventions that did and did not increase LARC use can be organized using a systems approach. The social ecological model (SEM) is a framework for understanding individual, interpersonal, organizational, community, and policy levels of influence on health behavior (McLeroy, Bibeau, Steckler, & Glanz, 1988). These levels reflected the range of strategies that were available for health promotion interventions at the time of publication. Moreover, this framework also decreases opportunities for placing responsibility of behavior change on the individual alone (McLeroy et al., 1988). The SEM expands on the work of others. McLeroy et al. (1988) stated that previous ecological models had shortcomings, such as collapsing physical and social levels into one influence on health or focusing only on morbidity or mortality outcomes, and not behavior. Public health practitioners can refer to the SEM to help explain the interaction between behaviors, community, policy, the environment, and other factors that influence health. In understanding the pathways between these social-ecological factors, practitioners can design and implement public health interventions that address key factors to improve health outcomes.

Interventions may have different combinations of strategies that fit into multiple levels of the SEM, making it challenging to summarize the literature comprehensively. Applying a systems approach through a scoping review can help synthesize and find gaps in the literature (Tricco et al., 2018), such as identifying which SEM levels may have a dearth of interventions. In this review, we mapped LARC intervention components to levels of the SEM and detailed specific strategies of the interventions.

Methods

Search Strategy

Using the scoping study methodology (Daudt, van Mossel, & Scott, 2013) and the Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews checklist (Tricco et al., 2018), we identified, in two phases, peer-reviewed publications of interventions that did and did not increase LARC uptake. For phase 1, study author M.R. and a research assistant searched PubMed/MEDLINE to identify original U.S.-based articles published in English over a 10-year period from January 1, 2010, through June 15, 2020, based on search terms related to interventions, LARC methods, and uptake or initiation. Phase 2 involved conducting an updated search of Embase and MEDLINE databases on October 30, 2020, using an expanded version of the phase 1 criteria. We present the full search terms for both phases in the Appendix. Citations from included studies were reviewed for additional articles.

Study Selection

For phase 1, authors G.P-B. and M.R. conducted independent searches for records identified and removed duplicate records. For phase 2, staff from an institutional library searched the databases and supplied a deduplicated file of articles. For both phases, duplicates were identified using the automated “find duplicates” function in EndNote X8. Two independent reviewers (G.P-B. and M.R.) screened titles and abstracts of remaining citations based on the initial search criteria and discussed discrepancies. We selected citations for full text reviewbased on the following criteria: presented findings of statistical significance testing; published nonsecondary research; designed U.S.-based original studies; reported findings of an intervention study (e.g., no conference abstracts, literature reviews, or feasibility studies); defined LARC uptake as the outcome; did not combine LARC with other contraceptive methods; and evaluated interventions or policy changes as exposures.

Data Abstraction

Data were abstracted using a spreadsheet in Excel for Microsoft 365 with predefined fields. Two authors (G.P-B. and M.R.) independently abstracted information from full text articles. Discrepancies, which did not arise often, were discussed by authors G.P-B. and M.R. If there was no consensus on categorization, then author L.R. adjudicated. Study characteristics for all citations undergoing full text review were recorded with the decision to include or exclude. These characteristics were the study design, intervention, statistical significance, and whether they adjusted for confounders. Interventions were categorized as increasing LARC use if publications reported statistically significant findings ($p \leq .05$ or 95% confidence intervals [CIs] containing no null values).

Categorization by SEM and Strategy Type

For each included article, all authors independently mapped interventions to SEM levels and classified interventions by types of strategies based on descriptions provided in the publications. Discrepancies were discussed and resolved. These five SEM levels reflect the

range of approaches for promoting health, from the individual level to public policy level (McLeroy et al., 1988).

1. Individual—characteristics of the individual such as knowledge, attitudes, behavior, self-concept, and/or skills.
2. Interpersonal—formal and informal social network and social support systems, including the family, work group, and friendship networks.
3. Organizational—social institutions with organizational characteristics and rules and regulations (formal and informal) for operation.
4. Community—relationships among organizations, institutions, and informal networks within defined boundaries.
5. Public policy—local, state, and national laws and policies.

We reviewed the details of the interventions and created the following five classifications to group the strategies based on thematic analyses: cost support (e.g., clinic funding and no-cost LARC), patient counseling (e.g., motivational interviewing), provider training (e.g., immediate postpartum LARC insertion), administrative support (e.g., scheduling appointments and providing referrals), and other (i.e., group support, LARC champion, or early postpartum care). An intervention could be classified as more than one strategy and more than one SEM level. These two classification systems are related: the former (strategy) provided more details about the latter (SEM) and in turn helped us determine the SEM level of the intervention. For example, an intervention with cost support and provider training strategies may have mapped to organizational and policy levels, depending on the details reported. When assessing the impact of interventions, strategies used in both intervention and control groups (e.g., standard care) within a study were not counted. The Ethics and Human Research Protection Program at the Florida Department of Health determined our work was not human subjects research and, therefore, did not require institutional review board approval.

Results

Search Results

Database searches for phases 1 and 2 yielded 291 and 784 articles, respectively (Figure 1). After removing one duplicate from phase 1 and screening titles and abstracts based on the criteria detailed elsewhere in this article, wefurther excluded 246 citations from phase 1 and 733 from phase 2. We conducted full-text reviews on 44 articles from phase 1 and 31 from phase 2. Six articles from phase 1 and one from phase 2 did not present statistical testing results (either *p* values or CIs). Four articles from phase 1 and two from phase 2 were excluded because they were a continuation or subanalyses of parent studies already included in the sample. One article each from phases 1 and 2 were conducted in another country. We also excluded one study from phase 1 because it was a feasibility study and one from phase 2 for being a literature review. For phase 1, we further excluded four for having other outcomes (e.g., intention to use and accessibility), three for combining LARC with other contraception methods, and one for examining an exposure that was not an intervention or

policy change (i.e., having Medicaid vs. private insurance). For phase 2, we additionally excluded six conference abstracts and 17 articles that were identified from phase 1. These exclusions left 27 articles (24 from phase 1 and three from phase 2) combined for inclusion in this scoping review.

Study Characteristics

Of the 27 publications we reviewed, study populations ranged from 49 people (Simmons, Edelman, Li, Yanit, & Jensen, 2013) to 7.32 million (Snyder et al., 2018). The most prevalent study design was a randomized controlled trial, found in 10 (37%) articles (Table 1). Thirteen (48%) conducted adjusted analyses, where they controlled for individual, clinical, or environmental factors (e.g., rural/urban settings and state policies). LARC use significantly increased in 17 (63%) of the intervention studies.

