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Adverse Childhood Experiences and Pregnancy Intentions Among Pregnant Women Seeking Prenatal Care

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Abstract

Background: This study examined whether adverse childhood experiences (ACEs) are associated with increased risk of having an unwanted or mistimed pregnancy.

Methods: Women in two medical centers within an integrated health system were screened for ACEs during standard prenatal care (N=745). Multinomial multivariable logistic regression analyses examined the associations of ACEs (count and type) with pregnancy intentions, adjusting for covariates.

Results: Overall, 58.3% of pregnant women reported 0 ACEs, 19.1% reported 1 ACE, and 22.7% reported 2+ ACEs; 76.2% reported wanting to get pregnant, 18.5% reported wanting to get pregnant but not at this time (i.e., mistimed pregnancy), and 5.2% reported not wanting to get pregnant at all (i.e., unwanted pregnancy). Having 2+ (versus 0) ACEs was associated with higher odds of an unwanted pregnancy (OR=2.60, 95% CI=1.19–5.68). Further, childhood loss of parent (OR=2.20, 95% CI=1.03–4.71) and neglect (OR=5.67, 95% CI=1.72–18.72) were each associated with higher odds of an unwanted pregnancy in separate analyses. ACEs count and type were not significantly associated with having a mistimed pregnancy.

Conclusions: Among women screened for ACEs during standard prenatal care, ACEs were associated with increased odds of having an unwanted pregnancy, but not a mistimed pregnancy. Additional research is needed to better understand the mechanisms through which ACEs and other individual, social, and contextual factors impact pregnancy intentions in order to better support women and provide appropriate resources to help prevent unintended pregnancies.

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Keywords

ACEs; pregnancy; prenatal; neglect

Introduction

Adverse childhood experiences (ACEs)—including parental loss, family dysfunction, physical, sexual, or emotional abuse, and neglect—are common in the US, with nearly two-thirds of children exposed to at least one ACE and nearly 40% exposed to two or more ACEs (Dube et al., 2001). Children exposed to ACEs prior to the age of 18 are at elevated risk for a variety of health problems including chronic diseases and psychiatric disorders in adulthood (Anda, Brown, Felitti, Dube, & Giles, 2008; Anda et al., 2006; Brown et al., 2009; Centers for Disease Control and Prevention; Chapman et al., 2004; Cuijpers et al., 2011; Dube et al., 2001; Dube, Anda, Felitti, Edwards, & Croft, 2002; Dube et al., 2003). Notably, ACEs are associated with higher odds of sexual risk factors, such as having a greater number of sexual partners, earlier age of first sexual intercourse, adolescent pregnancy, and sexually transmitted diseases (Anda et al., 2002; Dietz et al., 1999; Felitti et al., 1998; Hillis et al., 2010; Hillis et al., 2004; Hillis, Anda, Felitti, & Marchbanks, 2001; Hillis, Anda, Felitti, Nordenberg, & Marchbanks, 2000).

ACEs may also contribute to increased risk of having an unintended pregnancy, defined as a pregnancy that is either unwanted (i.e., the pregnancy occurred when it was not at all wanted) or mistimed (i.e., the pregnancy occurred sooner than desired). ACEs and unintended pregnancies are each associated with elevated risk for maternal mental health problems during pregnancy and adverse pregnancy outcomes (Agrati et al., 2015; Angerud, Annerback, Tyden, Boddeti, & Kristiansson, 2018; Buist, Gotman, & Yonkers, 2011; Chung, Mathew, Elo, Coyne, & Culhane, 2008; Chung et al., 2010; Farber, Herbert, & Reviere, 1996; Finer & Henshaw, 2006; Frankenberger, Clements-Nolle, & Yang, 2015; Gipson, Koenig, & Hindin, 2008; J. A. Hall et al., 2018; Leeners, Rath, Block, Gorres, & Tschudin, 2014; Madigan, Wade, Plamondon, Maguire, & Jenkins, 2017; McDonnell & Valentino, 2016; Nelson, Uscher-Pines, Staples, & Grisso, 2010; Olsen, 2018), and women with a history of ACEs may be at risk for having an unintended pregnancy. Yet, few studies have examined the relationship between history of ACEs and unintended pregnancy.

Limited research to date comes from a small number of national surveys with retrospectively assessed data on pregnancy intentions. A study of US adult women in a large healthcare organization from 1995 to 1996 found that having a greater number of total ACE exposures, as well as frequent physical abuse of the mother by her partner, and frequent psychological, physical, or sexual abuse in childhood, were associated with greater odds of having a first unintended pregnancy (Dietz et al., 1999). Two surveys from the UK in 2012 and 2013 found a dose-response relationship between ACE count and risk of retrospectively self-reporting an unintentional pregnancy prior to age 18 (Bellis, Hughes, Leckenby, Perkins, & Lowey, 2014; Bellis, Lowey, Leckenby, Hughes, & Harrison, 2014). Data from the National Longitudinal Study of Adolescent to Adult Health (Add Health) from 1994 to 2009 also found that adverse life experiences in childhood and adolescence were associated with

higher risk of having an unintended first pregnancy (K. S. Hall, Beauregard, Rentmeester, Livingston, & Harris, 2019).

