



Published in final edited form as:

Contraception. 2022 January ; 105: 61–66. doi:10.1016/j.contraception.2021.08.015.

The association between depression and contraceptive behaviors in a diverse sample of new prescription contraception users

Deborah Quint Shelef, MPH^a, Tina Raine-Bennett, MD, MPH^{b,c}, Malini Chandra, MS^c, Nancy Adler, PhD^d, Cassandra J. Marshall, DrPH, MPH^e, Julia R. Steinberg, PhD^a

^aDepartment of Family Science, University of Maryland School of Public Health, College Park, MD, 20742, USA

^bKaiser Permanente Northern California Division of Research, Oakland, CA, USA

^cMedicines360, San Francisco, CA, USA

^dDepartment of Psychiatry & Pediatrics, University of California, San Francisco, CA, USA

^eSchool of Public Health, University of California, Berkeley, CA, USA

Abstract

Objective: Among women initiating new prescription contraception, we investigated the relationship between recent depression and a range of contraceptive behaviors.

Study Design: We used medical and pharmacy records of 52,325 women ages 19–29 who initiated prescription contraception (pills, patches or rings, injectables, and long-acting reversible contraceptives) in 2014–2016 at a large integrated healthcare system in Northern California. Women had continuous enrollment for a year before and after initiating, and no records of prescription contraceptive use in the year before initiating. Depression in *the year prior* to initiation was dichotomized into 1) no depression indicator (reference group) or 2) depression diagnosis or redeemed antidepressant. Multinomial logistic regression models examined the associations between depression and method type initiated, and contraceptive patterns, timing of discontinuation, inconsistent use, and switching methods over a year after initiating, adjusting for sociodemographics and testing for interactions between depression and having a recent birth or abortion.

Results: Women with recent depression were more likely to initiate methods other than the pill, and the association was stronger for patches or rings versus pills among those with a recent birth compared to those without. Among women initiating all methods and the pill, those with depression were more likely to discontinue their method, use it inconsistently, and switch from it than use it continuously for a year.

Corresponding Author: Deborah Quint Shelef, MPH, dqshelef@umd.edu, Cell Phone: (202) 297-1107, Department Phone: (301) 405-3672, Fax: (301) 314-9161, Mail: Department of Family Science, University of Maryland School of Public Health, 1142 SPH Building, 4200 Valley Drive, College Park, MD, 20742, USA.

Declarations of Interest: None

Conclusion: Women with recent depression were less likely to initiate the pill; and when the pill was initiated, those with depression were more likely to discontinue use, use it inconsistently, and switch from it.

Keywords

depression; prescription contraceptive method initiated; contraceptive discontinuation; gaps in use; contraceptive switching

Introduction

Depression is the second leading cause of disability among individuals in the U.S., which means it affects individuals' family, social, and work lives [1], and it is more common in young adult women than men [2]. Women experiencing depression have lower motivation, energy, initiative, and confidence [3] and this may lead to engaging in different contraceptive behaviors than those not experiencing depression [4–6]. Among those not seeking pregnancy, depression has been shown to affect contraceptive behaviors such as whether to use contraception [7], method type selected [4,8,9], method type using [10,11], length of continuation [12–16], and whether used inconsistently [17].

Much research on the role of depression in contraceptive behaviors has focused on the outcomes of contraceptive method type selected or being used because method type is associated with risk of unintended pregnancy [18]. However, a consistent picture has not emerged [6,19]. Some studies have found that depression is associated with choice or use of less effective or no contraceptives methods [7,9,10,20]; others have found depression was associated with choice or use of more effective contraceptive methods [4,9,11,21]; and still others show no significant association with effectiveness level [5,22]. Many of these studies examined the association between depression and contraceptive method type selected or used among women in the postpartum or post-abortion period [5,8,21]; others were among women without a recent pregnancy [4,7,10]; and one study included women with and without a recent abortion [9]. The postpartum or post-abortion period may be different from other periods in women's lives. Specifically, the effect of more depressive symptoms on contraceptive use or selection may vary by whether women have experienced a recent abortion or childbirth, and that may explain varied findings across studies. During these time periods, more women may experience higher levels of transient elevated depressive symptoms for various reasons [8,23] and this may influence the association between depressive symptoms and contraceptive behaviors.

Less research has focused on whether depression is associated with other contraceptive behaviors that require energy, motivation, and initiative such as continuation, consistency of use, or switching methods, all of which are associated with risk of unintended pregnancy [24,25]. From this limited research, depression has been associated with earlier discontinuation of some methods – oral contraceptive pills, injectables, implants, and intrauterine contraception [12–16]. And depression may be associated with inconsistent use of some methods. Only one study has examined whether depression influences discontinuation [13] and another examined consistency of use [17] of various contraceptive

methods. No research has examined whether depression is associated with switching methods, which is related to risk of unintended pregnancy if it is accompanied by gaps in use [24,25].

