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ORIGINAL RESEARCH

Effects of structured contraceptive counseling in young women: Secondary analyses of a cluster randomized controlled trial (the LOWE trial)

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Abstract

Introduction: Unwanted pregnancy constitutes a huge health issue. Long-acting reversible contraception (LARC) are the most effective methods for preventing unwanted pregnancy, especially among young women. This study evaluates the intervention effect of structured contraceptive counseling on the choice, initiation, and use of LARC in young women.

Material and Methods: This is a secondary analysis of women aged 18–25, enrolled in a multicenter cluster randomized controlled trial performed in abortion, youth, and maternal health clinics across the Stockholm County in Sweden. Clinics were randomized (1:1) to provide structured contraceptive counseling (intervention) or standard counseling (control). Surveys were administered at the clinic visit and follow-ups at 3, 6, and 12 months. Primary outcome focused on the choice of LARC among women 18–25 years of age. Secondary outcomes included initiation, and use of LARC at 3 and 12 months, satisfaction with the counseling received and information on extended use of combined hormonal contraceptives. The study was registered at Clinicaltrials.gov (NCT03269357).

Results: From September 2017 to May 2019, 770 women aged 18–25 years from 28 clinics/clusters were recruited. There was a significant intervention effect on LARC choice (aOR 5.96, 95% CI 3.25–10.94), initiation (aOR 4.43, 95% CI 2.32–8.46), and use at 12 months (aOR 2.21, 95% CI 1.31–3.73). The odds of LARC choice at pre-booked visits were higher and more women received information about extended-use regimen for short-acting reversible contraception in the intervention group compared to the control group. The intervention package was well received, but with higher satisfaction at pre-booked compared to drop-in visits.

Conclusions: Our study demonstrates that comprehensive structured contraceptive counseling significantly increases LARC choice, initiation and use, with high satisfaction

Abbreviations: aOR, adjusted odds ratio; CI, confidence interval; HCP, healthcare provider; LARC, long-acting reversible contraception; LOWE, Larc fOrWard counsEling trial; SARC, short-acting reversible contraception.

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among young participants, especially at pre-booked visits. The results highlight an approach that merits implementation to increase quality of care in contraceptive services, to enhance reproductive health for adolescents and young adults.

KEYWORDS
adolescent, contraception, contraceptive counseling, counseling, directive counseling, long-acting reversible contraception, young adult

1 | INTRODUCTION

The importance of preventing unintended pregnancies among adolescents and young adults from both individual and societal perspectives is generally recognized. Despite a general increase in use of modern contraception since the 1990s, an estimated 164 million women globally are not using contraception although they do not wish to conceive.[1] Traditionally, short-acting reversible contraception (SARC) methods have been the most common methods among young people while long-acting reversible contraception (LARC) use has—somewhat counterintuitively—increased with increasing age and declining fertility. However, the advantages of LARC use for young people have been increasingly recognized.[2,3]

Recent estimates from the United Nations show that use of contraception is highest among 25–44-year-olds, and that the largest gap between contraceptive needs and use of modern contraception is seen among adolescents and young women.[1] In Sweden, the most recent estimate of unmet need for contraception among fertile-aged women was 17.2%.[4] Addressing contraceptive choice and uptake in young people is an area that has been largely underrepresented in most contraceptive research. In a recent Swedish study including 623 Swedish-speaking women seeking abortion, significant insights were uncovered about awareness of contraceptive methods and contraceptive use. It was found that condoms were the most frequently used method at 37%, followed by SARC at 35%, and withdrawal at 25%. Yet around the time of conception, over 60% did not use any contraceptive method or relied on withdrawal, indicating a trend of discontinuation of contraceptives, underestimation of pregnancy risks, particularly among adolescents, and a general low fertility awareness.[5] Despite these challenges, 88% of these women planned to use contraception post-abortion, predominantly choosing LARC and SARC, reflecting the study's conclusion of a high unmet need for effective contraception and the necessity for improved education and awareness in this area.[5] These results are in line with another earlier Swedish study conducted at abortion clinics where contraceptive history, at time of conception, and future use are presented.[6]

The LOWE (Larc fOrWard counsEling) trial explicitly evaluated the effect of a structured counseling protocol, using a cluster randomized design to limit the risk of spillover effects of the intervention to control participants. All other services remained unchanged to provide a true real-life setting. The trial reported an overall impact of structured contraceptive counseling on uptake (i.e., choice and initiation) of LARC,[7] as well as use,[8] also when controlled for migration background.[9] The current study presents the secondary outcomes among adolescents and young adults, with the aim to assess the intervention effect on contraceptive choice, initiation and use in young women aged 18–25 years of age. Additionally, this study aims to assess satisfaction with the intervention materials by type of visit, as well as information on extended-use of combined hormonal contraceptive methods.

