# Disparities in the Prevalence of Suicidal Ideation According to Oral Contraceptive Pill use among US Women: A cross-sectional study

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**Abstract**

**Background and Aims**

The relationship between oral contraceptive pill (OCP) and suicidal ideation remains unclear. This study aims to estimate the prevalence of suicidal ideation among US women and evaluate their associates overall and according to OCP use status.

**Methods**

Data from the National Health and Nutrition Examination Survey (NHANES) 2005-2012 were used to calculate the prevalence and associates of suicidal ideation in women using OCP. Suicidal ideation was assessed using the Patient Health Questionnaire-9. Overall and OCP-specific weighted prevalence of suicidal ideation were estimated. Multivariable logistic regressions were used to investigate overall and OCP-specific associates.

**Results**

The prevalence of suicidal ideation was 3.6% with no evident disparity between OCP groups, suggesting that OCP use is not associated with increased prevalence of suicidal ideation. Smoking was inversely associated with suicidal ideation in the former users of OCP, while history of diabetes, and thyroid problems appeared to be inversely associated with suicidal ideation in current users of OCP. In the overall population, the prevalence of suicidal ideation was greater in those who were: Black or Hispanic, smoking, taking antidepressants, those with lower educational attainment, and women with low and middle income.

**Conclusion**

Our findings suggest that OCP use was not associated with increased prevalence of suicidal ideation. Unique associates were identified among different OCP groups.

**Key words**

Suicidal Ideation, Mental Health Problems, Women, NHANES, Oral Contraceptive Pill, OCP

**Introduction**

Suicide is the deliberate act of taking one’s own life. Beyond suicides, many people display suicidal thoughts and behaviours. Suicidal thoughts are termed ‘suicidal ideation’ and include thinking about or considering suicide (Crosby, Ortega, and Melanson, 2011) whereas suicidal behaviours include non-fatal attempts at suicide. In the USA in 2021, it was estimated that 0.7% (approximately 1.7 million) of individuals aged 18 or older made at least one suicide attempt. Importantly, adult females reported a suicide attempt 1.33 times as often as males (American Foundation for Suicide, 2023).

A prior suicide attempt is the single most important risk factor for suicide in the general population, and suicidal ideation typically precedes a suicide attempt (WHO, 2023). Suicide attempts can result in negative consequences such as injury, hospitalisation and loss of independence, while they can also impose a significant financial burden on society (Klonsky, May, and Saffer, 2016). Therefore, it is crucial to recognise risk factors of suicidal ideation and suicide attempts particularly among US females to inform targeted preventive strategies.

One potentially important but understudied risk factor of suicidal ideation among US females is oral contraceptive pill (OCP) use. OCP is a common form of hormonal contraception for females aged 15 to 49 years in the US (CDC, 2019). The most commonly prescribed OCP is the combined oestrogen and progesterone pill (CDC, 2023). OCP use is plausibly associated with suicidal ideation owing to OCP use potentially altering brain function and, indeed, negative mood changes and depression are commonly reported in females taking OCP (Mu and Kulkarni, 2022). The literature on the relationship between OCP use and suicidality is scarce, inconsistent, and to the best of the authors knowledge no literature has investigated the association between OCP use and suicidal ideation per se. Previous studies were carried out over a decade ago and have mainly used samples of British females, (n= ∼17 000 to 167 000), all found a non-significant increase in the risk of suicide completion among the OCP users (Beral et al., 1999; Colditz, 1994; Hannaford et al., 2010; Vessey et al., 1989). In a more recent study utilizing a US cohort a positive association between OCP and death by suicide was observed (Charlton et al., 2014), finally using Danish registry-based data with approximately 500,000 participants a positive association was observed between contraceptive use and suicide attempts and completions. Interestingly, women aged 15–19 years were at higher risk than those aged 20 or older, suggesting that age may have a moderating effect in the association (Skovlund et al., 2018).

The present literature has yet to investigate the association between OCP use and suicidal ideation. Moreover, other than age the present literature has yet to investigate how the association between OCP use and suicidality is moderated by socio-demographic and behavioural factors. Such an investigation is important as the findings would allow for target intervention and/or policy. Given this background the focus of this study was to explore the cross-sectional association between OCP use and suicidal ideation, in adult women in the USA, while considering the potential interaction in the relationship via several socio-demographic and behavioral factors.

**Materials and methods**

**Data source**

The National Health and Nutrition Examination Survey (NHANES) is a program of studies conducted by the US National Center for Health Statistics (NCHS), which is a part of the Center for Disease Control and Prevention (CDC) (Curtin et al., 2012). NHANES is a series of cross-sectional surveys that aim to evaluate the health and nutritional status of the civilian noninstitutionalized US population. The NHANES sampling strategy is complex, and further information on the multistage sampling design is available elsewhere (CDC, 2022).