SEM Categorization

Among 27 interventions, 11 (41%) mapped to only one SEM level, 12 (44%) to two levels, and four (15%) to three levels (Table 1). Among the 11 interventions that operated from only one SEM level, four increased LARC uptake. Among the four studies that addressed only the individual level, none (0%) increased LARC uptake; among the three that addressed only the organization level, one (33%) increased it; the one study that addressed only the community level increased LARC uptake (100%); and among the three studies that addressed only the policy level, two (66%) increased LARC uptake. Among interventions that had two SEM levels, all 12 (100%) had an organizational-level component. When the organizational level component was combined with another level, most (n = 10) interventions increased use: five of six interventions (83%) with both organizational and individual levels and all five interventions (100%) with both organizational and policy levels. Among the four interventions with three SEM levels, one-half increased uptake. One of these four interventions had an interpersonal-level component, which was observed in combination with individual and organizational components (Table 1).

Of the 27 interventions, 17 increased LARC uptake. Of note, 11 of these 17 interventions (65%) had two SEM levels. By contrast, one of 10 interventions (10%) that did not increase uptake had two SEM levels. Of the 27 studies reviewed, those with a policy-level component had a high proportion that increased use (8/10 [80%]), as did those with an organizational-level component (14/19 [74%]) (Figure 2).

Strategy Categorization

Of 27 articles, intervention groups in 15 studies (56%) experienced one strategy (i.e., patient counseling, provider training, or cost or administrative support) that control groups did not (Table 1). Eleven intervention groups (41%) were exposed to two strategies and one intervention group (4%) was exposed to four strategies that respective control groups did not experience. Patient counseling and cost support were common strategies, with implementation of each in 12 of the 27 interventions groups (44%) (Table 1). The following study strategies increased LARC use: five of 12 studies (42%) including patient counseling, five of six studies (83%) involving administrative support, six of eight (75%) involving provider training, 11 of 12 interventions (91%) involving cost support, and two of three

interventions (66%) involving other strategies. A significant increase in LARC uptake was found for five of six interventions with cost support only compared with the control group, three of three with cost support and provider training, one of one with cost support and administrative support, one of one with cost support and other, and one of one with all four strategies.

Randomized Controlled Trials That Increased LARC Use

Three studies that were randomized controlled trials and reported increased LARC use mapped to the individual and organizational SEM levels (Table 1). In the Stevens et al. (2017) study, the Teen Options to Prevent Pregnancy program provided motivational interviewing-based contraceptive counseling delivered by a trained nurse at the client's home or in the community, access to a part-time contraceptive clinic, transportation to any local provider (not just the Teen Options to Prevent Pregnancy clinic), and social worker assistance. The authors observed a 13.7% absolute increase in self-reported LARC use in the intervention arm compared with the usual-care control arm (40.2% vs. 27.5%; difference = 13.7; 95% CI, 4.9–22.4; $p = .002$), after adjusting for demographic and study design characteristics. Torres, Turok, Clark, Sanders, and Godfrey (2018) observed that postpartum participants who received structured counseling with an emphasis on LARC methods using the GATHER tool had more than four times the odds of LARC use compared with those who had routine postpartum care (adjusted odds ratio [aOR], 4.6; 95% CI, 1.3–15.6). In the Whitaker et al. (2016) study, compared with receiving nonstandardized counseling, motivational interviewing-based contraception counseling resulted in a higher percentage of patients receiving LARC (65.5% vs. 32.3%; $p = .01$).

The following study mapped to organizational and policy SEM levels. Thompson et al. (2016) conducted multivariable analyses and found clinics with both public funding for contraceptive purchase and a four-hour continuing medical education training for all clinic staff had higher initiation rates than controls (adjusted hazard ratio, 1.43; 95% CI, 1.04–1.98), and patients receiving care at clinics with Medicaid family planning expansion programs had higher initiation rates than those seen at clinics without such programs (adjusted hazard ratio, 2.26; 95% CI, 1.59–3.19).

Randomized Controlled Trials That Did Not Increase LARC Use

All six randomized controlled trials that did not increase LARC use had an individual-level component and two of these also had organizational, community, or policy components (Table 1). Five of these six studies used a patient contraceptive counseling strategy (Frarey, Gurney, Sober, Whittaker, & Schreiber, 2019; Haider et al., 2020; Herbert et al., 2018; Staley, Charm, Slough, Zerden, & Morse, 2019; Tang et al., 2014) and the remaining study (Simmons et al., 2013) included both patient counseling and administrative support (e.g., appointment scheduling).

Observational Studies That Adjusted for Confounders and Increased LARC Use

The following observational studies that adjusted for confounders and increased LARC use mapped to the organizational SEM level in combination with either the individual or policy level (Table 1). Buckel, Maddipati, Goodman, Peipert, and Madden (2019) found that

participants at health centers with a combination of patient contraceptive counseling, health care provider education, and cost support for LARC had more than four times the odds of same-day LARC uptake (adjusted relative risk, 4.73; 95% CI, 3.20–6.98) compared with patients at health centers that offered structured contraceptive counseling and usual care. Tomlin, Bambulas, Sutton, Pazdernik, and Coonrod (2017) observed a two-fold (aOR, 2.08; 95% CI, 1.69–2.55) increased likelihood of LARC use in relation to adolescent prenatal care with motivational interviewing versus standard prenatal care. Thompson, Speidel, Saporta, Waxman, and Harper (2011) reported LARC uptake was associated with having trained clinicians (aOR, 7.8; 95% CI, 2.9–21.4), state contraceptive coverage mandate for private insurers (aOR, 2.7; 95% CI, 1.2–6.2), and Medicaid waivers expanding family planning services (aOR, 1.9; 95% CI, 1.0–3.6). Goyal, Canfield, Aiken, Dermish, and Potter (2017) found that participation in a specialized funding program (i.e., the LARC Access Program using funding from the Medicaid 1115 waiver program) at a multi-institution health delivery system was associated with a 10-fold greater incidence of receiving LARC for low-income, uninsured county residents compared with ineligible (i.e., higher-income or low-income noncounty resident) participants, after adjusting for age, race/ethnicity, and education.

The following two studies mapped to the policy SEM level only. Goldin-Evans et al. (2019) found that changing a Medicaid policy to increase providers' reimbursement rate for the LARC device to the wholesale acquisition cost increased uptake by two-fold after adjusting for patient and provider characteristics (aOR, 2.08; 95% CI, 1.69–2.55). Also, the aORs for receiving a LARC method after this policy change versus before varied by provider specialty and ranged from 1.66 to 3.93 for obstetrician/gynecologist, hospital/hospital system, family planning clinic, maternal and fetal medicine, and family practices (all statistically significant) and from 1.12 to 1.94 for nurse practitioner, pediatrics, and pharmacy (none statistically significant). Snyder et al. (2018) reported that out-of-pocket costs for all contraceptive methods for privately insured women decreased after implementation of the ACA-related contraceptive coverage requirement, which was associated with a statistically significant increase in LARC uptake after controlling for age and geographic factors (aOR, 1.03; 95% CI, 1.02–1.04).