Building from previous research and existing theory, the current study examined whether depression influences a variety of contraceptive behaviors including type of prescribed contraceptive method initiated, patterns of use, timing of discontinuation, inconsistency of use, and switching methods. We also examined whether the effects of depression on contraceptive behaviors vary by having had a recent abortion or childbirth. By examining whether depression prior to initiating contraception is associated with a range of contraceptive behaviors in one study and whether findings vary by recent childbirth or abortion, we gain a more holistic understanding of which contraceptive behaviors may be influenced by experiencing depression and its symptoms. This may inform contraceptive counseling practices and justify further investigation of why depression influences a range of contraceptive behaviors.

1. Materials and Methods

2.1 Setting

We conducted a cohort study of young women of reproductive age enrolled in Kaiser Permanente Northern California (KPNC), a large, integrated delivery system in Northern California serving over 4 million members. The membership of KPNC is generally representative of the region's ethnically and socioeconomically diverse population, although with fewer adults at high- and low- income extremes, and described in more detail elsewhere [26]. Data were abstracted from electronic health records including administrative and claims databases, outpatient encounters and inpatient admissions, and pharmacy databases. The Institutional Review Boards at KPNC and the University of Maryland approved this study with waiver of consent.

2.2 Sample

To be eligible for this study, women had to be between the ages of 19 to 29 years, initiate a prescription contraceptive method between 2014 and 2016, not have multiple methods initiated on this same day, and not have prescription patterns that may indicate use for reasons other than pregnancy prevention (e.g. nonstandard dispensing quantities of pills, patches, or rings, or more than 8 DMPA injections). We focus on those aged 19–29 because they are at most risk of unintended pregnancy [27] and were legally adults during the time period of the study. In addition, to be eligible women had to be KPNC members at least 12 months prior to and 13 months after initiating their index contraceptive method and not have records of having a contraceptive method dispensed or inserted in the 12 months prior to initiating their method. These criteria were specified so that women were 'new' initiators of prescribed contraception (i.e., they did not use in the year before initiating) and so that we had information on women's prescribed contraceptive behaviors for a year after initiating their index method. We also excluded women who had infertility, sterilization, menopause, ovarian failure or hysterectomy diagnoses or procedure codes in year prior to initiating one's index method (n = 907) because they are not at risk of pregnancy. We could not go

further back in time for these diagnoses as many women were not receiving care at KPNC more than a year before initiating. Given the high fertility in the age range of our cohort (19 to 29 years) [28,29], it is unlikely that many other women had infertility, sterilization, menopause, ovarian failure, or hysterectomies more than a year before initiating one's index contraceptive method. This resulted in a cohort of 54,696 women; 2,371 women (4.3%) were removed due to missing data on race/ethnicity or reporting race/ethnicity other than Black, White, Hispanic or Asian or missing data on income status, resulting in an analysis cohort of 52,325 women.

2.3 Measures

2.3.1 Dependent Variables—We coded contraceptive behaviors based on medical records of administration (shots) or insertion (IUDs or implants) and pharmacy records of prescriptions redeemed (pills, patches, rings). For pills, patches, and rings, data included dates and dosages redeemed by women during the study period. Pills, patches, or rings that were picked up were mostly dispensed in 3-month increments [30]; none were dispensed in longer increments. For shots, data included dates of administration during the study period, and for IUDs and implants, data included dates of when inserted or removed during the study period. Therefore, we were able to examine type of the method first initiated (called index method), and length of continuation of the index method, whether there were gaps in use of this method, and switching behaviors over a year after initiation.

Type of method initiated: Methods were categorized into four groups based on the amount of user behaviors required: 1) pills, 2) patches or rings, 3) shot (or injectable), and 4) long-acting reversible contraception (LARC; which included IUDs and implants).

Contraceptive patterns: Women were divided into five groups based on their contraceptive patterns over the 12 months after initiating: 1) those who continued their index method consistently for the entire year, 2) those who discontinued their index method during the year and did not start another method, 3) those who had gaps in use of their index method and did not switch methods, 4) those who switched methods but had no gaps in use, and 5) those who switched methods and had gaps in use. To be considered in the first category of continuing pills, patches, rings, or shots for the entire year, women had to pick up their subsequent prescription (pills, patches, or rings) or receive their subsequent injection (shot) by the fourteenth day after their previous prescription ended or injection timed out. For long-acting reversible contraception, women could not have more than one day between removal and insertion of next IUD or implant to be considered continuing use of LARC.

Contraceptive discontinuation: Among those who discontinued their index method during the year and did not start another method, we examined when women discontinued in 3-month periods over the year. Our reference group was those who discontinued in the last quarter of the year after initiating the index method.

2.3.2 Independent Variable: Depression—We created a dichotomous variable for depression in the year prior to initiating contraception based on two indicators: presence or absence of clinician diagnosis of depression in the medical record, and pharmacy record of

antidepressant prescription filled. Women were classified as having: 1) Neither diagnosis of depression nor antidepressant prescription filled (henceforth *no depression*), or 2) Diagnosis of depression or antidepressant prescription filled (henceforth *depression*). Diagnosis of depression was based on ICD-9 and ICD-10 codes [31]. For antidepressants, we used filled prescription medications with the American Hospital Formulary Service (AHFS) code of 281604 (antidepressants) [32], as well as drugs that contained Milnacipran or Selegiline, which are used to treat depression.