Key message

The benefits of LARC methods for young women have been recognized. This study demonstrates that structured counseling significantly enhances adolescent and young women's uptake of LARC. Offering this scalable model to improve contraceptive care globally may also reduce unintended pregnancy.

2 | MATERIAL AND METHODS

The full methodology of the LOWE trial has been previously published.[7]

2.1 | Study design and randomization

The LOWE trial was a multicenter cluster randomized controlled trial evaluating the effect of structured contraceptive counseling on LARC choice compared to standard counseling among women seeking contraceptive counseling or induced abortion where contraceptive counseling is included. In brief, the trial took place in abortion, youth, and maternal health clinics in the Stockholm County, Sweden, providing contraceptive counseling. Clinics were randomized in a 1:1 ratio to provide either structured contraceptive counseling (intervention) or to remain with their standard contraceptive counseling (control). All clinics constituted the clusters in the trial. The randomization was stratified by clinic type, and for youth and maternal health clinics by the proportion of migrants within the catchments area. Masking of allocation was not applicable on the cluster level. However, patients received information

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that the purpose of the study was to examine contraceptive uptake in general, not LARCs in particular. An independent statistician performed the randomization, using the statistical software R 3.4.0 (www.r-project.org).

2.2 | Participants

All abortion, youth and maternal health clinics providing contraceptive counseling were sent an open invitation to participate and, upon acceptance, assessed for eligibility, with no limitation regarding baseline prescription of LARC. The sole exclusion criteria was participation in competing trials. Patients who met the following criteria were included in the study: 18 years of age or older, proficient in either Swedish or English (with or without the assistance of a professional interpreter), sexually active or intending to be within 6 months, and sought contraception primarily for pregnancy prevention.

2.3 | Study setting

In this setting, contraceptive counseling and prescriptions are provided free of charge. In addition, contraceptive methods are free up to the age of 21 and subsidized up to 26 years of age to a yearly cost equivalent to approximately $9.5/€9 for SARC or for the full duration of use for any LARC.

2.4 | Intervention

The intervention package included an educational video on contraceptive methods in Swedish with English subtitles (https://www.youtube.com/watch?v=moTB8y4Fy5c), four key questions, a tiered chart displaying typical use effectiveness proportions, and a toolbox with life-sized models of available contraceptive methods (intervention package available at https://ki.se/kbh/lowereal). The educational video was to be seen by the participant prior to meeting with the healthcare provider (HCP), while the other parts of the intervention package was to be used during the counseling visit. Intervention clinics were trained in the intervention and the HCPs were emphasized to use all four components together. Control clinics remained with their standard counseling, that is, no specific structure.

2.5 | Data collection

Participants reported their intended contraceptive method prior to receiving their allocated counseling, completed one survey to collect baseline characteristics and in the intervention group the satisfaction with the intervention material after the clinic visit. Follow-up self-reported data were collected through online e-surveys at 3, 6, and 12 months. The HCP completed one survey at the end of the clinic visit to collect data on reproductive—as well as contraceptive history and the contraceptive choice. To ensure comprehensive data collection and to mitigate potential data gaps or participant attrition, telephone interviews were also conducted as a supplementary data collection method. For participants with incomplete data or who could not be reached, the medical records from the Stockholm region were examined to identify any recorded pregnancies.

2.6 | Outcome measures

The primary outcome in this paper is the intervention effect on choice of LARC among women 18–25 years of age. Secondary outcomes include LARC initiation and use at 3- and 12-month follow-up, pregnancy rate by group and clinic type at 12-month follow-up. We also explored LARC choice by group allocation and the type of visit, and when intended LARC use. Among participants in the intervention group, user satisfaction with the intervention was assessed. Additionally, we analyzed SARC choice, initiation, and use by group and related information on extended use without a hormone-free interval, among participants choosing combined oral contraception, patch, or vaginal ring.