Observational Studies That Adjusted for Confounders and Did Not Increase LARC Use

Among the 10 interventions from observational studies that did not increase LARC use, two adjusted for reproductive, demographic, or socioeconomic factors. The aRRs were 0.98 (95% CI, 0.94–1.02) for patient counseling using the Greet, Ask, Tell, Help, Explain tool and provider training (Madden, Mullersman, Omvig, Secura, & Peipert, 2013) (individual and organizational SEM levels) and 1.99 (95% CI, 0.57–6.62) for using LARC-focused video counseling during prenatal care (Staley et al., 2019) (individual SEM level).

Discussion

In this scoping review of 27 articles, interventions that increased LARC uptake used various strategy combinations across all SEM levels. Most of the interventions that included organizational- or policy-level components and used cost support strategies were

found to increase LARC use. Of all publications we reviewed, only one intervention (CenteringPregnancy) mapped to the interpersonal SEM level.

In our review, none of the four studies that mapped to only the individual SEM level increased LARC use. Client-centered contraceptive counseling or motivational interviewing (Miller & Rollnick, 2013; Whitaker et al., 2016) allows patients to collaborate with their counselor to design their own family planning while learning about the safety and efficacy of various contraceptive methods (Buckel et al., 2019; Stevens, Lutz, Osuagwu, Rotz, & Goesling, 2017; Tomlin et al., 2017; Torres et al., 2018). However, in our review, counseling alone was not found to increase LARC uptake. More interventions (five of six) increased uptake if individual and organizational (e.g., provider training) components were included.

We identified one intervention with an interpersonal-level component. DeCesare, Hannah, and Amin (2017) evaluated the impact of the CenteringPregnancy program on LARC uptake and found a higher percentage of women in the intervention group (24.5%) used a LARC method if they attended group prenatal appointments with other women who had similar gestational ages and freely discussed all FDA-approved birth control methods than if they received traditional care (8.3%). One study, however, does not provide enough evidence to make inferences about the impact of interventions with interpersonal-level components. Furthermore, this study examined the impact of one type of social network when others, such as workgroup or family networks, exist and could be explored.

Likewise, only three of 27 reviewed studies included a community-level component. Two of these three increased LARC uptake. Many definitions of community exist. For this article, we focused on a definition McLeroy et al. (1988) provided to help detail the SEM framework. These authors highlight the importance of relationships within communities, because neglecting relationships may decrease the acceptance of interventions within specific subgroups that have varying values, norms, attitudes, and behaviors. For the two successful interventions, investigators established or enhanced relationships with community partners by creating educational opportunities through lunch-and-learn seminars that included both community and clinical partners (Aligne, Phelps, VanScott, Korones, & Greenberg, 2020) or by providing funding support (Evans, Breeze, Paulus, & Meadows, 2017). The one unsuccessful intervention worked with community partners to provide childcare for patients (Simmons et al., 2013). More research with rigorous epidemiologic methods could be conducted to better assess the impact community-level interventions have on contraceptive use among people at risk of unintended pregnancies.

In this scoping review, we found that 14 of 19 studies (74%) with an organizational-level component increased LARC use. When both organizational and individual SEM level components were implemented, five of six interventions (83%) increased uptake. For five interventions with both organizational and policy level components, five (100%) increased LARC use. Training providers to insert intrauterine devices or implants or to conduct patient-centered counseling using methods such as role-playing coupled with cost support to make these methods available to those in need increased uptake between 1.5 and 10.0-fold (Buckel et al., 2019; Goyal et al., 2017; Stevens et al., 2017; Thompson et al., 2011, 2016). Cost support was a common strategy used in interventions that increased LARC

uptake, which mainly mapped to organizational and policy SEM levels (Ricketts, Klingler, & Schwalberg, 2014; Steenland, Pace, Sinaiko, & Cohen, 2019).

Eight of 10 interventions (80%) that included a policy-level component increased LARC use. Three of these 10 had policy SEM-level components only. Findings from the two studies that examined the effect of the ACA-related contraceptive coverage requirement were inconsistent (Bell, 2018; Snyder et al., 2018). Goldin-Evans et al. (2019) reported that increasing the Medicaid reimbursement rate was statistically significantly associated with increased LARC uptake among most provider types, including family practice (aOR, 2.90) and maternal and fetal medicine (aOR, 3.19).

Strengths and Limitations

A strength of our review is that we mapped interventions to SEM levels, which allows one to consider the potential impact of both macro (e.g., policy level) and micro (e.g., individual level) factors on behavior change and better comprehend the magnitude of that potential impact at each SEM level. Limitations also exist. Because our review is a scoping review, which is useful for rapidly mapping key concepts, identifying gaps in the literature, examining the nature of research activity, and disseminating findings (Daudt et al., 2013), it does not match the rigor of a systematic review, which includes a critical appraisal or risk of bias assessment (Tricco et al., 2018). Using stringent inclusion criteria would have yielded fewer articles to review and may have changed our conclusions. Still, to minimize confounding bias or variability in the data, we summarized findings from studies that adjusted for factors in multivariable regression models. We did not systematically look at policy changes, only those evaluated in the literature, and therefore may have underestimated the impact of policies on LARC uptake. Furthermore, most studies we reviewed used purposive or convenience sampling and may not have been included in a systematic review. These sampling forms may contribute to self-selection and other biases. Conducting a systematic review on this topic is a future research opportunity that may show whether we would have produced different results with a more rigorous approach.

Implications for Policy and/or Practice

Our review found that organizational and policy SEM components were most prevalent in interventions that increased LARC use, which is consistent with the Health Impact Pyramid (Frieden, 2010). The pyramid framework suggests that, when compared with interventions that require more individual-level effort (e.g., education and counseling), interventions focusing on lower levels of the pyramid (e.g., socioeconomic factors and changing the context for health) tend to have more impact on health outcomes because they reach broader segments of society.

Still, it is important to acknowledge that no matter the level, efforts to increase LARC use should not deny women reproductive control (Gomez, Fuentes, & Allina, 2014). Undermining reproductive autonomy can be avoided by eliminating barriers to ensure access to all contraceptive methods (Gomez et al., 2014). In North Carolina, the state-funded Improving Community Outcomes for Maternal and Child Health initiative made notable strides in transforming an evidence-based strategy that focused on increasing access to

LARC into a broader strategy that incorporated principles of reproductive justice (Yates et al., 2022), after listening to community partners' concerns about the original strategy. They modified the strategy by focusing more on Reproductive Life Planning (RLP) and informed consent, which included changing evaluative performance measures and scope of work and deliverables required by county health department grantees. Two examples of revisions to performance measures were changing the following:

1. "Increase the number of clients who receive a LARC" to "Increase the number of local health department (LHD) patients who report access to all methods without pressure from providers."
2. "Increase the # of LHDs and community providers who offer LARC" to "Increase the percent of LHD providers who utilize the RLP protocol when providing health care services to women in all LHD clinics (family planning, maternal health, etc.)"