2.3.3. Other Variables

Sociodemographic factors.: Based on previous research, we included the covariates of age, race/ethnicity, and income [10,20,33]; these variables were extracted from the medical records. Age ranged from 19 – 29 years and was treated as a continuous variable.

Race/ethnicity was categorized into 4 mutually exclusive groups: non-Hispanic White, non-Hispanic Black, Hispanic, and non-Hispanic Asian. For income, we created a binary variable indicating residence in a census tract with 20% incomes below the federal poverty level (“low-income area”); we took this approach because individual-level income was not available.

Recent pregnancy history.: Induced abortion or a live birth in the year prior to the index date (yes, no) was determined based on identification of diagnostic and procedural codes and claims from outside referrals.

2.4 Analyses:

We conducted multinomial logistic regression for all outcomes. For all contraceptive behavioral outcomes other than method type initiated, we examined models for all women who initiated methods together and separately for each method category (pills, patches or rings, shot, and LARC). We tested for the interaction between recent live birth and depression status and between recent abortion and depression status, and adjusted for the covariates described above. When interactions between depression and recent abortion or childbirth were not significant, we adjusted for having had a recent abortion or childbirth, respectively. We also adjusted for method type when analyses examined behaviors of all methods together (i.e., contraceptive patterns, continuation, gaps in use, and switching). Results are presented as adjusted relative risk ratios (aRRR) with 95% confidence intervals (CIs). All analyses were conducted in Stata version 15.1.

2. Results

The average age of 52,325 women in the cohort was 22.7 years, and 44.0% were identified as non-Hispanic White, 27.8% as Hispanic, 18.3% as non-Hispanic Asian, and 9.9% as non-Hispanic Black. Just over 12% resided in a census tract with 20% of household incomes below the federal poverty level. In the prior 12 months, 16.4% of women had a live birth and 4.0% of women had an abortion. The most frequent contraceptive method type initiated was the pill (67.7%, n = 35,426), followed by a long-acting reversible method (19.9%, n = 10,427; 14.2% an IUD and 5.8% an implant). Fewer women initiated the shot (7.6%), ring

(3.9%), or patch (0.9%). Fourteen percent of women had evidence of depression. Descriptive characteristics of this sample by depression status are presented in Table 1.

For our first outcome of method type initiated, there was a significant interaction between depression and birth in the past year, $p < 0.02$, but not between depression and abortion in the past year, $p = 0.7942$. Thus, Table 2 presents the association between having recent depression and method type initiated by whether or not women had a recent birth adjusted for our other covariates (including having a recent abortion). When probing the interaction, we found that having depression was more strongly related to initiating patches or rings versus pills for those who gave birth in the past year (aRRR = 2.30, 95% CI: 1.55–3.41) relative to those who did not (aRRR = 1.29, 95% CI: 1.15–1.44), $p < 0.01$. Women with depression were more likely to initiate shots or LARC relative to pills, and these associations did not differ by having a recent birth.

Twenty-nine and one tenth percent of women continued their method consistently for at least a year after initiating it, and this varied by method type: 15.3% of pill users, 7.3% of patch or ring users, 25.6% of injectable users, and 82.5% of LARC users, $p < 0.0005$ (data not shown). There were no significant interactions between having a recent abortion or a recent birth and depression on the outcome of contraceptive patterns. Table 3 shows that for all methods combined, for pills, and for LARC, women with depression (versus those without) were more likely to discontinue their index method, use their index method inconsistently, or switch methods compared to continuing their method for the whole year.

Of all women who discontinued their index method and did not start another method, we found that women with depression were more likely to discontinue in the first 6 months relative to the last 3 months of the year for all methods combined, pills, and patches or rings (Table 4). These associations did not vary by recent abortion or birth history, $p\text{-values} > 0.10$. In contrast, the association between depression and length of continuation of LARC did vary by recent birth history, $p < 0.05$. Among women who did not have a recent live birth, women with depression were more likely to discontinue LARC in the first three months [aRRR= 2.20, 95% CI: 1.25–3.87]. Among women who had a recent birth, women with depression were *less* likely, though not significantly, to discontinue LARC in the first three month after initiating [aRRR= 0.45, 95% CI: 0.17–1.18].

Among all women and those who initiated the pill who had switched methods or had at least one gap in use, depression was associated with switching methods with gaps in use [all women who initiated aRRR = 1.48, 95% CI: 1.32–1.65; pill initiators aRRR = 1.64, 95% CI: 1.44–1.87] and without gaps in use [all women who initiated aRRR = 1.48, 95% CI: 1.28–1.71; pill initiators aRRR = 1.70, 95% CI: 1.44–2.02] compared to having only gaps in use of one's index method and not switching methods (Table 5). Findings did not differ by having had a recent birth or abortion, $p\text{-values} > 0.06$.