2.7 | Statistical Analyses

The sample size was determined for the primary outcome of the main trial, that is, intervention effect on LARC choice, assuming an intraclass correlation of 0.05. Data were sourced from participants from all three clinic types in the main trial. To analyze the intervention effect on LARC choice, initiation and use, we used logistic mixed-effects models with random intercept for the clinic to account for clustering. In the same manner as in the main trial, intraclass correlation estimates and their 95% confidence intervals were calculated using the random intercept logistic model intraclass correlation from Wu et al.[10] Results on pregnancies, LARC choice by group allocation and when intended LARC use, and SARC outcomes were retrieved by similar logistic regressions models. Satisfaction with the intervention was assessed by the non-parametric Mann–Whitney *U*-test after normality distribution checked by the Shapiro–Wilk tests. Whether the different parts of the intervention were found supportive in contraceptive choice were analyzed by Fisher's Exact test. A two-sided $p < 0.05$ was used as significance level. Statistical analyses were performed using the statistical software R 4.3.2 (www.r-project.org) and SPSS Statistics 29 (IBM, Armonk, NY, USA).

3 | RESULTS

From September 2017 to May 2019, the main trial was conducted at 28 clinics whereof 14 were randomized to provide the intervention and 14 to provide standard care (control). Recruitment was stopped when the estimated sample size was reached. The last follow-up was completed in May 2020. The final study population consisted of

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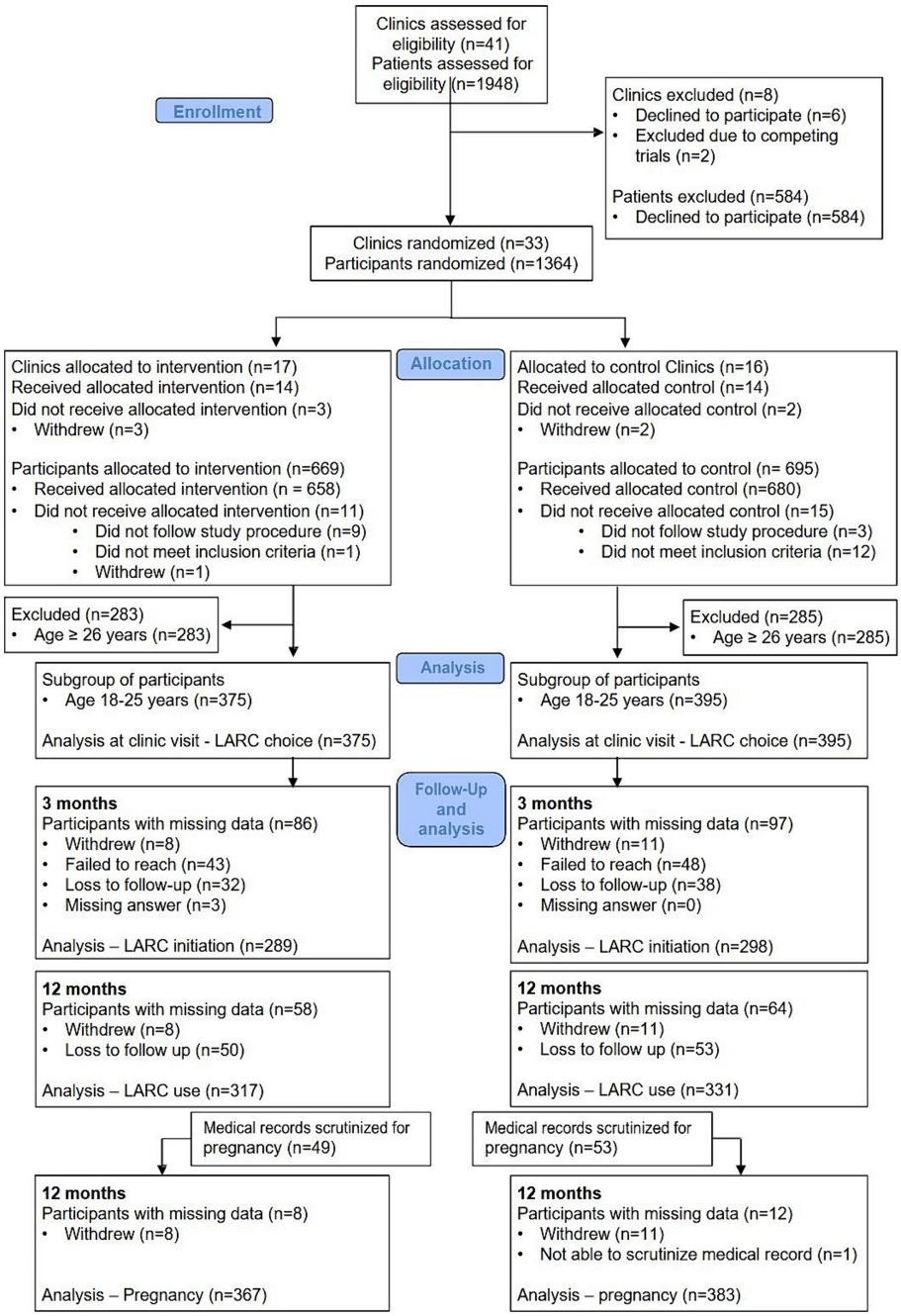