They also removed a 10% target increase in the number of LARC users and subsequently encouraged sites to increase all contraceptive methods available to individuals, focusing on access instead of a specific method. Moreover, leaders also trained patients, community members, and providers about reproductive justice, which included education about patient-centered contraceptive counseling. Sites were encouraged to collect feedback from clients. To better assess consumer experience with contraceptive services, one site is using the Person-Centered Counseling Measure (https://pcccmeasure.ucsf.edu/). Despite the short-term success in improving the goals and strategies of improving Community Outcomes for Maternal and Child Health based on community feedback and partnering with reproductive justice organizations, there is not yet clear understanding of the long-term implications of their changes (Yates et al., 2022). Evaluating this type of program change is an opportunity for future research.

Conclusions

Of the articles reviewed, interventions with organizational and policy SEM components increased LARC use more than did interventions with other SEM components. interventions that increased uptake frequently implemented multiple strategies, such as a combination of patient counseling, provider training, and cost support, with cost support being the most prevalent effective strategy. Researchers could fill gaps by studying interventions at the interpersonal and community levels. Future interventions that aim to increase access to LARC—or any type of contraceptive method—use may consider incorporating multiple strategy types and SEM levels.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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References

Aligne CA, Phelps R, VanScott JL, Korones SA, & Greenberg KB (2020). Impact of the Rochester LARC Initiative on adolescents' utilization of long-acting reversible contraception. American Journal of Obstetrics and Gynecology, 222(4S), S890.e891–S890.e896.

American College of Obstetricians and Gynecologists. (2017). Long-acting reversible contraception: Implants and intrauterine devices. Practice Bulletin No. 186. Obstetrics and Gynecology, 130, e251–e269. [PubMed: 29064972]

American College of Obstetricians and Gynecologists. (2019). Nation's Ob-Gyns Oppose Coercive Contraception Practices and Policies. Available: https://www.acog.org. Accessed: June 6, 2023.

Bell KN, Meyn LA, & Chen BA (2018). Long-acting reversible contraceptive uptake before and after the Affordable Care Act contraceptive mandate in women undergoing first trimester surgical abortion. Womens Health Issues, 28(4), 301–305. [PubMed: 29853173]

Bergin A, Tristan S, Terplan M, Gilliam ML, & Whitaker AK (2012). A missed opportunity for care: Two-visit IUD insertion protocols inhibit placement. Contraception, 86(6), 694–697. [PubMed: 22770798]

Beshar I, So J, Chelvakumar M, Cahill EP, Shaw KA, & Shaw JG (2021). Socioeconomic differences persist in use of permanent vs long-acting reversible contraception: An analysis of the National Survey of Family Growth, 2006 to 2010 vs 2015 to 2017. Contraception, 103(4), 246–254. [PubMed: 33359509]

Buckel C, Maddipati R, Goodman M, Peipert JF, & Madden T. (2019). Effect of staff training and cost support on provision of long-acting reversible contraception in community health centers. Contraception, 99(4), 222–227. [PubMed: 30685287]

Carlin CS, Fertig AR, & Dowd BE (2016). Affordable Care Act's mandate eliminating contraceptive cost sharing influenced choices of women with employer coverage. Health Aff (Millwood), 35(9), 1608–1615. [PubMed: 27605640]

Centers for Medicare & Medicaid Services. (2010). Family planning services option and new benefit rules for benchmark plans. SMDL#10-013; ACA#4. Available: https://www.medicaid.gov/sites/default/files/Federal-Policy-Guidance/downloads/SMD10013.pdf. Accessed: July 17, 2023.

Chen MJ, Hou MY, Hsia JK, Cansino CD, Melo J, & Creinin MD (2017). Long-acting reversible contraception initiation with a 2- to 3-week compared with a 6-week postpartum visit. Obstetrics and Gynecology, 130(4), 788–794. [PubMed: 28885429]

Committee on Gynecologic Practice Long-Acting Reversible Contraception Working Group. (2015). Committee opinion No. 642: Increasing access to contraceptive implants and intrauterine devices to reduce unintended pregnancy. Obstetrics and Gynecology, 126(4), e44–e48. [PubMed: 26393458]

Committee on Health Care for Underserved Women. (2015). Committee opinion no. 615: Access to contraception. Obstetrics and Gynecology, 125(1), 250–255. [PubMed: 25560140]

Conde-Agudelo A, Rosas-Bermudez A, Castaño F, & Norton MH (2012). Effects of birth spacing on maternal, perinatal, infant, and child health: A systematic review of causal mechanisms. Studies in Family Planning, 43(2), 93–114. [PubMed: 23175949]

Daniele MAS, Cleland J, Benova L, & Ali M (2017). Provider and lay perspectives on intra-uterine contraception: A global review. Reproductive Health, 14(1), 119. [PubMed: 28950913]

Daniels K, & Abma JC (2020). Current contraceptive status among women aged 15-49: United States, 2017-2019. NCHS Data Brief, 388, 1–8.

Darney BG, Jacob RL, Hoopes M, Rodriguez MI, Hatch B, Marino M, … Cottrell EK (2020). Evaluation of Medicaid expansion under the Affordable Care Act and contraceptive care in US community health centers. JAMA Network Open, 3(6): Article e206874. [PubMed: 32496568]

Daudt HM, van Mossel C, & Scott SJ (2013). Enhancing the scoping study methodology: A large, inter-professional team's experience with Arksey and O'Malley's framework. BMC Medical Research Methodology, 13, 48. [PubMed: 23522333]

DeCesare JZ, Hannah D, & Amin R (2017). Postpartum contraception use rates of patients participating in the Centering Pregnancy model of care versus traditional obstetrical care. Journal of Reproductive Medicine, 62(1–2), 45–49. [PubMed: 29999281]

Evans ML, Breeze JL, Paulus JK, & Meadows A (2017). Revolving loan fund: A novel approach to increasing access to long-acting reversible contraception methods in community health centers. Journal of Public Health Management Practice, 23(6), 684–689. [PubMed: 28628582]

Fox JB, & Shaw FE (2015). Clinical preventive services coverage and the Affordable Care Act. American Journal of Public Health, 105(1), e7–e10.