However, these studies did not differentiate between unwantedness versus mistiming of pregnancy, which may mask important differences among subgroups of women with unintended pregnancies (D'Angelo, Gilbert, Rochat, Santelli, & Herold, 2004). This is a key gap in the literature as women with unwanted pregnancies are more likely than those with mistimed pregnancies to feel unhappy about the pregnancy, to report that their partner did not want the pregnancy, to experience physical abuse during pregnancy, and to engage in risky health behaviors during pregnancy; they may have elevated risk for poor infant outcomes (e.g., low offspring birth weight) and a lower likelihood of breastfeeding (D'Angelo et al., 2004; Joyce, Kaestner, & Korenman, 2000; Kost, Landry, & Darroch, 1998; Piccinino & Peterson, 1999; Santelli et al., 2003). In addition, prior studies assessed pregnancy intentions retrospectively after the birth occurred rather than during pregnancy, and reports of pregnancy intentions tend to become more positive after the baby is born. Finally, with increasing availability of effective birth control methods and use of long-acting reversible contraception (LARC) among women of reproductive age in the US in recent years, rates of unintended pregnancies are decreasing (Finer & Zolna, 2016; Kavanaugh & Jerman, 2018), and data from these older studies may not generalize to women today.

Building on prior research, we address key gaps in knowledge of the association between ACEs (number and type) and pregnancy intentions (wanted, mistimed, unwanted) in a sample of pregnant women screened for ACEs and pregnancy intentions during standard prenatal care. Results will provide insights about whether exposure to a greater number of ACEs and individual types of ACE exposures are related to elevated risk of having an unwanted or mistimed pregnancy.

Methods

Study Site

Kaiser Permanente Northern California (KPNC) is a nonprofit, multispecialty healthcare delivery system that insures >40% of the region's commercially insured population; patients are diverse and representative of the population in Northern California (Gordon et al., 2016). KPNC provides health services to >4 million members (Terhune, 2013) and has >40,000 pregnancies each year across 15 medical centers. This study received approval from the KPNC Institutional Review Board with waiver of informed consent.

This study includes data from a pilot quality improvement project in two medical centers that screened English-speaking pregnant women aged 18 for ACEs as part of standard prenatal care at their second or third prenatal visit (typically between 14–20 weeks gestation; range 13 weeks to 30 weeks) from April 1, 2018 to March 31, 2019. Patients were given the ACEs screening questionnaire by the medical assistant in the exam room while waiting for their medical provider. Similar to a prior pilot study by the research team, health care providers then reviewed the questionnaires with patients and provided referrals for behavioral health services, as needed, along with a resource handout with relevant mental health, community, and educational resources (Flanagan et al., 2018).

Participants

The study included the 745 English-speaking pregnant women who completed the 10-item ACEs screening questionnaire and self-reported their pregnancy intentions during standard prenatal care. Women who did not complete the ACEs questionnaire (n=14) or the self-reported pregnancy intentions question (n=19) were excluded. These women were not significantly different from those who completed these questionnaires on age, race/ethnicity, or median neighborhood household income. An additional 41 women who completed an older 8-item version of the ACEs questionnaire that did not include two questions about neglect were also excluded. These 41 women did not differ significantly from those included on age, neighborhood median income, or race/ethnicity.

Measures

ACEs prior to age 18 were assessed with a 10-item modified version of the Behavioral Risk Factor Surveillance System Questionnaire (Centers for Disease Control and Prevention, 2019b), developed by the study team to be appropriate for prenatal patients and easy to self-administer in a healthcare setting. ACEs response options were yes or no and possible scores ranged from 0–10. ACEs were categorized into number (0, 1, and 2+) and type (loss of parent, sexual abuse, physical abuse, emotional abuse, neglect, and family dysfunction; Table 2 provides each ACE question and ACE type categories).

Pregnancy intentions (wanting to get pregnant, wanting to get pregnant but not at this time [mistimed pregnancy], and not wanting to get pregnant at all [unwanted pregnancy]) were obtained from a pregnancy circumstances questionnaire given at the first prenatal visit as part of standard prenatal care and recorded in the electronic health record (EHR).

Demographic characteristics included women's age at ACEs screening, race/ethnicity (non-Hispanic White, Asian/Pacific Islander, Black, Hispanic, Other/unknown), Medicaid status, and census-based neighborhood median household income from the EHR. Parity was based on the patient's obstetric history for the pregnancy in which they were surveyed (prior to delivery). Self-reported living situation (categorized as living with partner/baby's father or not) was based on a pregnancy circumstances questionnaire given at entry to prenatal care, and any use of cannabis in the year prior to pregnancy, any use of nicotine in the year prior to pregnancy, and at least weekly use of alcohol in the year prior to pregnancy were based on a self-reported prenatal substance use screening questionnaire given at the first prenatal visit as part of standard prenatal care.

Analyses

Frequencies and percentages were used to describe the prevalence of socio-demographic characteristics (age, race/ethnicity, median neighborhood income, living situation, Medicaid status), parity, substance use in the year before pregnancy (any cannabis use, any nicotine use, at least weekly alcohol use), ACE count (0, 1, 2+), and ACE type. Median and interquartile range (IQR) were used to describe the distribution of age and median neighborhood household income. Chi-square and Fisher exact tests were used to compare categorical socio-demographic and clinical covariates, ACE count, and ACE type by pregnancy intentions. Multinomial multivariable logistic regression was used to calculate the odds of having an unwanted or mistimed pregnancy versus wanted pregnancy, by ACE count

and type, adjusting for covariates. Covariates were chosen based on reported associations in scientific literature and observed bivariate associations with pregnancy circumstances. Median neighborhood income and at least weekly use of alcohol in the year prior to pregnancy were not significantly associated with pregnancy intentions and were not included as covariates in the models. Model fit was assessed using the Hosmer-Lemeshow Goodness of Fit test. Although there were 39 women in the unwanted pregnancy group, we encountered no issues with convergence. A p-value of <0.05 was considered statistically significant. All statistical analyses were performed in SAS 9.4.