FIGURE 1 CONSORT flow chart diagram.

1338 participants, whereof 658 received the intervention and 680 received the control. The mean cluster size was 48 participants (min 11, max 60). The study population in this study ($n=770$) include 375 participants from the intervention group and 395 from the control group. The flow of participants is presented in Figure 1.

Both groups were comparable in terms of baseline characteristics, at what type of clinic they were recruited, and intended LARC use reported prior to counseling (Table 1).

After receiving the counseling, more participants at intervention clinics chose LARC compared to participants at control clinics (adjusted odds ratio [aOR] 5.96, 95% Confidence Interval [CI] 3.25–10.94, $p<0.001$). The estimated intraclass correlation was 0.006 (95% CI 0.00–0.03). In addition, more women in the intervention group had initiated their LARC at 3-month follow-up (aOR 4.43, 95% CI 2.32–8.46, $p<0.001$) and were using LARC at 12-month follow-up (aOR 2.21, 95% CI 1.31–3.73, $p<0.003$). The intervention effect on LARC choice, initiation, and use is presented in Table 2.

In the intervention group ($n=373$, 2 missing data), the proportion of participants receiving the counseling at pre-booked visits and drop-in visits was 84.7% ($n=316$) and 15.3% ($n=57$), respectively. The corresponding figures for the control group ($n=394$, 1 missing data) was 86.5% ($n=341$) and 13.5% ($n=53$). Among all participants, the intervention effect on LARC choice was significant

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TABLE 1 Baseline characteristics of participants, by group allocation.

	Intervention $n=375$	Control $n=395$
Median age (IQR)	21 (18–24)	21 (18–24)
Reproductive history		
Current or previous pregnancy	67 (17.9)	83 (21.0)
Abortion	54 (14.4)	70 (17.7)
Given birth	9 (2.4)	9 (2.3)
Highest form of completed education		
Primary school	58 (16.0)	66 (17.1)
Secondary school	250 (68.9)	268 (69.4)
College	16 (4.4)	14 (3.6)
University	35 (9.6)	33 (8.6)
Other	4 (1.1)	5 (1.3)
Missing	12	9
Current relationship		
Single	135 (37.2)	117 (30.3)
Partner—living together	83 (22.9)	100 (25.9)
Partner—living apart	138 (38.0)	163 (42.2)
Other	7 (1.9)	6 (1.6)
Missing	12	9
Clinic type		
Abortion clinic	38 (10.1)	44 (11.1)
Youth clinic	283 (75.5)	299 (75.7)
Maternal health clinic	54 (14.4)	52 (13.2)
Intended LARC use	82 (21.9)	85 (21.5)

Note: Data are *n* (%) if not stated elsewise.

Abbreviations: IQR, interquartile range; LARC, long-acting reversible contraception.

during pre-booked visits (aOR 5.86, 95% CI 3.08–11.13). Among participants who reported an intended LARC use ($n=149$) prior to counseling, there was no intervention effect on LARC choice during pre-booked compared to drop-in visits (aOR 2.41, 95% CI 0.68–8.58). Adjusted odds ratios for drop-in visits were not possible to retrieve because of too few cases (Table 3).