3. Discussion

In a large managed care population in Northern California, we found that women with depression were more likely to initiate methods other than the pill, and among women

initiating all methods combined, those with depression were more likely to discontinue their initiated method (and not start another method), use their index method inconsistently, and switch from their index method rather than use their initiated method continuously over the following year. Among those who discontinued their index method, depression was associated with discontinuing earlier versus later in the year. And among those who used a method inconsistently or switched methods, depression was associated with switching methods at least once compared to continuing to use one's index method inconsistently. When looking at behaviors among those initiating specific methods, the aforementioned associations were all significant for women initiating pills, and some were significant for those initiating the patch and ring or LARC.

While our study found that women with recent depression indicators were more likely to initiate methods that require fewer user behaviors (i.e., initiate methods that do not require daily use such as the pill), the pill was the most common method initiated, even among those who recently had depression (62%). And when the pill was initiated, those with depression were less adherent and committed to using it consistently, suggesting depression may increase women's risk of unintended pregnancy for those using the pill. Awareness of these findings is important for contraceptive counseling practices or trainings.

Possible reasons for why women initiating contraception were less likely to initiate pills compared to other methods include patient factors or experiences, provider practices, or a combination of the two. For instance, women with depression may more strongly prefer or providers may more strongly recommend to depressed patients methods that require fewer user behaviors than the pill. Alternatively, when recommended, patients experiencing depression may more readily accept providers' guidance. Furthermore, the associations between depression and some contraceptive behaviors varied by having had a recent birth. This may be due to stronger patient preferences or provider recommendations, or higher acceptance of providers' guidance by depressed patients among those who recently gave birth. Future research is needed to understand why depression influenced contraceptive behaviors in the ways it did here.

There are some limitations worth mentioning. First, our cohort included only women who have health insurance and access to health care services. These women may differ from the general U.S. population in their contraceptive use. Nevertheless, the membership of KPNC is generally similar to the population of insured adults in the region with respect to sociodemographics, as well as health and well-being indicators [26]. Second, our sample included only women initiating prescription contraception, and so could not examine whether depression was associated with the decision to initiate contraception, including both prescription and non-prescription methods. Other research has found depression was associated with choosing to use no method versus some method at family planning visits [7].

Third, while the use of medical and pharmacy records prevents reporting bias of depressive symptoms or contraceptive method use, this approach has some limitations. Some women with depression may not have been captured since we included women with a known diagnosis or antidepressant use, and women with depression may not have been diagnosed or received an antidepressant [35,36]. However, our finding that 14% of women in the study

population experienced depression in the prior year is consistent with national prevalence data [35,37–39]. Related, we do not know that all women with depression indicators were in fact experiencing or had experienced depression. Those with only antidepressant redemptions only may be using for other reasons such as anxiety disorders, insomnia or pain; nevertheless, a study of Canadian medical records data found that over 70% using antidepressants did so for depression or anxiety [40], suggesting most women use antidepressants for a mental health reason. Furthermore, using records of prescription redemptions (only for pills, patches, and rings) does not ensure that women actually used the methods once picked up.

Finally, we can only speculate on reasons for our findings because we did not assess reasons. Thus, future research is warranted to examine possible reasons for the association between depression and contraceptive behaviors. However, we are reassured because we examined the effect of depression on a range of contraceptive behaviors, and not simply method initiated, and our findings paint a consistent picture. Namely, those with depression were more likely to not initiate the pill, which requires the most user behaviors compared to other methods included here. Furthermore, those experiencing depression were more likely to discontinue the pill (and not start another method), discontinue the pill earlier rather than later in the year, and switch from the pill rather than use it inconsistently, all further suggesting a desire to avoid the daily behaviors of the pill.

In this large, diverse cohort of young women initiating contraception at KPNC, we found that recent depression was associated with a range of contraceptive behaviors including initiating prescribed contraceptive methods other than the pill. In addition, recent depression was associated with *not* using one's initiated method continuously and consistently over a year, discontinuing one's initiated method earlier rather than later, and switching methods rather than using one's initiated method inconsistently. All associations between depression and contraceptive behaviors subsequent to initiation were significant for only pill initiators. Contraceptive providers and training programs should be aware of these findings and future research is warranted to understand reasons for why depression is associated with contraceptive behaviors.

Acknowledgements:

The research presented in this paper was supported by the National Institutes of Health (Eunice Kennedy Shriver National Center for Child Health and Human Development K01 HD075834, PI: Steinberg; P2C-HD041041, PI: Rendall), the Maryland Population Research Center Seed Grant program, and a University of Maryland, College Park Faculty-Student Research award from the Graduate College (PI: Steinberg). The funders were not involved in the study design, data collection, analysis or interpretation, writing, or submitting for publication.