Results

The sample (N = 745) was 43.6% non-Hispanic White, 21.7% Hispanic, 9.7% Black, 19.9% Asian/Pacific Islander, and 5.1% other/unknown race/ethnicity; 11.3% were aged 18–24, 65.6% were aged 25–34, and 23.1% were aged 35+, with a median age of 31 (IQR:28–34). The median neighborhood household income was \$98,672 (IQR: \$72,667–\$117,917); 52.4% had a median neighborhood household income below \$100,000, and 8.9% of women had Medicaid (Table 1). Most women lived with their partner/baby's father (92.6%), and were primiparous or multiparous (62.0%), while few self-reported any nicotine use (7.8%), any cannabis use (12.1%), or weekly alcohol use (20.3%) in the year before pregnancy.

Most women (76.2%) reported wanting to get pregnant, 18.5% reported wanting to get pregnant but not at this time (mistimed pregnancy), and 5.2% reported not wanting to get pregnant at all (unwanted pregnancy) (Table 1). Overall, 58.3% of pregnant women reported 0 ACEs, 19.1% reported 1 ACE, and 22.7% reported 2+ ACEs (Table 2). The median ACE score was 0 (IQR:0–1) and the mean ACE score was 1 (SD=1.7). The most prevalent ACEs were family dysfunction (26.1%), loss of a parent (22.6%), and emotional abuse (14.6%). Compared to women who wanted to get pregnant (20.4%), women with a mistimed (27.5%) or unwanted pregnancy (38.5%) were significantly more likely to have 2+ ACEs ($p = 0.01$) (Table 2, Figure 1). In addition, women with a mistimed or unwanted pregnancy were significantly more likely to report family dysfunction ($p = 0.03$) or childhood neglect ($p < 0.01$) (Table 2).

Results from multivariable models examining associations between ACEs and pregnancy intentions adjusting for covariates found that compared to women with 0 ACEs, those with 2+ ACEs (OR=2.60, 95% CI = 1.19, 5.68), but not 1 ACE (OR=0.66, 95% CI = 0.22, 1.96), had significantly greater odds of having an unwanted versus wanted pregnancy (Table 3). In addition, Hispanic ethnicity (compared to non-Hispanic White: OR = 3.07; 95% CI = 1.34, 7.01), being primiparous or multiparous (compared to nulliparous: OR = 5.38; 95% CI = 1.80, 16.09), and not living with a partner/the baby's father (OR = 10.31; 95% CI = 3.60, 29.51) were associated with higher odds of an unwanted pregnancy, while older age (age 25–34 vs. 18–24: OR = 0.25; 95% CI = 0.09, 0.72) was associated with lower odds of an unwanted pregnancy (not shown). In separate multivariable models that examined each ACE type and pregnancy intentions adjusting for covariates, the odds of having an unwanted versus wanted pregnancy were significantly greater among women who reported childhood loss of a parent (OR = 2.20, 95% CI = 1.03, 4.71) or childhood neglect (OR = 5.67, 95% CI = 1.72, 18.72).

ACEs were not significantly associated with having a mistimed versus wanted pregnancy (Table 3); however, any versus no cannabis use in the year prior to pregnancy (OR = 1.99; 95% CI = 1.08, 3.66) and not living with a partner/the baby's father (OR = 5.49; 95% CI = 2.71, 11.13) were significantly associated with higher odds of a mistimed pregnancy, while older age (age 25–34 vs. 18–24: OR = 0.41; 95% CI = 0.22, 0.75; age 35+ vs. 18–24: OR = 0.28; 95% CI = 0.13, 0.61) was associated with significantly lower odds of a mistimed pregnancy.

Discussion

To our knowledge, this is the first study to examine the association between ACEs and mistimed or unwanted pregnancies in a sample of pregnant women screened for ACEs and pregnancy intentions during standard prenatal care. Results indicate that compared to women without ACEs, those with two or more ACEs had more than two times greater odds of having an unwanted versus wanted pregnancy, even after adjusting for key socio-demographic and clinical characteristics. Moreover, unwanted pregnancies were elevated among women who reported childhood loss of a parent or childhood neglect. These findings build on prior studies that have retrospectively assessed pregnancy intentions after delivery (Dietz et al., 1999) and suggest that certain childhood exposures may confer especially high risk for having an unwanted pregnancy.

A particularly important contribution of the current paper is the finding that ACEs were only associated with risk of having an unwanted pregnancy, but not a mistimed pregnancy. Prior studies of ACEs and pregnancy intentions have only assessed whether the pregnancy was intended versus unintended, and our results highlight the importance of differentiating unwantedness versus mistiming of pregnancy. Women with unwanted versus mistimed pregnancies face additional risk factors associated with poor maternal and offspring health, including risky maternal health behaviors, intimate partner abuse, and lower happiness about the pregnancy (D'Angelo et al., 2004; Kost et al., 1998; Piccinino & Peterson, 1999; Santelli et al., 2003). Our study adds to this literature and indicates that women with unintended pregnancies are also more likely to have been exposed to ACEs. Mistimed pregnancies may be due to current issues in the woman's life, including lack of a stable relationship, or desire to achieve certain educational or financial goals first. Our results suggest that unwanted pregnancies may occur in the context of additional psychosocial risk factors, such as ACEs, that may compound risk for poor maternal and infant health. Support for women who choose to move forward with an unwanted pregnancy may look quite different than support for women with a mistimed pregnancy. For example, while additional research is needed to better understand the mechanisms through which ACEs are related to risk of having an unwanted pregnancy, women with unwanted pregnancies may benefit from education about the impact of ACEs on health and parenting, and extra resources and support to help break the intergenerational cycle of ACEs.