At the 12-month follow-up, there were no differences in the number of participants who experienced at least one pregnancy during the study period between the intervention and control groups by clinic type. Neither did the total number of participants who reported a pregnancy differ, with 16/367 (4.4%) and 27/383 (7.0%) in the intervention and control group, respectively (aOR 0.48, 95% CI 0.22–1.06). During the study period, six participants experienced two pregnancies whereof four in the intervention group and two in the control group. Hence, the total number of pregnancies were 49.

The different parts of the intervention material were generally well received; however, with higher satisfaction reported for the educational video ($p=0.03$), effectiveness chart ($p=0.01$) and box of contraceptive models ($p<0.01$) during pre-booked compared to drop-in visits. In addition, the type of visit affected the extent to which participants reported the different intervention parts to be supportive in contraceptive choice, with a higher rate during pre-booked compared to drop-in visits ($p<0.01$ for all parts). While the educational video and the effectiveness chart were found supportive by most participants at both pre-booked and drop-in visits, the box of models was found supportive by 40.0% of participants at drop-in visits (Table 4).

The participants in the intervention group had lower rates of SARC choice at the clinic visit (aOR 0.23, 95% CI 0.14–0.40, $p<0.001$), initiation at 3 months (aOR 0.25, 95% CI 0.14–0.45, $p<0.001$) and use at 12-month follow-up (aOR 0.61, 95% CI 0.38–0.95, $p=0.029$) compared to the control group. Among participants choosing combined oral contraception, patch, or vaginal ring, more participants in the intervention group had received information about extended-use (133/143, 93.0%) compared to the control group (178/213, 83.6%; aOR 13.87, 95% CI 2.94–65.41, $p<0.001$). The contraceptive profile among study participants at different time points is presented in Table 5.

4 | DISCUSSION

These secondary analyses demonstrate a significant impact of the structured counseling intervention on increasing choice, initiation, and use of LARC among young women. Additionally, an observed increase in LARC choice was seen among participants in the intervention group who attended the clinics through pre-booked visits compared to drop-in visits. During pre-booked visits, participants were more satisfied with the different intervention parts and to a higher extent found them to be supportive in contraceptive choice. Among users of combined hormonal contraception, more participants from intervention clinics had received information about extended-use without a hormone-free break.

Several interventions to increase LARC use have been evaluated, including health system-based-, provider-based-, and individual-focused interventions.[11] One of the most well-known and successful projects to increase LARC uptake is the Contraceptive CHOICE Project. The project used a short script with information about LARC methods that was read to all women at time of eligibility screening. They also developed a standardized comprehensive counseling program that included training of counselors (3×2 h) and a more comprehensive script including information about all reversible contraceptive methods explaining their effectiveness, advantages, and disadvantages to the participant.[12] The project demonstrated that their form of structured contraceptive counseling, along with cost-free provision of contraception in the St Louis area led to dramatically increased uptake of LARC, and subsequently lower numbers of unintended pregnancies, repeat abortions, and birth rates, especially in the teenage cohort, compared with state of Missouri and U.S. rates.[13,14] In our trial, we did not use a university research

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TABLE 2 Intervention effect on LARC choice, initiation, and use.

Outcome	Intervention	Control	OR[a] (95% CI)	*p*-value	aOR[b] (95% CI)	*p*-value
LARC Choice[c]	168/375 (44.8)	114/395 (28.9)	2.10 (1.11–3.99)	0.023	5.96 (3.25–10.94)	<0.001
LARC initiation[d]	132/289 (45.7)	82/298 (27.5)	2.20 (1.41–3.43)	<0.001	4.43 (2.32–8.46)	<0.001
LARC use[e]	123/317 (38.8)	88/331 (26.6)	1.76 (1.24–2.51)	0.002	2.21 (1.31–3.73)	0.003

Note: Data are n (%) if not stated elsewise.

Abbreviations; aOR, adjusted odds ratio; CI, confidence interval; LARC, long-acting reversible contraception; OR, odds ratio.

[a]Analyzed by logistic regression with intervention as sole fixed factor (reference: control) and clinic as random factor.

[b]Analyzed by logistic regression with intervention (reference: control), age, highest level of completed education, previous pregnancy, with and without previous abortion, intended use of LARC, and clinic type as fixed factors and clinic as random factor.

[c]Choice recorded at clinic visit.