Frarey A, Gurney EP, Sober S, Whittaker PG, & Schreiber CA (2019). Postpartum contraceptive counseling for first-time adolescent mothers: A randomized controlled trial. Archives of Gynecology and Obstetrics, 299(2), 361–369. [PubMed: 30470924]

Frieden TR (2010). A framework for public health action: The health impact pyramid. American Journal of Public Health, 100(4), 590–595. [PubMed: 20167880]

Gemmill A, & Lindberg LD (2013). Short interpregnancy intervals in the United States. Obstetrics and Gynecology, 122(1), 64–71. [PubMed: 23743455]

Gilliam ML, Mistretta SQ, Martins SL, & Holl JL (2014). Impact of a revised appointment scheduling script on IUD service delivery in three Title X family planning clinics. Contraception, 90(5), 548–549. [PubMed: 25033748]

Goldin Evans M, Broyles S, Frederiksen B, Gee RE, Phillippi S, Sothern M, … Wightkin J (2019). Long-acting reversible contraceptive utilization after policy change increasing device reimbursement to wholesale acquisition cost in Louisiana. American Journal of Obstetrics and Gynecology, 221(2), 128, e121-e110.

Gomez AM, Fuentes L, & Allina A (2014). Women or LARC first? Reproductive autonomy and the promotion of long-acting reversible contraceptive methods. Perspectives of Sexual and Reproductive Health, 46(3), 171–175.

Goyal V, Canfield C, Aiken ARA, Dermish A, & Potter JE (2017). Postabortion contraceptive use and continuation when long-acting reversible contraception is free. Obstetrics and Gynecology, 129(4), 655–662. [PubMed: 28277358]

Haider S, Stoffel C, Rankin K, Uesugi K, Handler A, & Caskey R (2020). A novel approach to postpartum contraception provision combined with infant care: A randomized, controlled trial. Womens Health Issues, 30(2), 83–92. [PubMed: 31964564]

Harney C, Dude A, & Haider S (2017). Factors associated with short interpregnancy interval in women who plan postpartum LARC: A retrospective study. Contraception, 95(3), 245–250. [PubMed: 27589883]

Herbert LE, Hill BJ, Quinn M, Holl JL, Whitaker AK, & Gilliam ML (2018). Mobile contraceptive application use in a clinical setting in addition to standard contraceptive counseling: A randomized controlled trial. Contraception, 98, 281 −287. [PubMed: 30006030]

Kaitz M, Mankuta D, & Mankuta L (2019). Long-acting reversible contraception: A route to reproductive justice or injustice. Infant Mental Health Journal, 40(5), 673–689. [PubMed: 31329311]

Law A, Wen L, Lin J, Tangirala M, Schwartz JS, & Zampaglione E (2016). Are women benefiting from the Affordable Care Act? A real-world evaluation of the impact of the Affordable Care Act on out-of-pocket costs for contraceptives. Contraception, 93(5), 392–39 . [PubMed: 26806631]

Madden T, Mullersman JL, Omvig KJ, Secura GM, & Peipert JF (2013). Structured contraceptive counseling provided by the Contraceptive CHOICE Project. Contraception, 88(2), 243–249. [PubMed: 22959396]

McLeroy KR, Bibeau D, Steckler A, & Glanz K (1988). An ecological perspective on health promotion programs. Health Education Quarterly, 15(4), 351–377. [PubMed: 3068205]

Miller WR, & Rollnick S (2013). Motivational interviewing: Helping people change (3rd ed.) New York: Guildford Press.

Moniz MH, Spector-Bagdady K, Perritt JB, Heisler M, Loder CM, Wetmore MK, & Harris LH (2022). Balancing enhanced contraceptive access with risk of reproductive injustice: A United States comparative case study. Contraception, 113, 88–94. [PubMed: 35439531]

Okoroh EM, Kane DJ, Gee RE, Kieltyka L, Frederiksen BN, Baca KM, … Barfield WD (2018). Policy change is not enough: Engaging provider champions on immediate postpartum contraception. American Journal of Obstetrics and Gynecology, 218(6), 590.e591–590.e597.

Orris A, Mauser G, Bachrach D, & Grady A (2019). Enhancing access to family planning services in Medicaid: A toolkit for states. Available: https://www.manatt.com/Manatt/media/Documents/Articles/Arnold-Ventures_Family-Planning-Toolkit_FINAL.PDF. Accessed: July 17, 2023.

Peipert JF, Madden T, Allsworth JE, & Secura GM (2012). Preventing unintended pregnancies by providing no-cost contraception. Obstetrics and Gynecology, 120(6), 1291–1297. [PubMed: 23168752]

Phillips J, & Sandhu P (2018). Barriers to implementation of long-acting reversible contraception: A systematic review. Journal of the American Association of Nurse Practitioners, 30(4), 236–243. [PubMed: 29757790]

Ranji U, Bair Y, & Salganicoff A (2016). Medicaid and Family Planning: Background and Implications of the ACA. Kaiser Family Foundation. Available: https://www.kff.org/report-section/medicaid-and-family-planning-the-acamedicaid-expansion-and-family-planning/. Accessed: January 18, 2022.

Ricketts S, Klingler G, & Schwalberg R (2014). Game change in Colorado: Widespread use of long-acting reversible contraceptives and rapid decline in births among young, low-income women. Perspectives of Sexual and Reproductive Health, 46(3), 125–132.

Ross L, & Solinger R (2017). Reproductive justice: An introduction. Available:. Berkeley: University of California Press https://books.google.com/books?id=Yyw2DgAAQBAJ. Accessed: July 17, 2023.

Shah PS, Balkhair T, Ohlsson A, Beyene J, Scott F, & Frick C (2011). Intention to become pregnant and low birth weight and preterm birth: A systematic review. Maternal and Child Health Journal, 15(2), 205–216. [PubMed: 20012348]

Simmons KB, Edelman AB, Li H, Yanit KE, & Jensen JT (2013). Personalized contraceptive assistance and uptake of long-acting, reversible contraceptives by postpartum women: A randomized, controlled trial. Contraception, 88(1), 45–51. [PubMed: 23218851]

Smith AJB, Hurwitz AG, Singh T, & Harney KF (2019). Pediatric provider education and use of long-acting reversible contraception in adolescents. Journal of Pediatric Health Care, 33(2), 146–152.e141. [PubMed: 30228031]

Snyder AH, Weisman CS, Liu G, Leslie D, & Chuang CH (2018). The impact of the Affordable Care Act on contraceptive use and costs among privately insured women. Womens Health Issues, 28(3), 219–223. [PubMed: 29544988]

Staley SA, Charm SS, Slough LB, Zerden ML, & Morse JE (2019). Prenatal contraceptive counseling by video. Southern Medical Journal, 112(1), 8–13. [PubMed: 30608623]

Steenland MW, Pace LE, Sinaiko AD, & Cohen JL (2019). Association between South Carolina Medicaid's change in payment for immediate postpartum long-acting reversible contraception and birth intervals. JAMA, 322(1), 76–78. [PubMed: 31158852]

Stevens J, Lutz R, Osuagwu N, Rotz D, & Goesling B (2017). A randomized trial of motivational interviewing and facilitated contraceptive access to prevent rapid repeat pregnancy among adolescent mothers. American Journal of Obstetrics and Gynecology, 217(4), 423.e421–423.e429.