Pregnancy intentions are complex and influenced by multiple individual, social, cultural, and contextual factors, yet, healthcare systems typically focus on contraception as primary mode of preventing unplanned pregnancy. Our results suggest that while effective contraception is critically important for preventing unplanned pregnancies, focusing solely on contraception

may leave out other tools that could specifically help to reduce unwanted pregnancies. For example, screening reproductive aged women for ACEs and other psychosocial factors may help clinicians and healthcare systems to better identify and support at-risk women with resources to prevent a future unwanted pregnancy. Additional studies that advance understanding of the mechanisms through which ACEs contribute to increased risk of unwanted pregnancies will inform the development of better prevention and intervention strategies to prevent unwanted pregnancies.

Notably, few women reported not wanting to get pregnant at all (5%), and because our study included women screened for ACEs during standard prenatal care between 14 and 20 weeks of gestation, women with unintended pregnancies who chose to terminate their pregnancies prior to this time frame are not included. Studies suggest that approximately 40% of unintended pregnancies end in abortion (Finer & Zolna, 2016), and the association between ACEs and unintended pregnancies may have been even stronger if our ACEs screening occurred earlier in pregnancy and we were able to capture data on women who chose to terminate their pregnancies. Further research is needed to better understand the relationship between ACEs and mistimed vs. unwanted pregnancy, as well as termination of pregnancy. Learning about this could inform more effective public health strategies to reduce both unplanned pregnancy and pregnancy termination.

Limitations and Strengths

The study was conducted in two KPNC medical centers and was limited to English-speaking patients aged 18 and older who were seeking prenatal care. Findings may overrepresent women with wanted pregnancies and may not generalize to all pregnant patients. Self-reported ACEs and pregnancy intentions are subject to self-report biases, and we did not have detailed information about each ACE (e.g., severity, frequency, age, or duration of exposure). Future longitudinal studies with larger samples that assess pregnancy intentions earlier in pregnancy and include more detailed information about ACEs and other factors that may influence pregnancy intentions (e.g., reproductive coercion, relationship instability, intimate partner violence, mood and anxiety disorders, and medical problems) will be important to better understand how ACEs impact pregnancy intentions. Finally, it is important to note that while pregnancy intentions are useful for understanding women's pregnancy preferences, the construct of pregnancy intentions may not be relevant for all women (Borrero et al., 2015; Lundsberg, Peglow, Qasba, Yonkers, & Garipey, 2018). Some women are ambivalent or indifferent about becoming pregnant, the strength and intentions can fluctuate over time, and intentions do not fully capture women's emotional responses to their pregnancies, which can be positive or negative regardless of pregnancy intention (Aiken, Borrero, Callegari, & Dehlendorf, 2016; Manze, Watnick, & Romero, 2019).

Strengths of this study include use of a large, diverse sample of women universally screened for ACEs and pregnancy intentions during standard prenatal care; differentiation of unwanted pregnancy versus mistimed pregnancy; a focus on both ACE count and individual ACEs; and contemporary data in the age of increasing use of long-acting contraceptives and declining rates of unintended pregnancies.

Implications for Practice and/or Policy

Given that our study found ACEs were associated with increased odds of having an unwanted pregnancy, healthcare organizations have an important opportunity to offer support during prenatal care for pregnant women who have experienced ACEs. The psychosocial burden of continuing an unwanted pregnancy in the context of ACEs may be quite high. Due to these factors alone, women may experience many other negative thoughts and feelings as they prepare to parent the new child. Prenatal care is an ideal setting for providing emotional and behavioral health support to help women deal with these complex psychosocial issues. Prenatal care that incorporates empowering conversations that recognize past trauma while simultaneously fostering resilience and maternal-infant attachment could help support healthy parenting and potentially interrupt the intergenerational cycle of ACEs. Additional referral services to mental health, counseling, and educational classes could also be beneficial for these women. Our finding that unwanted pregnancies were elevated among women who reported childhood loss of a parent or childhood neglect suggests using an identified version of the ACEs screening tool (rather than just a total score) may allow clinicians to recognize and respond to specific risks factors (e.g., neglect) that are associated with an increased likelihood of having an unintended pregnancy. Additional research is needed to better understand the mechanisms through which ACEs are associated with risk for having an unwanted pregnancy and how to most effectively use this information in clinical practice.