References:

- [1]. James SL, Abate D, Abate KH, Abay SM, Abbafati C, Abbasi N, et al. Global, regional, and national incidence, prevalence, and years lived with disability for 354 diseases and injuries for 195 countries and territories, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017. *The Lancet* 2018;392:1789–858. 10.1016/S0140-6736(18)32279-7.
- [2]. Mojtabai R, Olfson M, Han B. National Trends in the Prevalence and Treatment of Depression in Adolescents and Young Adults. *Pediatrics* 2016;138:e20161878. 10.1542/peds.2016-1878. [PubMed: 27940701]

- [3]. American Psychiatric Association. Diagnostic and statistical manual of mental disorders: DSM-5. 5th ed. Arlington, VA: American Psychiatric Association; 2013.
- [4]. Francis J, Presser L, Malbon K, Braun-Courville D, Linares LO. An exploratory analysis of contraceptive method choice and symptoms of depression in adolescent females initiating prescription contraception. *Contraception* 2015;91:336–43. 10.1016/j.contraception.2014.12.010. [PubMed: 25553873]
- [5]. Lawley ME, Haddad L, Burley K, Farr SL. Use of contraception among US women reporting postpartum depressive symptoms, pregnancy risk assessment monitoring system 2009–2011. *Contraception* 2018;97:29–33. 10.1016/j.contraception.2017.09.009. [PubMed: 28958839]
- [6]. Hall KS, Steinberg JR. Chapter 23: Mental Health and Contraception. Hatcher RA, Nelson AL, Trussell J, Cwiak C, Cason P, Policar MS, Aiken ARA, Marrazzo J, & Kowal D (Eds). *Contraceptive Technology*, 21st Edition., New York, NY: Ayer Company Publishers, Inc.; 2018.
- [7]. Garbers S, Correa N, Tobier N, Blust S, Chiasson MA. Association between symptoms of depression and contraceptive method choices among low-income women at urban reproductive health centers. *Matern Child Health J* 2010;14:102–9. 10.1007/s10995-008-0437-y. [PubMed: 19067135]
- [8]. Steinberg JR, Tschann JM, Henderson JT, Drey EA, Steinauer JE, Harper CC. Psychological distress and post-abortion contraceptive method effectiveness level chosen at an urban clinic. *Contraception* 2013;88:717–24. 10.1016/j.contraception.2013.08.009. [PubMed: 24094755]
- [9]. Steinberg JR, Adler NE, Thompson KM, Westhoff C, Harper CC. Current and past depressive symptoms and contraceptive effectiveness level method selected among women seeking reproductive health services. *Soc Sci Med* 2018;214:20–5. 10.1016/j.socscimed.2018.08.009. [PubMed: 30138841]
- [10]. Hall KS, Moreau C, Trussell J, Barber J. Role of young women’s depression and stress symptoms in their weekly use and nonuse of contraceptive methods. *J Adolesc Health* 2013;53:241–8. 10.1016/j.jadohealth.2013.02.009. [PubMed: 23582524]
- [11]. Callegari LS, Zhao X, Nelson KM, Lehavot K, Bradley KA, Borrero S. Associations of mental illness and substance use disorders with prescription contraception use among women veterans. *Contraception* 2014;90:97–103. 10.1016/j.contraception.2014.02.028. [PubMed: 24731860]
- [12]. Bello JK, Salas J, Meyer D, Heiden-Rootes K, Davis DM, Keegan Garrett E, et al. Mental health diagnoses and early removal of long-acting reversible contraception. *J Affect Disord* 2020;262:333–6. 10.1016/j.jad.2019.11.046. [PubMed: 31740110]
- [13]. Callegari LS, Zhao X, Nelson KM, Borrero S. Contraceptive adherence among women Veterans with mental illness and substance use disorder. *Contraception* 2015;91:386–92. 10.1016/j.contraception.2015.01.013. [PubMed: 25636807]
- [14]. Hall KS, White KO, Rickert VI, Reame N, Westhoff C. Influence of depressed mood and psychological stress symptoms on perceived oral contraceptive side effects and discontinuation in young minority women. *Contraception* 2012;86:518–25. 10.1016/j.contraception.2012.04.010. [PubMed: 22673038]
- [15]. Westhoff C, Truman C, Kalmuss D, Cushman L, Rulin M, Heartwell S, et al. Depressive symptoms and Norplant contraceptive implants. *Contraception* 1998;57:241–5. 10.1016/S0010-7824(98)00022-5. [PubMed: 9649915]
- [16]. Westhoff C, Truman C, Kalmuss D, Cushman L, Davidson A, Rulin M, et al. Depressive symptoms and Depo-Provera. *Contraception* 1998;57:237–40. 10.1016/S0010-7824(98)00024-9. [PubMed: 9649914]
- [17]. Stidham Hall K, Moreau C, Trussell J, Barber J. Young women’s consistency of contraceptive use--does depression or stress matter? *Contraception* 2013;88:641–9. 10.1016/j.contraception.2013.06.003. [PubMed: 23850075]
- [18]. Trussell J, Aiken A, Micks E, Guthrie K. Efficacy, Safety, and Personal Considerations. Hatcher RA, Nelson AL, Trussell J, Cwiak C, Cason P, Policar MS, Edelman A, Aiken ARA, Marrazzo J, Kowal D (Eds.) *Contraceptive Technology* (21st ed.), New York, NY: Ayer Company Publishers, Inc.; 2018.