Tang JH, Dominik RC, Zerden ML, Verbiest SB, Brody SC, & Stuart GS (2014). Effect of an educational script on postpartum contraceptive use: A randomized controlled trial. Contraception, 90(2), 162–167. [PubMed: 24833047]

Thompson EL, Vamos CA, Logan RG, Bronson EA, Detman LA, Piepenbrink R, … Sappenfield WM (2020). Patients and provider's knowledge, attitudes, and beliefs regarding immediate postpartum long-acting reversible contraception: A systematic review. Women Health, 60(2), 179–196. [PubMed: 31122167]

Thompson KM, Rocca CH, Kohn JE, Goodman S, Stern L, Blum M, … Harper CC (2016). Public funding for contraception, provider training, and use of highly effective contraceptives: A cluster randomized trial. American Journal of Public Health, 106(3), 541–546. [PubMed: 26794168]

Thompson KM, Speidel JJ, Saporta V, Waxman NJ, & Harper CC (2011). Contraceptive policies affect post-abortion provision of long-acting reversible contraception. Contraception, 83(1), 41–47. [PubMed: 21134502]

Tomlin K, Bambulas T, Sutton M, Pazdernik V, & Coonrod DV (2017). Motivational interviewing to promote long-acting reversible contraception in postpartum teenagers. Journal of Pediatric and Adolescent Gynecology, 30(3), 383–388. [PubMed: 27871919]

Torres LN, Turok DK, Clark EAS, Sanders JN, & Godfrey EM (2018). Increasing IUD and implant use among those at risk of a subsequent preterm birth: A randomized controlled trial of postpartum contraceptive counseling. Womens Health Issues, 28(5), 393–400. [PubMed: 30227936]

Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, … Straus SE (2018). PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and explanation. Annals of Internal Medicine, 169(7), 467–473. [PubMed: 30178033]

Vela VX, Patton EW, Sanghavi D, Wood SF, Shin P, & Rosenbaum S (2018). Rethinking Medicaid coverage and payment policy to promote high value care: The case of long-acting reversible contraception. Womens Health Issues, 28(2), 137–143. [PubMed: 29329988]

Wachino V (2016). Informational bulletin: State Medicaid payment approaches to improve access to long-acting reversible contraception. Centers for Medicare & Medicaid Services. Available: https://www.medicaid.gov/federal-policy-guidance/downloads/cib040816.pdf. Accessed: July 17, 2023.

Weisman CS, Chuang CH, Snyder AH, Liu G, & Leslie DL (2019). ACA's contraceptive coverage requirement: Measuring use and out-of-pocket spending. Health Aff (Millwood), 38(9), 1537–1541. [PubMed: 31479363]

Whitaker AK, Quinn MT, Munroe E, Martins SL, Mistretta SQ, & Gilliam ML (2016). A motivational interviewing-based counseling intervention to increase postabortion uptake of contraception: A pilot randomized controlled trial. Patient Education and Counseling, 99(10), 1663–1669. [PubMed: 27211225]

Winner B, Peipert JF, Zhao Q, Buckel C, Madden T, Allsworth JE, & Secura GM (2012). Effectiveness of long-acting reversible contraception. New England Journal of Medicine, 366(21), 1998–2007. [PubMed: 22621627]

Wu M, Eisenberg R, Negassa A, & Levi E (2020). Associations between immediate postpartum long-acting reversible contraception and short interpregnancy intervals. Contraception, 102(6), 409–413. [PubMed: 32918870]

Yates L, Morgan I, Tucker C, Henderson C, Shuler TO, & Cilenti D (2022). A path towards reproductive justice: Incorporating a RJ framework into North Carolina's Improving Community Outcomes for Maternal and Child Health Initiative. Maternal and Child Health Journal, 27(1), 7–14. [PubMed: 36352285]

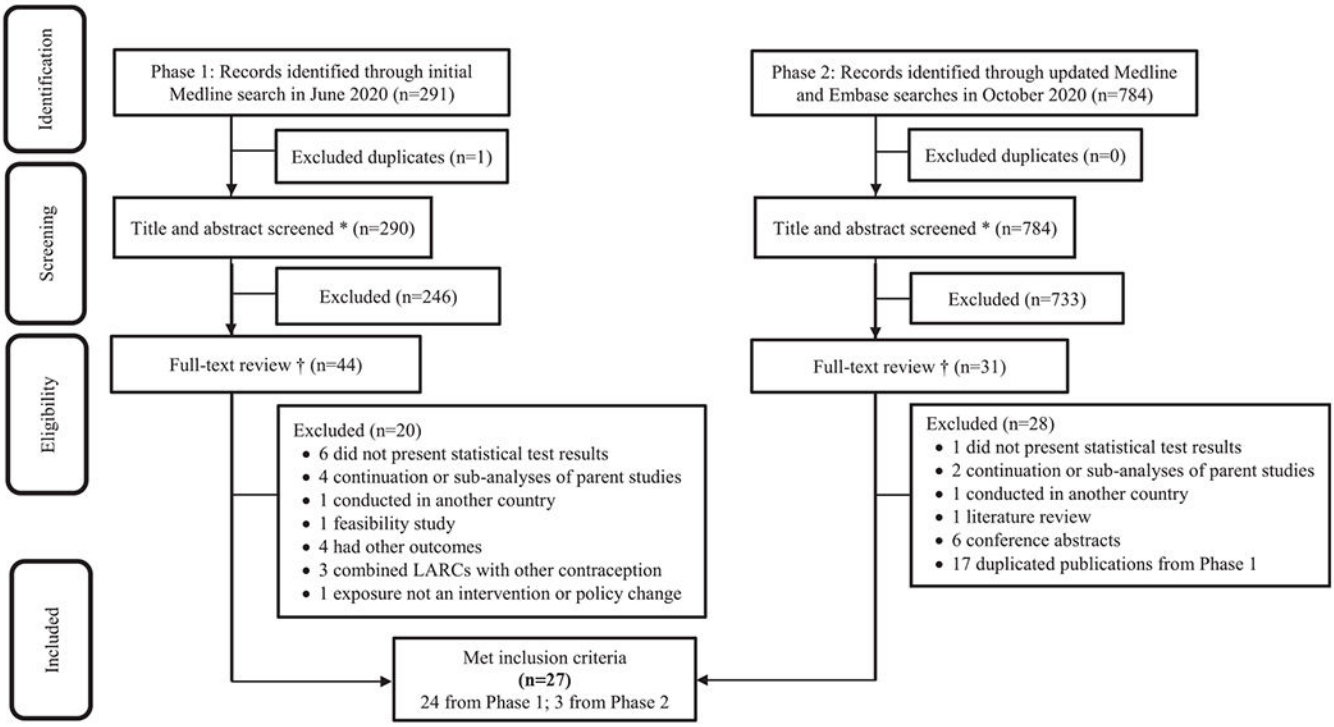

Figure 1.