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References

- Agrati D, Browne D, Jonas W, Meaney M, Atkinson L, Steiner M, et al. (2015). Maternal anxiety from pregnancy to 2 years postpartum: transactional patterns of maternal early adversity and child temperament. *Archives of Women's Mental Health*, 18, 693–705.
- Aiken AR, Borrero S, Callegari LS, & Dehlendorf C (2016). Rethinking the pregnancy planning paradigm: Unintended conceptions or unrepresentative concepts? *Perspectives on Sexual and Reproductive Health*, 48, 147–151. [PubMed: 27513444]
- Anda RF, Brown DW, Felitti VJ, Dube SR, & Giles WH (2008). Adverse childhood experiences and prescription drug use in a cohort study of adult HMO patients. *BMC Public Health*, 8, 198. [PubMed: 18533034]
- Anda RF, Chapman DP, Felitti VJ, Edwards V, Williamson DF, Croft JB, et al. (2002). Adverse Childhood Experiences and Risk of Paternity in Teen Pregnancy. *Obstetrics and Gynecology*, 100, 37–45. [PubMed: 12100801]
- Anda RF, Felitti VJ, Bremner JD, Walker JD, Whitfield C, Perry BD, et al. (2006). The enduring effects of abuse and related adverse experiences in childhood. A convergence of evidence from neurobiology and epidemiology. *European Archives of Psychiatry and Clinical Neuroscience*, 256, 174–186. [PubMed: 16311898]
- Angerud K, Annerback EM, Tyden T, Boddeti S, & Kristiansson P (2018). Adverse childhood experiences and depressive symptomatology among pregnant women. *Acta Obstetrica et Gynecologica Scandinavica*, 97, 701–708. [PubMed: 29431859]
- Bellis MA, Hughes K, Leckenby N, Perkins C, & Lowey H (2014). National household survey of adverse childhood experiences and their relationship with resilience to health-harming behaviors in England. *BMC Medicine*, 12, 72. [PubMed: 24886026]
- Bellis MA, Lowey H, Leckenby N, Hughes K, & Harrison D (2014). Adverse childhood experiences: retrospective study to determine their impact on adult health behaviours and health outcomes in a UK population. *Journal of Public Health*, 36, 81–91. [PubMed: 23587573]
- Borrero S, Nikolajski C, Steinberg JR, Freedman L, Akers AY, Ibrahim S, et al. (2015). “It just happens”: a qualitative study exploring low-income women’s perspectives on pregnancy intention and planning. *Contraception*, 91, 150–156. [PubMed: 25477272]
- Brown DW, Anda RF, Tiemeier H, Felitti VJ, Edwards VJ, Croft JB, et al. (2009). Adverse childhood experiences and the risk of premature mortality. *American Journal of Preventive Medicine*, 37, 389–396. [PubMed: 19840693]
- Buist A, Gotman N, & Yonkers KA (2011). Generalized anxiety disorder: course and risk factors in pregnancy. *Journal of Affective Disorders*, 131, 277–283. [PubMed: 21269708]
- Centers for Disease Control and Prevention. (2019a). Adverse Childhood Experiences (ACEs). Retrieved December 4, 2019, from <https://www.cdc.gov/violenceprevention/acestudy/index.html>.
- Centers for Disease Control and Prevention. (2019b). Behavioral Risk Factor Surveillance System Survey ACE Data, 2009–2014. Atlanta, GA. Retrieved December 4, 2019, from https://www.cdc.gov/violenceprevention/acestudy/ace_brfss.html.
- Chapman DP, Whitfield CL, Felitti VJ, Dube SR, Edwards VJ, & Anda RF (2004). Adverse childhood experiences and the risk of depressive disorders in adulthood. *Journal of Affective Disorders*, 82, 217–225. [PubMed: 15488250]

- Chung EK, Mathew L, Elo IT, Coyne JC, & Culhane JF (2008). Depressive symptoms in disadvantaged women receiving prenatal care: the influence of adverse and positive childhood experiences. *Ambulatory Pediatrics*, 8, 109–116. [PubMed: 18355740]
- Chung EK, Nurmohamed L, Mathew L, Elo IT, Coyne JC, & Culhane JF (2010). Risky health behaviors among mothers-to-be: the impact of adverse childhood experiences. *Academic Pediatrics*, 10, 245–251. [PubMed: 20599179]
- Cuijpers P, Smit F, Unger F, Stikkelbroek Y, Ten Have M, & de Graaf R (2011). The disease burden of childhood adversities in adults: a population-based study. *Child Abuse and Neglect*, 35, 937–945. [PubMed: 22099144]
- D'Angelo DV, Gilbert BC, Rochat RW, Santelli JS, & Herold JM (2004). Differences between mistimed and unwanted pregnancies among women who have live births. *Perspectives on Sexual and Reproductive Health*, 36, 192–197. [PubMed: 15519961]
- Dietz PM, Spitz AM, Anda RF, Williamson DF, McMahon PM, Santelli JS, et al. (1999). Unintended pregnancy among adult women exposed to abuse or household dysfunction during their childhood. *JAMA*, 282, 1359–1364. [PubMed: 10527183]
- Dube SR, Anda RF, Felitti VJ, Chapman DP, Williamson DF, & Giles WH (2001). Childhood abuse, household dysfunction, and the risk of attempted suicide throughout the life span: findings from the Adverse Childhood Experiences Study. *JAMA*, 286, 3089–3096. [PubMed: 11754674]
- Dube SR, Anda RF, Felitti VJ, Edwards VJ, & Croft JB (2002). Adverse childhood experiences and personal alcohol abuse as an adult. *Addictive Behaviors*, 27, 713–725. [PubMed: 12201379]
- Dube SR, Felitti VJ, Dong M, Chapman DP, Giles WH, & Anda RF (2003). Childhood abuse, neglect, and household dysfunction and the risk of illicit drug use: The adverse childhood experiences study. *Pediatrics*, 111, 564–572. [PubMed: 12612237]
- Farber EW, Herbert SE, & Reviere SL (1996). Childhood abuse and suicidality in obstetrics patients in a hospital-based urban prenatal clinic. *General Hospital Psychiatry*, 18, 56–60. [PubMed: 8666214]
- Felitti VJ, Anda RF, Nordenberg D, Williamson DF, Spitz AM, Edwards V, et al. (1998). Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults. The Adverse Childhood Experiences (ACE) Study. *American Journal of Preventive Medicine*, 14, 245–258. [PubMed: 9635069]
- Finer LB, & Henshaw SK (2006). Disparities in rates of unintended pregnancy in the United States, 1994 and 2001. *Perspectives on Sexual and Reproductive Health*, 38, 90–96. [PubMed: 16772190]
- Finer LB, & Zolna MR (2016). Declines in unintended pregnancy in the United States, 2008–2011. *New England Journal of Medicine*, 374, 843–852.
- Flanagan T, Alabaster A, McCaw B, Stoller N, Watson C, & Young-Wolff KC (2018). Feasibility and acceptability of screening for Adverse Childhood Experiences in prenatal care. *Journal of Women's Health*, 27, 903–911.
- Frankenberger DJ, Clements-Nolle K, & Yang W (2015). The association between adverse childhood experiences and alcohol use during pregnancy in a representative sample of adult women. *Women's Health Issues*, 25, 688–695. [PubMed: 26227209]
- Gipson JD, Koenig MA, & Hindin MJ (2008). The effects of unintended pregnancy on infant, child, and parental health: a review of the literature. *Studies in Family Planning*, 39, 18–38. [PubMed: 18540521]
- Gordon N, Lin T (2016). The Kaiser Permanente Northern California Adult Member Health Survey. *The Permanente Journal*, 20(4), 15–225
- Hall JA, Barrett G, Copas A, Phiri T, Malata A, & Stephenson J (2018). Reassessing pregnancy intention and its relation to maternal, perinatal and neonatal outcomes in a low-income setting: A cohort study. *PLoS One*, 13, e0205487. [PubMed: 30335769]
- Hall KS, Beauregard JL, Rentmeester ST, Livingston M, & Harris KM (2019). Adverse life experiences and risk of unintended pregnancy in adolescence and early adulthood: Implications for toxic stress and reproductive health. *SSM Population Health*, 7, 100344. [PubMed: 30623016]
- Hillis SD, Anda RF, Dube SR, Felitti VJ, Marchbanks PA, Macaluso M, et al. (2010). The protective effect of family strengths in childhood against adolescent pregnancy and its long-term psychosocial consequences. *The Permanente Journal*, 14, 18–27.