- [19]. Steinberg JR. Chapter 175: Contraception. Ayers S, Llewellyn C, McManus C, Newman S, Petrie K, Revenson TA, & Weinman J (Eds.) Cambridge Handbook of Psychology, Health and Medicine, 3rd Edition., Cambridge, UK: Cambridge University Press; 2019.
- [20]. Vafai Y, Steinberg JR. The effects of preabortion depressive symptoms on postabortion contraceptive effectiveness level chosen among women seeking abortions. *Contraception* 2018;97:335–40. 10.1016/j.contraception.2017.12.013. [PubMed: 29287671]
- [21]. Steinberg JR, Harrison EY, Boudreaux M. Psychosocial Factors Associated With Postpartum Contraceptive Method Use After an Unintended Birth. *Obstet Gynecol* 2020;135:821–31. 10.1097/AOG.0000000000003745. [PubMed: 32168207]
- [22]. Faisal-Cury A, Menezes PR, Huang H. The relationship between perinatal psychiatric disorders and contraception use among postpartum women. *Contraception* 2013;88:498–502. 10.1016/j.contraception.2013.02.003. [PubMed: 23507171]
- [23]. Meltzer-Brody S, Howard LM, Bergink V, Vigod S, Jones I, Munk-Olsen T, et al. Postpartum psychiatric disorders. *Nat Rev Dis Primers* 2018;4:18022. 10.1038/nrdp.2018.22. [PubMed: 29695824]
- [24]. Jaccard J, Levitz N. Counseling adolescents about contraception: towards the development of an evidence-based protocol for contraceptive counselors. *J Adolesc Health* 2013;52:S6–13. 10.1016/j.jadohealth.2013.01.018. [PubMed: 23535060]
- [25]. Jaccard J *Unlocking the Contraception Conundrum: Reducing Unplanned Pregnancies in Emerging Adulthood*. Washington, DC: The National Campaign to Prevent Teen and Unplanned Pregnancy; 2009.
- [26]. Gordon N *Similarity of Adult Kaiser Permanente Members to the Adult Population in Kaiser Permanente's Northern California Service Area: Comparisons based on the 2017/2018 cycle of the California Health Interview Survey*. Oakland, CA: Kaiser Permanente Northern California Division of Research; 2020.
- [27]. Finer LB, Zolna MR. Declines in Unintended Pregnancy in the United States, 2008–2011. *N Engl J Med* 2016;374:843–52. 10.1056/NEJMs1506575. [PubMed: 26962904]
- [28]. Chandra A, Copen CE, Stephen EH. Infertility and impaired fecundity in the United States, 1982–2010: data from the National Survey of Family Growth. *Natl Health Stat Report* 2013;1–18, 1 p following 19.
- [29]. Female age-related fertility decline. Committee Opinion No. 589. *Obstet Gynecol* 2014;123:719–21. 10.1097/01.AOG.0000444440.96486.61. [PubMed: 24553169]
- [30]. Marshall C, Schmittiel J, Chandra M, Calhoun A, Raine-Bennett T. The Relationship Between Prescription Copayments and Contraceptive Adherence in a New-user Cohort. *Med Care* 2018;56:577–82. 10.1097/MLR.0000000000000921. [PubMed: 29847539]
- [31]. International Statistical Classification of Diseases and Related Health Problems (ICD). Accessed at <https://www.who.int/standards/classifications/classification-of-diseases> n.d.
- [32]. AHFS Pharmacologic-Therapeutic Classification. Accessed at <https://www.ahfsdruginformation.com/ahfs-pharmacologic-therapeutic-classification/> n.d.
- [33]. Daniels K, Mosher W, Jones J. Contraceptive Methods Women Have Ever Used: United States, 1982–2010. *National Health Statistics Reports* 2013;62.
- [34]. Steinberg JR, Marthey D, Xie L, Boudreaux M. Contraceptive method type and satisfaction, confidence in use, and switching intentions. *Contraception* 2021;104:176–82. 10.1016/j.contraception.2021.02.010. [PubMed: 33621581]
- [35]. Farr SL, Bitsko RH, Hayes DK, Dietz PM. Mental health and access to services among US women of reproductive age. *American Journal of Obstetrics & Gynecology* 2010;203:542.e1–542.e9. 10.1016/j.ajog.2010.07.007. [PubMed: 20817143]
- [36]. Guo N, Robakis T, Miller C, Butwick A. Prevalence of Depression Among Women of Reproductive Age in the United States. *Obstet Gynecol* 2018;131:671–9. 10.1097/AOG.0000000000002535. [PubMed: 29528926]
- [37]. Zhou J, Ko JY, Haight SC, Tong VT. Treatment of Substance Use Disorders Among Women of Reproductive Age by Depression and Anxiety Disorder Status, 2008–2014. *J Womens Health (Larchmt)* 2019;28:1068–76. 10.1089/jwh.2018.7597. [PubMed: 31298606]