[d]Initiation reported at 3-month follow-up.

[e]Use reported at 12-month follow-up.

TABLE 3 LARC choice by type of visit and group allocation, and when intended LARC use.

Type of visit	Intervention	Control	OR[a] (95% CI)	*p*-value	aOR[b] (95% CI)	*p*-value
Pre-booked	151/316 (47.8)	105/341 (30.8)	2.69 (1.26–5.75)	0.011	5.86 (3.08–11.13)	<0.001
Drop-in	16/57 (28.1)	9/53 (17.0)	1.91 (0.76–4.79)	0.169		
When intended LARC use						
Pre-booked	71/76 (93.4)	65/74 (87.8)	1.97 (0.63–6.17)	0.247	2.41 (0.68–8.58)	0.174
Drop-in	4/5 (80.0)	9/11 (81.8)	0.89 (0.06–12.88)	0.931		

Note: Data are *n* (%) if not stated elsewise. Empty cells for aOR are due to the model not being estimable (too few observed events).

[a]OR, Odds ratio for intervention, based on logistic regression with intervention as sole fixed factor (reference: control) and clinic as random factor.

[b]aOR, Adjusted Odds ratio for intervention, based on logistic regression with intervention (reference: control), age, highest level of completed education, previous pregnancy, with and without previous abortion, intended use of LARC (only for the first two results in Table 3), and clinic type as fixed factors and clinic as random factor.

site with specially trained research members and partnering clinics. Instead, we used a cluster randomized design in a real life setting where HCPs, after a 3-h training session including updates from research in the contraceptive field and in provision of the intervention, provided the intervention. In addition, all participants had to collect their contraceptive item and pay the up-front cost at a pharmacy (with exception from the copper intrauterine device provided free of charge) prior to method initiation. Hence, the results are generalizable to a more general context of contraceptive service provision, compared to cohort studies whose results on LARC uptake are compared to state and country prevalences. Results similar to ours have been seen in cluster randomized trials using structured contraceptive counseling with maintained costs for contraceptive items among young women up to 25 years of age in the United States and among fertile aged women (16–45 years) in Australia, however, with introduction of same day LARC insertion or quick referrals.[15,16] Our intervention for structured contraceptive counseling had an evident effect on LARC choice and initiation among all fertile-aged women, with an aOR 2.77 and Odds Ratio (OR) 1.74, respectively,[7] and the intervention was well received among both HCPs and patients, and was found supportive in contraceptive counseling and contraceptive choice.[17] In the current paper, including only young women aged 18–25, the intervention was more than twice as effective in increasing LARC choice and initiation, and once again well received by the participants. High LARC uptake along with high satisfaction merits implementation in general contraceptive service provision to increase quality of care.

Our results with a higher rate of LARC choice during pre-booked compared to drop-in visits indicate that planned visits provide a better opportunity for effective counseling and shared decision making. In addition, satisfaction with the intervention material was generally higher during pre-booked visits. During the recruitment period, most eligible patients who declined to participate in the trial were found at maternal health clinics. The contraceptive services at maternal health clinics are provided, to a larger extent than at youth clinics, during drop-in visits, which are often shorter in time and offer less opportunity for comprehensive counseling. Our findings suggest that expanding the duration of the drop-in visits in combination with educational interventions, could potentially enhance contraceptive counseling effectiveness among young women with increased levels of satisfaction. It cannot be excluded patients who arrange a pre-booked visit differ from those who use drop-in services, which could explain higher initiation of LARC. On the other hand, we argue that both types of visits are needed to increase accessibility to contraception services for all. In the LOWE study,[17] it was found that the youngest group of women found the video component of the intervention package most supportive for the contraceptive choice. This result is confirmed in the current study, which could be explained by the audiovisual component of that specific intervention part, making it more accessible for young patients. Based on the high satisfaction

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TABLE 4 Participant satisfaction with the intervention material among those receiving structured contraceptive counseling, by type of visit.