- Hillis SD, Anda RF, Dube SR, Felitti VJ, Marchbanks PA, & Marks JS (2004). The association between adverse childhood experiences and adolescent pregnancy, long-term psychosocial consequences, and fetal death. *Pediatrics*, 113, 320–327. [PubMed: 14754944]
- Hillis SD, Anda RF, Felitti VJ, & Marchbanks PA (2001). Adverse childhood experiences and sexual risk behaviors in women: a retrospective cohort study. *Family Planning Perspectives*, 33, 206–211. [PubMed: 11589541]
- Hillis SD, Anda RF, Felitti VJ, Nordenberg D, & Marchbanks PA (2000). Adverse childhood experiences and sexually transmitted diseases in men and women: a retrospective study. *Pediatrics*, 106, E11. [PubMed: 10878180]
- Joyce T, Kaestner R, & Korenman S (2000). The stability of pregnancy intentions and pregnancy-related maternal behaviors. *Maternal and Child Health Journal*, 4, 171–178. [PubMed: 11097504]
- Kavanaugh ML, & Jerman J (2018). Contraceptive method use in the United States: trends and characteristics between 2008, 2012 and 2014. *Contraception*, 97, 14–21. [PubMed: 29038071]
- Kost K, Landry DJ, & Darroch JE (1998). The effects of pregnancy planning status on birth outcomes and infant care. *Family Planning Perspectives*, 30, 223–230. [PubMed: 9782045]
- Leeners B, Rath W, Block E, Gorres G, & Tschudin S (2014). Risk factors for unfavorable pregnancy outcome in women with adverse childhood experiences. *Journal of Perinatal Medicine*, 42, 171–178. [PubMed: 24334452]
- Lundsberg LS, Peglow S, Qasba N, Yonkers KA, & Garipey AM (2018). Is preconception substance use associated with unplanned or poorly timed pregnancy? *Journal of Addiction Medicine*, 12, 321–328. [PubMed: 29570477]
- Madigan S, Wade M, Plamondon A, Maguire JL, & Jenkins JM (2017). Maternal adverse childhood experience and infant health: Biomedical and psychosocial risks as intermediary mechanisms. *Journal of Pediatrics*, 187, 282–289 e281.
- Manze MG, Watnick D, & Romero D (2019). A qualitative assessment of perspectives on getting pregnant: the Social Position and Family Formation study. *Reproductive Health*, 16, 135. [PubMed: 31488161]
- McDonnell CG, & Valentino K (2016). Intergenerational effects of childhood trauma: Evaluating pathways among maternal ACEs, perinatal depressive symptoms, and infant outcomes. *Child Maltreatment*, 21, 317–326. [PubMed: 27457410]
- Nelson DB, Uscher-Pines L, Staples SR, & Grisso JA (2010). Childhood violence and behavioral effects among urban pregnant women. *J. Womens Health (Larchmt)*, 19, 1177–1183. [PubMed: 20392141]
- Olsen JM (2018). Integrative review of pregnancy health risks and outcomes associated with Adverse Childhood Experiences. *Journal of Obstetric, Gynecologic, and Neonatal Nursing*, 47, 783–794.
- Piccinino LJ, & Peterson LS (1999). Ambivalent attitudes and unintended pregnancy. In Severy LJ & Miller WB (Eds.), *Advances in population: psychosocial perspectives*, Vol. 3 (pp. 227–249). London: Jessica Kinglsey Publishers.
- Santelli J, RoCHAT R, Hatfield-Timajchy K, Gilbert BC, Curtis K, Cabral R, et al. (2003). The measurement and meaning of unintended pregnancy. *Perspectives on Sexual and Reproductive Health*, 35, 94–101. [PubMed: 12729139]
- Terhune C (2013). Report: Kaiser tops state health insurance market with 40% share. *Los Angeles Times*. Retrieved June 9, 2020, from <http://articles.latimes.com/2013/jan/29/business/la-fi-mo-health-insure-market-20130129>.