- [38]. Ko JY, Farr SL, Dietz PM, Robbins CL. Depression and treatment among U.S. pregnant and nonpregnant women of reproductive age, 2005–2009. *J Womens Health (Larchmt)* 2012;21:830–6. 10.1089/jwh.2011.3466. [PubMed: 22691031]
- [39]. Farr SL, Hayes DK, Bitsko RH, Bansil P, Dietz PM. Depression, diabetes, and chronic disease risk factors among US women of reproductive age. *Prev Chronic Dis* 2011;8:A119. [PubMed: 22005612]
- [40]. Wong J, Motulsky A, Egale T, Buckeridge DL, Abrahamowicz M, Tamblyn R. Treatment Indications for Antidepressants Prescribed in Primary Care in Quebec, Canada, 2006–2015. *JAMA* 2016;315:2230. 10.1001/jama.2016.3445. [PubMed: 27218634]

Implications:

Women with recent depression indicators should be followed closely to ensure they have the support they need to meet their reproductive goals. Those who wish to avoid pregnancy may benefit from methods that do not require daily use.

Table 1.

Characteristics of women by depression status who initiated prescription contraception in 2014–2016 at Kaiser Permanente Northern California

	No Depression (n = 45,021)	Depression (n = 7,304)	p-value (Chi- Square)
Age			
Mean (SD)	22.7 (3.3)	22.6 (3.4)	p=0.08
19–24y (%)	70.9	70.7	p=0.83
25–29y (%)	29.2	29.3	
Race/Ethnicity (%)			
			p<0.0001
Non-Hispanic White	42.2	54.8	
Non-Hispanic Black	9.9	10.2	
Hispanic	28.3	24.8	
Non-Hispanic Asian	19.6	10.2	
Low-income area (%)			
			p=0.72
Yes	12.2	12.0	
No	87.8	88.0	
Abortion in past 12m (%)			
			p=0.33
Yes	4.0	4.2	
No	96.1	96.8	
Live birth in past 12m (%)			
			p=0.03
Yes	16.6	15.5	
No	83.4	84.5	
Type of index method initiated (%)			
			p<0.0001
Pill	68.6	62.1	
Patch or Ring	4.6	5.8	
Shot	7.4	8.6	
LARC (IUDs or implants)	19.3	23.6	
Patterns of use of index method (%)			
			p<0.0001
Continued all year (n = 15,216)	29.1	28.8	
Discontinued (n = 20,851)	40.0	39.1	
Gaps in use of initiated method (n = 11,236)	21.8	19.7	
Switched methods only and no gaps (n = 1,672)	3.0	4.2	
Switched methods and gaps in use (n = 3,350)	6.1	8.3	
Discontinuation (n = 20,851) (%)			
			p=0.001
Within first 3 months after initiating	51.6	50.7	
3–6 months after initiating	21.5	24.6	
6–9 months after initiating	14.4	13.5	
9–12 months after initiating	12.5	11.2	

Notes. The p-value for the mean of age is from ANOVA. All other p-values are from chi-square tests. Those who discontinued are individuals who discontinued their index method during the year and didn't start the method again or start another method.

Association between depression and method type initiated by recent live birth (n = 52,325) among young women who initiated prescription contraception in 2014–2016 at Kaiser Permanente Northern California (aRRRs and 95% CIs)

Table 2:

	Women with no live birth in prior 12 months				Women with a live birth in prior 12 months			
	Patch or Ring vs Pill	Shot vs Pill	LARC vs Pill	LARC vs Pill	Patch or Ring vs Pill	Shot vs Pill	Shot vs Pill	LARC vs Pill
Depression	1.29 (1.15–1.44)	1.28 (1.15–1.42)	1.42 (1.32–1.52)	1.42 (1.32–1.52)	2.30 (1.55–3.41)	1.50 (1.22–1.85)	1.50 (1.22–1.85)	1.39 (1.21–1.59)

Notes. The adjusted relative risk ratios (aRRR) presented compare women with depression indicators to women with no depression indicators (reference group). The following covariates were included in the model (in addition to the depression indicator presented above): race/ethnicity, age, income, recent abortion, recent birth, and the interaction term of recent birth and depression. The omnibus interaction effect between recent birth and depression was significant, $\chi^2(3) = 9.97, p < 0.02$. Specifically, the effect of depression on initiating the patch or ring versus the pill was stronger for women with a live birth in the past 12 months compared to women without a live birth in the past 12 months, $p < 0.01$. No other effects of depression on method initiated significantly varied by birth history in the past 12 months.

Table 3.