Flow diagram summarizing two literature search phases and selection processes for scoping review of interventions to increase uptake of long-acting reversible contraceptive methods published between 2010 and 2020. * Titles and abstracts were screened for publications in journals as original U.S.-based articles in English from January 1, 2010, through June 15, 2020 for Phase 1 and October 20, 2020, for Phase 2, based on search terms related to interventions, long-acting reversible contraceptive (LARC) methods, and uptake or initiation. † Full-text articles were reviewed with these inclusion criteria: presented findings of statistical significance testing; published nonsecondary research; designed U.S.-based original studies; reported findings of an intervention study (e.g., no conference abstracts, literature reviews, or feasibility studies); defined LARC uptake as the outcome; did not combine LARC uptake with other contraceptive methods; and evaluated interventions or policy changes as exposures.

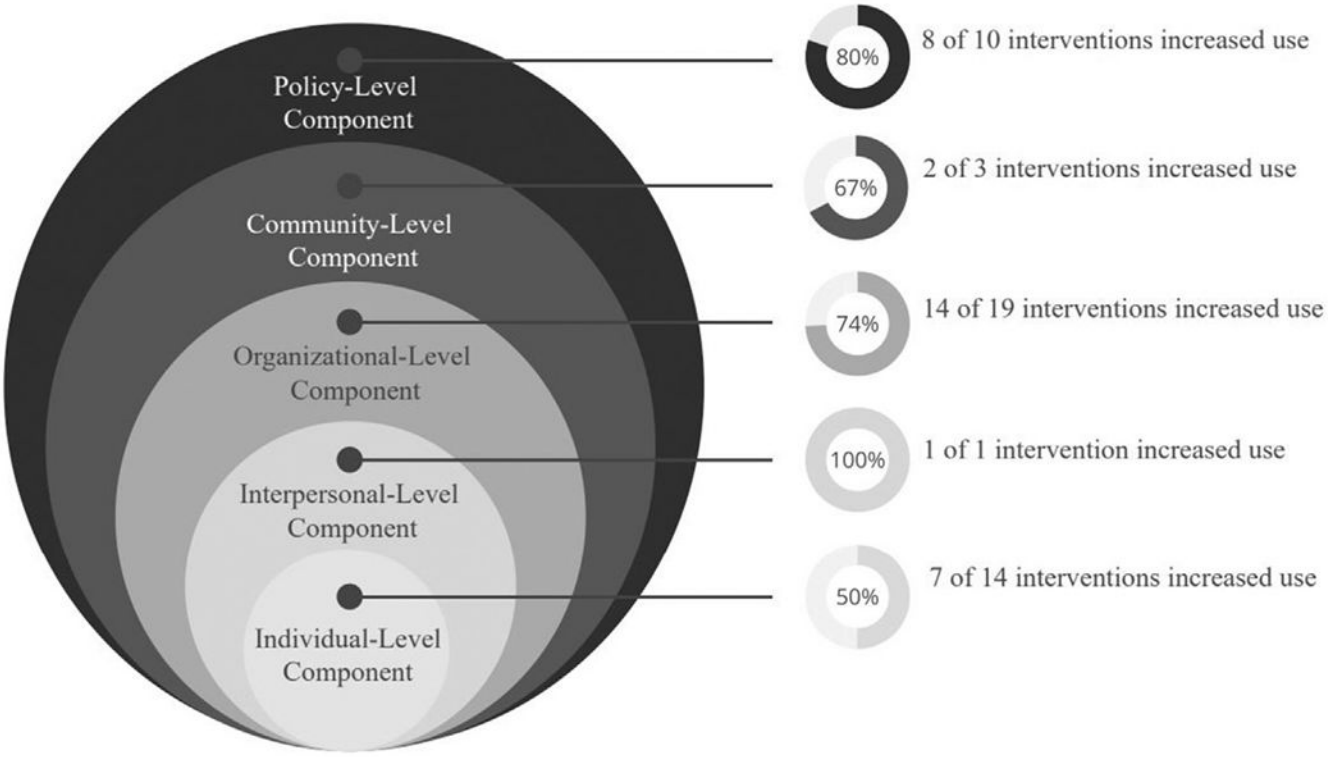

Figure 2.

Proportion of interventions that increased* long-acting reversible contraception (LARC) use by their inclusion of components of the social ecological model ($N = 27$ studies).[†]

*Interventions had statistically significant ($p \leq .05$) increases in LARC use, regardless of whether estimates were adjusted for confounders. [†]The sum of interventions in each social ecological model level exceeds 27 because most interventions operated at multiple levels.

Table 1

Summary of 27 Interventions to Increase LARC Use Published 2010–2020, Sorted by Statistical Significance Findings and Author Name

First Author	Year	Study Design	Intervention Strategy*	Intervention Details	Adjusted for Factors	Selected Results	SEM Level*
Studies with statistically significant findings*							
Aligne	2020	Quasi-experimental study	Provider training, administrative support	Lunch-and-learn talks to staff from community and medical partners about no-cost LARC services; contraceptive implant training for providers; community partners connected by a third party.	No	Pre-study: 4% vs. Post-study: 24%	Community
Buckel	2019	Time-trend study	Cost support, provider training	Provider training on contraception and barriers to same-day LARC; cost support to ensure LARC stocked in clinic and no-cost LARC for uninsured. (Contraceptive counseling provided to intervention and CGs.)	Yes	IG: 54% vs. CG: 14%; aRR, 4.73 (95% CI, 3.20, 6.98)	Individual, organizational
DeCesare	2017	Retrospective cohort study	Patient counseling, other (group support)	CenteringPregnancy program: prenatal appointments to a group of 8–12 women with similar gestational ages over 10 sessions, each lasting two hours. All birth control options are discussed in one session and women encouraged to engage. Program and traditional care offered at a residency clinic.	No	IG: 24.5% vs. CG: 8.3%	Individual, interpersonal, organizational
Evans	2017	Pre-post cohort study	Cost support, administrative support	Three community health centers affiliated with the Boston Healthy Start Initiative received $5000 from the Revolving Loan Fund to purchase LARC devices. Administrative tasks included memorandum of understanding agreements between CHC directors and Health Commissioner.	No	Proportion of implants: Pre-period: 21.1% Post-period: 34.1%	Organizational, community
Gilliam	2014	Pre-post study	administrative support	IUD appointment scheduling script	No	Among women ≤ 25 years old – Pre-study: 41% vs. Post-study: 68%	Organizational
Goldin Evans	2019	Retrospective, repeated cross-sectional study	Cost support	Raising LARC reimbursement rate	Yes	aOR, 2.08 (95% CI, 1.69, 2.55)	Policy
Goyal	2017	Prospective study	Cost support	Provision of immediate postabortion no-cost LARC. A health delivery system used Medicaid 1115 waiver funding to completely subsidize LARC under the LARC Access Program. (Contraceptive counseling provided to intervention and CGs.)	Yes	1) Low-income eligible: 65% 2) Low-income ineligible: 5% 3) Higher income: 24% aOR1 vs. 2 = 10.1 (95% CI, 4.7, 21.9)	Individual, organizational, policy
Okoroh	2018	Retrospective study	Cost support, other (LARC champion)	Implementation of Medicaid reimbursement policy or IPPLARC with support from a provider champion in Louisiana (at the state and facility level) and Iowa (at the facility level only).	No	Iowa results: Insertions pre-policy: 4.6/month Insertions post-policy: 6.6/month (p = .12) Louisiana results: Insertions pre-policy: 2.6/month	Organizational, policy