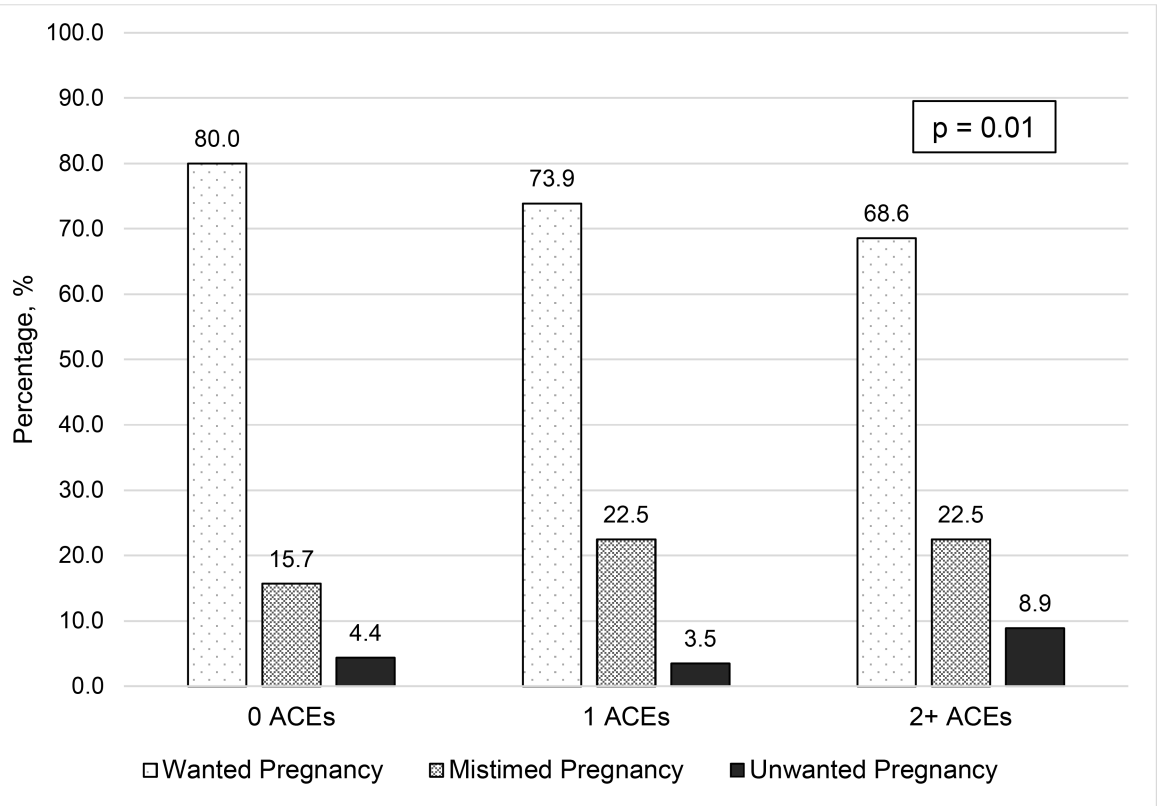


Figure 1.
 Pregnancy Intentions by ACE Score (N = 745)
 Chi-square p-value significant at 0.01.

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Table 1. Unadjusted Prevalence of Socio-Demographic and Clinical Characteristics among Pregnant Women, by Pregnancy Intentions (N = 745)

Characteristic	Pregnancy Intentions				p-value
	Overall	Wanted Pregnancy N = 568 (76.2%)	Mistimed Pregnancy N = 138 (18.5%)	Unwanted Pregnancy N = 39 (5.2%)	
	N (%)	N (%)	N (%)	N (%)	
Age					
18–25	84 (11.3)	42 (7.4)	34 (24.6)	8 (20.5)	<0.01
26–35	489 (65.6)	393 (69.2)	80 (58.0)	16 (41.0)	
36+	172 (23.1)	133 (23.4)	24 (17.4)	15 (38.5)	
Race/Ethnicity					
Non-Hispanic White	325 (43.6)	125 (22.0)	19 (13.8)	4 (10.3)	<0.01
Asian/Pacific Islander	148 (19.9)	45 (7.9)	23 (16.7)	4 (10.3)	
Black	72 (9.7)	113 (19.9)	32 (23.2)	17 (43.6)	
Hispanic	162 (21.7)	29 (5.1)	7 (5.1)	2 (5.1)	
Other/Unknown	38 (5.1)	256 (45.1)	57 (41.3)	12 (30.8)	
Median Neighborhood Household Income					
< \$100,000	389 (52.4)	293 (51.8)	77 (55.8)	19 (48.7)	0.62
\$100,000	354 (47.6)	273 (48.2)	61 (44.2)	20 (51.3)	
Lives with Partner/Baby's Father					
Yes	685 (92.6)	545 (96.8)	110 (79.7)	30 (76.9)	<0.01
No	55 (7.4)	18 (3.2)	28 (20.3)	9 (23.1)	
Parity					
0	283 (38.0)	220 (38.7)	58 (42.0)	5 (12.8)	<0.01
1+	462 (62.0)	348 (61.3)	80 (58.0)	34 (87.2)	
Insurance Status					
Medicaid	65 (8.9)	37 (6.6)	19 (14.4)	9 (23.1)	<0.01
Other	665 (91.1)	522 (93.4)	113 (85.6)	30 (76.9)	