Association between depression and contraceptive patterns over the year after initiating among young women who initiated prescription contraception in 2014–2016 at Kaiser Permanente Northern California (aRRRs and 95% CIs)

	Discontinued	Gaps in use and no switching	Switched methods and no gaps	Switched methods and gaps
All contraceptive initiators (n = 52,325)				
Depression	1.27 (1.18–1.37)	1.18 (1.08–1.29)	1.62 (1.41–1.86)	1.62 (1.45–1.80)
Pill initiators (n = 35,436)				
Depression	1.40 (1.27–1.55)	1.31 (1.17–1.46)	2.21 (1.84–2.65)	2.12 (1.83–2.46)
Patch or ring initiators (n = 2,506)				
Depression	1.45 (0.93–2.27)	1.14 (0.71–1.82)	1.21 (0.63–2.33)	1.17 (0.71–1.95)
Shot initiators (n=3,956)				
Depression	0.99 (0.79–1.24)	1.11 (0.85–1.46)	0.98 (0.67–1.45)	1.23 (0.92–1.64)
LARC initiators (n = 10,427)				
Depression	1.23 (1.04–1.46)	1.08 (0.54–2.14)	1.20 (0.88–1.63)	1.20 (0.95–1.51)

Notes. The adjusted relative risk ratios (aRRR) presented compare women with depression indicators to women with no depression indicators (reference group). Comparison group of the multinomial logistic regression is those who used their initiated method continuously and consistently for the entire year. Those who discontinued their method did not start another method for the entire year. Models adjusted for race/ethnicity, age, income, recent abortion, and recent birth. The first analysis among all contraceptive initiators also controlled for method type initiated. No interactions between recent birth or abortion and depression were significant.

Table 4.

Association between depression and timing of discontinuation among those who discontinued among young women who initiated prescription contraception in 2014–2016 at Kaiser Permanente Northern California (aRRRs and 95% CIs)

	Discontinued in first 3 months versus last 3 months	Discontinued in second 3 months versus last 3 months	Discontinued in third 3 months versus last 3 months
All contraceptive discontinuers (n = 20,851)			
Depression	1.22 (1.07–1.40)	1.32 (1.15–1.53)	1.06 (0.91–1.25)
Pill discontinuers (n = 17,116)			
Depression	1.85 (1.02–1.38)	1.28 (1.08–1.50)	1.08 (0.90–1.29)
Patch or ring discontinuers (n = 1,204)			
Depression	2.13 (1.06–4.25)	2.91 (1.43–5.93)	1.95 (0.88–4.29)
Shot discontinuers (n = 1,560)			
Depression	1.32 (0.81–2.15)	1.22 (0.70–2.13)	0.98 (0.54–1.79)
LARC discontinuers (n = 971)			
Depression			
<i>No live birth in prior year</i>	2.20 (1.25–3.87)	1.71 (0.96–3.03)	1.11 (0.60–2.05)
<i>Live birth in prior year</i>	0.45 (0.17–1.18)	0.67 (0.31–1.48)	0.59 (0.28–1.26)

Notes. The adjusted relative risk ratios (aRRR) presented compare women with depression indicators to women with no depression indicators (reference group). Models adjusted for race/ethnicity, age, income, recent abortion, and recent birth. The first analysis among all contraceptive discontinuers also controlled for method type initiated. For those who discontinued LARC, there was a significant interaction between depression and live birth in the prior 12 months, $\chi^2(3) = 8.71$, $p = 0.03$. Therefore, this model also includes the interaction between depression and live birth. Specifically, depression increased the likelihood of discontinuing LARC in the first three months for those without a recent birth but decreased the likelihood of discontinuing LARC in the first three months for those with a recent birth, $p = 0.005$. No other effects of depression on timing of LARC discontinuation significantly varied by recent birth.

Table 5.

Association between depression and switching behaviors and inconsistent use among those who switched or used method inconsistently among young women who initiated prescription contraception in 2014–2016 at Kaiser Permanente Northern California (aRRRs and 95% CIs)

	Switching and no gaps versus gaps and no switching	Both switching and gaps and switching versus gaps and no switching
All contraceptive inconsistent users or switchers (n = 16,258)		
Depression	1.48 (1.28–1.71)	1.48 (1.32–1.65)
Pill inconsistent users or switchers (n = 12,905)		
Depression	1.70 (1.44–2.02)	1.64 (1.44–1.87)
Patch or ring inconsistent users or switchers (n = 1,120)		
Depression	1.07 (0.62–1.84)	1.01 (0.71–1.45)
Shot inconsistent users or switchers (n = 1,383)		
Depression	0.87 (0.58–1.31)	1.08 (0.79–1.48)
LARC inconsistent users or switchers (n = 850)		
Depression	1.20 (0.56–2.55)	1.21 (0.58–2.51)

Notes. The adjusted relative risk ratios (aRRR) presented compare women with depression indicators to women with no depression indicators (reference group). Models adjusted for race/ethnicity, age, income, recent abortion, and recent birth. The first analysis among all contraceptive inconsistent users or switchers also controlled for method type initiated. There were no significant interactions between depression and recent abortion, *p-values*>0.06.