	Pre-booked visit *n* = 316	Drop-in visit *n* = 57	*p*-value
Educational video			
Very good	202 (63.9)	30 (52.6)	0.03[a]
Good	101 (32.0)	17 (29.8)	
No opinion	4 (1.3)	4 (7.0)	
Poor	1 (0.3)	2 (3.5)	
Very poor	0 (0)	0 (0)	
Missing	8 (2.5)	4 (7.0)	
Video was supportive in contraceptive choice	245 (77.5)	32 (56.1)	<0.01[b]
Missing	8 (2.5)	4 (7.0)	
Effectiveness chart			
Very good	176 (55.7)	25 (43.9)	0.01[a]
Good	108 (34.2)	16 (28.1)	
No opinion	13 (4.1)	2 (3.5)	
Poor	0 (0)	0 (0)	
Very poor	0 (0)	0 (0)	
I was never shown the effectiveness chart	11 (3.5)	10 (17.5)	
Missing	8 (2.5)	4 (7.0)	
Chart was supportive in contraceptive choice	211 (66.8)	28 (49.1)	<0.01[b]
Missing	12 (3.8)	7 (12.3)	
Box of contraceptive models			
Very good	187 (59.2)	13 (22.8)	<0.01[a]
Good	90 (28.5)	16 (28.1)	
No opinion	16 (5.1)	7 (12.3)	
Poor	0 (0)	0 (0)	
Very poor	0 (0)	0 (0)	
I was never shown the box with the models	15 (4.7)	17 (29.8)	
Missing	8 (2.5)	4 (7.0)	
Box was supportive in contraceptive choice	207 (67.9)	20 (40.0)	<0.001[b]
Missing	11 (3.5)	7 (12.3)	

Note: Data are *n* (%) unless stated elsewise. One participant in the intervention group stated type of visit as "Other" with no additional information about the type available, while one participant had missing data for type of visit, hence, the total *N* = 374.

[a]*p*-values analyzed by Mann–Whitney *U*-test.

[b]*p*-values analyzed by Fisher's Exact test.

with all parts of the intervention and that they were found supportive in contraceptive choice by most participants, we argue that all parts should be used together to aid in shared decision making regarding contraceptive use.

Our intervention material included information about extended-use of combined hormonal contraceptives, and consequently we saw a higher proportion of participants in the intervention group reporting to have received this information compared to the control group. Extended-use comes with several health benefits including less menstrual pain, genital irritation, bloating, and headache.[18] As combined oral contraception regimens with shorter hormone-free breaks result in fewer contraceptive failures,[19] extended-use of all combined hormonal contraceptives could be considered a more effective option compared to cyclic-use regimens, especially among young women who are at higher risk of unintended pregnancy due to high fertility and sometimes a less structured life. Contraceptive counseling is important for supporting especially younger women to make well-informed decisions[20,21] that shape their health, education,

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TABLE 5 Contraceptive profile of women included in the study at different time points (total $N = 770$).

Contraceptive method	Choice of contraception (at clinic visit)	Initiation of contraception (follow-up 3 months)[a]	Use of contraception (follow-up 12 months)[b]
No method	28 (3.6)	33 (5.6)	131 (20.2)
Hormonal IUD	187 (24.3)	144 (24.5)	151 (23.3)
Copper IUD	28 (3.6)	23 (3.9)	13 (2.0)
Implant	67 (8.7)	47 (8.0)	47 (7.3)
COC	297 (38.6)	221 (37.6)	208 (32.1)
POP	74 (9.6)	59 (10.1)	41 (6.3)
Vaginal ring	48 (6.2)	45 (7.7)	33 (5.1)
Patch	11 (1.4)	7 (1.2)	2 (0.3)
Injectable	0	0	1 (0.2)
Condom (only)	11 (1.4)	3 (0.5)	20 (3.1)
Not known	12 (1.6)	4 (0.7)	0
Other	7 (0.9)	1 (0.2)	1 (0.2)

Note: Data are *n* (%).

Abbreviations: COC, combined oral contraceptives; IUD, intrauterine device; POP, progesterone only pills.

[a]Missing $n = 183$.