Pregnancy Intentions					
Characteristic	Overall	Wanted Pregnancy N = 568 (76.2%)	Mistimed Pregnancy N = 138 (18.5%)	Unwanted Pregnancy N = 39 (5.2%)	p-value
	N (%)	N (%)	N (%)	N (%)	
<i>Any Nicotine Use in Year Prior to Pregnancy</i>					
Yes	57 (7.8)	33 (5.9)	20 (15.0)	4 (10.3)	<0.01
No	671 (92.2)	523 (94.1)	113 (85.0)	35 (89.7)	
<i>Any Cannabis Use in Year Prior to Pregnancy</i>					
Yes	88 (12.1)	49 (8.8)	35 (25.9)	4 (10.3)	<0.01
No	641 (87.9)	506 (91.2)	100 (74.1)	35 (89.7)	
<i>At Least Weekly Alcohol Use in Year Prior to Pregnancy</i>					
Yes	147 (20.3)	115 (20.8)	27 (20.0)	5 (12.8)	0.48
No	579 (79.8)	437 (79.2)	108 (80.0)	34 (87.2)	

All p-values computed using chi-square test.

Table 2.

Prevalence of Individual ACEs among Pregnant Women (N = 745)

	Pregnancy Intentions				p-value
	Overall	Wanted Pregnancy N = 568 (76.2%)	Mistimed Pregnancy N = 138 (18.5%)	Unwanted Pregnancy N = 39 (5.2%)	
	%	%	%	%	%
Individual ACEs Prior to Age 18					
<i>Family Dysfunction</i>					
1. Did you live with anyone who had a problem with drinking or using drugs, including prescription medications?	26.1	24.1	30.4	38.5	0.06
2. Did you live with anyone who was depressed, mentally ill or attempted suicide?	15.0	14.3	17.4	18.0	0.57
3. Did you live with anyone who went to jail or prison?	13.7	12.9	16.7	15.4	0.48
4. Did your parents or adults in your home ever hit, punch, beat, or threaten to harm each other?	8.2	7.2	10.1	15.4	0.13
	8.5	7.6	10.9	12.8	0.28
<i>Loss of Parent</i>					
5. Did you lose a parent through divorce, abandonment, death or other reason?	22.6	19.9	30.4	33.3	<0.01
<i>Emotional Abuse</i>					
6. Did a parent or adult in your home ever swear at you, insult you, or put you down?	14.6	13.6	16.7	23.1	0.20
<i>Physical Abuse</i>					
7. Not including spanking, did a parent or adult in your home ever hit, beat, kick, or physically hurt you in any way?	5.6	4.9	6.5	12.8	0.10
<i>Sexual Abuse</i>					
8. Did you experience unwanted sexual contact (such as fondling, or oral/anal/vaginal intercourse/penetration)?	7.7	6.7	10.1	12.8	0.18
<i>Neglect</i>					
9. Did you feel that no one in your family loved you or thought you were special?	3.8	3.2	3.6	12.8	<0.01
10. Did you feel that you didn't have enough to eat, had to wear dirty clothes, or had no one to protect or take care of you?	2.8	2.1	3.6	10.3	<0.01*
	1.9	1.6	2.2	5.1	0.03*
Number of ACEs	%	%	%	%	%
0	58.3	61.1	49.3	48.7	0.01

Pregnancy Intentions					
	Overall	Wanted Pregnancy N = 568 (76.2%)	Mistimed Pregnancy N = 138 (18.5%)	Unwanted Pregnancy N = 39 (5.2%)	p-value
1	19.1	18.5	23.2	12.8	
2+	22.7	20.4	27.5	38.5	

All p-values computed using chi-square test unless indicated otherwise.

* Fisher's exact test was used to calculate p-value.

Table 3. Adjusted Odds Ratio (OR) Estimates for ACEs and Pregnancy Intentions among Pregnant Women (N = 745)

	Unwanted Versus Wanted Pregnancy		Mistimed Versus Wanted Pregnancy	
	OR (95% CI)	p-value	OR (95% CI)	p-value
Number of ACEs				
0	Reference		Reference	
1	0.66 (0.22–1.96)	0.46	1.37 (0.80–2.34)	0.24
2+	2.60 (1.19–5.68)	0.02	1.42 (0.85–2.37)	0.19
ACE Category				
Loss of Parent	2.20 (1.03–4.71)	0.04	1.61 (1.00–2.59)	0.05
Family Dysfunction	1.86 (0.88–3.90)	0.10	1.23 (0.77–1.96)	0.39
Emotional Abuse	2.24 (0.93–5.37)	0.07	1.27 (0.71–2.27)	0.42
Physical Abuse	3.17 (1.00–10.07)	0.05	1.69 (0.71–3.98)	0.23
Sexual Abuse	2.02 (0.67–6.07)	0.21	1.27 (0.62–2.61)	0.51
Neglect	5.67 (1.72–18.72)	<0.01	1.34 (0.43–4.17)	0.62

Separate models were run for number of ACEs and each type of ACE category with pregnancy intentions as the outcome. All analyses adjusted for age, race, parity, use of cannabis in the year prior to pregnancy, use of nicotine in the year prior to pregnancy, Medicaid status, and living situation.