First Author	Year	Study Design	Intervention Strategy*	Intervention Details	Adjusted for Factors	Selected Results	SEM Level*
						Insertions post-policy: 45.2/month ($p = .0002$)	
Ricketts	2014	Ecological analysis (pre-post)	Cost support	Increased funding (private) at Title X clinics	No	Pre-study: 5% vs. Post-study: 19%	Organizational, policy
Snyder	2018	Retrospective cohort analysis	Cost support	ACA-related contraceptive coverage requirement	Yes	aOR, 1.03 (95% CI, 1.02–1.04)	Policy
Steenland	2019	Interrupted time series study	Cost support	Medicaid reimbursement for IPPLARC	No	Teens: 0.1% before vs. 11% after Adults: 0.1% before vs. 6% after	Organizational, policy
Stevens	2017	RCT	Cost support, patient counseling, provider training, administrative support	TOPP Program: Nurses trained in motivational interviewing, which they provided to patients once monthly; access to contraceptive methods at a part-time contraceptive clinic; offered transportation to any local provider; psychosocial assessments; and referrals to a variety of community-based services.	Yes	IG: 40% vs. CG: 27%. Difference: 13.7 (95% CI, 4.9, 22.4)	Individual, organizational
Thompson	2016	Cluster RCT	Cost support, provider training	Public funding, four-hour provider education on IUD insertion and counseling role-play	Yes	IG: aHR, 1.43 (95% CI, 1.04–1.98) Medicaid family planning expansion aHR, 2.26 (95% CI, 1.59–3.19)	Organizational, policy
Thompson	2011	Retrospective survey administered to facilities	Cost support, provider training	State family planning policies to provide LARC, recent provider training in LARC insertion	Yes	Recently trained clinicians: aOR, 7.8 (95% CI, 2.9–21.4) State contraceptive coverage mandate for private insurers: aOR, 2.7 (95% CI, 1.2–6.2) Medicaid family planning service waivers: aOR, 1.9 (95% CI, 1.0–3.6)	Organizational, policy
Tomlin	2017	Retrospective cohort study	Patient counseling, administrative support	Interdisciplinary adolescent prenatal care and motivational interviewing. Pregnant adolescents scheduled into the clinic by staff from the larger health system or an outside agency.	Yes	IG: 38% vs. CG: 18%; aOR, 2.8 (95% CI, 1.5–5.2)	Individual, organizational
Torres	2018	RCT	Patient counseling	Counseling via GATHER tool in an inpatient setting where counselors worked and study participants were recruited	Yes	IG: 51% vs. CG: 31% aOR, 4.6 (95% CI, 1.3–15.6)	Individual, organizational
Whitaker	2016	RCT	Patient counseling, provider training	Patient receipt of and provider training in motivational interviewing	No	IG: 66% vs. CG: 32%	Individual, organizational
Studies with statistically nonsignificant findings†							
Bell	2018	Retrospective cohort study	Cost support	ACA-related contraceptive coverage requirement	No	Pre-ACA: 46% vs. Post-ACA: 48% ($p = .63$)	Policy
Chen	2017	Quasi-experimental study	Other (earlier postpartum visit)	Clinic policy changed timing of postpartum visits from 6 to 2–3 weeks for contraceptive counseling and maternal well-being assessment.	No	Post-clinic policy change: 16.5% vs. Pre-clinic policy change: 31.1% $p \leq .01$; the policy did not increase LARC uptake	Organizational

First Author	Year	Study Design	Intervention Strategy*	Intervention Details	Adjusted for Factors	Selected Results	SEM Level*
Frarey	2019	RCT	Patient counseling	Standardized immediate postpartum contraceptive counseling	No	Intervention: 22.0% (implant) vs. Control: 26.0% (implant) (p = .90)	Individual
Haider	2020	RCT	Patient counseling	An academic medical center offered contraceptive services to mothers at well-baby visits. (Title X funds covered contraception provided to intervention and CGs.)	Yes	Intervention: 19.1% vs. Control: 20.9% p = 63; RR = 0.85 (95% CI, 0.59, 1.23)	Individual, organizational, policy
Herbert	2018	RCT	Patient counseling	Use of miPlan, a waiting-room contraceptive counseling application	No	Intervention: 3.8% vs. Controls: 1.0% (p = .37)	Individual
Madden	2013	Prospective cohort study	Patient counseling, provider training	Counseling via GATHER tool	Yes	aRR, 0.98 (95% CI, 0.94–1.02)	Individual, organizational
Simmons	2013	RCT	Patient counseling, administrative support	Contraception education; help with insurance coverage, appointment scheduling, transportation, and childcare in the community	No	Intervention: 72% Control: 67% (p = .76)	Individual, organizational, community
Smith	2019	Interrupted time series study	Provider training	Pediatric provider education initiative	No	Pre-intervention: decreased by 4 devices/10,000 adolescents monthly vs. Post-intervention: stabilized but the increase was not statistically significant (p = .91)	Organizational
Staley	2018	RCT	Patient counseling	LARC-focused video counseling during prenatal care	Yes	Intervention: 39.4% vs. Control 29.4%. p = .39 aOR, 1.99 (95% CI, 0.59–6.62)	Individual
Tang	2014	RCT	Patient counseling	A postpartum educational script about LARC (scheduling participant's six-week postpartum visit was standard care)	No	Intervention: 17.6% vs. Control: 13.3% p = .10; RR = 1.3 (95% CI, 0.9–1.9)	Individual

Abbreviations: ACA, Affordable Care Act; aHR, adjusted hazard ratio; aOR, adjusted odds ratio; aRR, adjusted relative risk; CG, control group; CI, confidence interval; GATHER, Greet, Ask, Tell, Help, Explain, and Return; IG, intervention group; IPPLARC, immediate postpartum LARC; LARC, long-acting reversible contraception; RCT, randomized controlled trial; SEM, social ecological model; TOPP, Teen Options to Prevent Pregnancy.

*Strategies used as standard care in both intervention and control groups were not listed. Therefore, strategies listed in the table were unique to the intervention group. However, the SEM level(s) presented is for both intervention and control groups.

†Interventions were statistically significant if $p \leq .05$ or 95% CIs did not contain the null value.