[b]Missing $n = 122$.

and socioeconomic status, and adding information on extended-use and known health benefits might aid in shared decision making regarding SARC usage. Widespread use of effective contraceptive methods should herald long-term public-health advantages—lower abortion rates and complications in particular—and promote greater autonomy for women, especially the younger generation, to assert reproductive health needs. A respectful contraceptive counseling supporting contraceptive decision making free from coercion is of great importance since provider bias in LARC promotion has been expressed by young women.[22]

The number of pregnancies did not significantly differ between the intervention and control groups during the 12-month follow-up period. However, in the main LOWE trial, a significant difference in subsequent pregnancies was seen within 12 months among participants enrolled at abortion clinics,[7] suggesting that this secondary analysis is underpowered for studying this outcome. Recent statistics on abortion in Sweden show a steady decrease in abortion rates among younger women in Sweden.[23] Based on registry data on prescribed collected LARC items, the Swedish National Board of Health and Welfare assign the decrease to an increase in LARC use, with a notable rise in intrauterine device prescriptions between 2011 and 2019. Additional explanations could be the introduction of free contraceptives for women under 21 from 2017, along with subsidies in some healthcare regions for those up to 26 years. The intervention's success in increasing LARC uptake suggests that when young women are provided with detailed, unbiased information, they are more likely to opt for more effective LARC methods.

Sweden offers free contraceptives for individuals up to 21 years of age. This is seen as an important public health intervention against unwanted pregnancies and abortions, especially in lower income groups.[24] Youths are especially affected by this reform since they are more prone to unplanned pregnancies. Interventions that increase use of LARC could also be considered a great means to reduced societal and individual costs related to use of contraception and unwanted pregnancies in both low- and high-income settings.[25–28]

The major strength of this study is the cluster randomized design mitigating the risk of spill-over effects of the intervention to participants at control clinics. Another strength is the use of an audiovisual intervention package, aiding in contraceptive decision making regardless of the individual's preference on how to gather information. Furthermore, the inclusion of clusters representing the most common clinic types providing contraceptive counseling (i.e., abortion-, youth-, and maternal health clinics), and the high proportion of young women in the total study population (57.5%) offer broad evidence about LARC choice, initiation and use among young women in a real-life setting.

The current study has some limitations. The power calculation and sample size were estimated for the primary outcome of the main trial to evaluate the intervention effect among all fertile aged patients seeking contraceptive counseling or induced abortion with contraceptive counseling included. The current study was not powered to explore rare outcomes such as pregnancy and subsequent abortions. Previous studies in Sweden show that, over time, cost normally does not affect the choice and use of contraceptive methods.[2,4,29] As contraceptive methods are free of charge for women in Sweden up to 21 years and subsidized for women up to 26 years, we were not expecting that the cost of contraceptive method would affect the choice, initiation, and use of contraceptive methods. With a median age of 21 years in the current study population, the existing subsidy system could constitute a limitation of generalizability of this study to settings where contraceptives are not free of charge or subsidized.

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5 | CONCLUSION

The LOWE Trial demonstrates the impact of structured contraceptive counseling on young women's choice, initiation, and use of LARCs. Furthermore, the educational materials, including the video, structured question, effectiveness chart, and box of contraceptive models, were favorably received, especially during pre-booked visits. The findings suggest that comprehensive, structured contraceptive counseling significantly influences uptake of highly-effective LARC methods that has previously been proven to reduce unintended pregnancies. The results highlight a successful approach that could be replicated in other regions and settings to improve quality of care and health outcomes in adolescent and young adult women.

AUTHOR CONTRIBUTIONS

Kristina Gemzell-Danielsson was responsible for the study concept, trial protocol, regulatory approvals and overall responsible for the study conduct and funding. Helena Kopp Kallner, Niklas Envall, Karin Emtell Iwarsson contributed to study design, protocol development and in securing funding as well as in conduct of the study. All authors except Volodymyr Podolskyi and Isabella Bizjak were involved in the development of study tools and recruitment of participating clinics. Isabella Bizjak, Karin Emtell Iwarsson, and Niklas Envall acquired the data. Volodymyr Podolskyi and STATISTICON were responsible for data analyses. All authors contributed to the interpretation of the data and manuscript writing.

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CONFLICT OF INTEREST STATEMENT

The authors declare no support from any organization for the submitted work.

ETHICS STATEMENT

Ethical permission was obtained from the regional ethics committee in Stockholm (Dnr 2017/525-31/4) on March 29, 2017. The study was conducted in accordance with the World Medical Association Declaration of Helsinki. All eligible study participants received oral and written information and provided a signed informed consent prior to enrollment. Reporting of the trial follows the Consort Statement Extended Guidelines for cluster randomized trials and was registered at ClinicalTrials.gov (NCT03269357).

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