### Study population

The present study used NHANES data from 2005 to 2012. We chose these years based on the availability of the Patient Health Questionnaire (PHQ-9) which is used to diagnose the severity of depression and also screens for suicidal ideation. The research sample included women, aged 18–55 years who provided data pertaining to suicidal ideation and OCP use. After applying the exclusion criteria (i.e., pregnant women, women without data on OCP use and PHQ-9), the final sample included 6,239 women aged 18-55 years. The selection of the population for inclusion in the present study has been illustrated previously (refer to Figure 1 in Gawronska et al., 2023).

**Suicidal ideation**

We assess suicidal ideation using Item #9 of the PHQ-9, a valid instrument for screening the severity of depression in the past 2 weeks. Item #9 inquiries about the presence of suicidal ideation (‘thoughts that you would be better off dead or of hurting yourself in some way’). Item #9 is a single screening question on suicide risk that is scored as “0” (not at all), “1” (several days), “2” (more than half the days), and “3” (nearly every day). Women who scored one or higher on this item were defined as experiencing suicidal ideation (Rossom et al., 2017).

**Explanatory variable**

The main area of interest was the current use of OCP. Women were defined as current users of OCP if they stated using OCP during the data collection. Those who answered ‘no’ to ‘‘ever taken birth control pills?’’ were defined as never users of OCP, and women who answered ‘yes’ but were not current user of OCP were defined as former users of OCP.

**Socio-demographic characteristics and lifestyle behaviors**

To account for potential confounding factors, our models were adjusted for sociodemographic and behavioral covariates, along with antidepressant use and chronic diseases. Data on socio-demographic characteristics and behavioural factors were self-reported, including age, race/ethnicity (non-Hispanic White, non-Hispanic Black, Hispanic, and Other), marital status (never married, widowed/divorced/separated, married/living with a partner), family income-to-poverty ratio (<1.3 [lowest income], 1.3- <3.5 [middle income], ≥3.5 [highest income]), education (less than high school [<14 years of age], high school [14-18 years of age], and above high school [>18 years of age]), smoking status (never, former, and current smokers), BMI was calculated as weight in kilograms divided by height in meters squared (Curtin et al., 2012), age at menarche and number of live birth deliveries. Those who stated not giving birth to a child were categorized as nulliparous. Four chronic conditions were included in the analyses: diabetes, cancer, cardiovascular disease (CVD) and thyroid problems (Grabovac et al., 2020). Chronic diseases were defined if women reported that they were ever told by a health care professional to have CVD, cancer, diabetes, and/or thyroid problems (Yang et al., 2019). Due to NHANES data limitation, it was impossible to determine the type of diabetes and to differentiate between hypothyroidism and hyperthyroidism. Participants were categorized as current users of antidepressants if they reported using the medication in the 30 days preceding the survey interview. However, due to the absence of data on the drug schedule, medication compliance, or the frequency of intake, we were unable to ascertain the specific details of medication intake by women.

### Statistical analyses

Analytic weights were applied as recommended by NHANES analytical guidelines. It is recommended to apply weights when analyzing NHANES data to account for the complex survey design, including oversampling to ensure that the sample is representative of the U.S. civilian noninstitutionalized population (CDC, 2024). We calculated prevalence and 95% confidence intervals (CI) for suicidal ideation, overall and stratified by OCP use status (current users, never users, and former users). Multivariable logistic regression models were used to calculate the association between OCP use and suicidal ideation and to explore OCP use correlates of suicidal ideation. All analyses were adjusted for sociodemographic and lifestyle characteristics. An interaction term was used to investigate if the association between correlates and suicidal ideation differed in OCP use groups (see Table 2). We performed all statistical analyses using SPSS software (version 26, IBM Corp. in Armonk, NY). A two-sided *p* < 0.05 was considered statistically significant.

**Results**

A total of 6,239 women (Weighted N = 67,687,062) aged 18-55 were included in the final data analysis. Of those, 1,742 women reported never using OCP (27.9%), 3,823 reported being former users of OCP (61.3%), and 674 women reported currently using OCP (10.8%). Demographic characteristics have been previously detailed in greater depth (refer to Table 1 in Gawronska et al., 2023).

### Prevalence of suicidal ideation by OCP use

Current users of OCP had a lower prevalence of suicidal ideation (2.1%; 95%CI, 1.0 to 4.5) compared to never users of OCP (4.3%; 95%CI, 3.3 to 5.6) and former users of OCP (3.7%; 95%CI, 3.0 to 4.5) (Table 1). The prevalence of suicidal ideation was not significantly different between OCP use groups (Table 2).

### Age-stratified prevalence of suicidal ideation by OCP use

The overall prevalence of suicidal ideation in age groups 18-14, 25-34, 35-44 and 45-55 years old was 2.7%, 3.1%, 3.6% and 4.5% respectively. The prevalence differed in OCP use groups from 1.5% in current users of OCP aged 18-24 years old to 6.7% in never users of OCP in 35-44 and 45 - 55 years old groups. Further analyses showed that 18-24 years old never users of OCP (OR, 0.27; 95%CI, 0.96 to 0.76) and 25-34 years old never users of OCP (OR, 0.23; 95%CI, 0.85 to 0.62) were less likely to experience suicidal ideation compared to 45-55 years old never users of OCP after controlling for socioeconomic and lifestyle factors. There were no statistically significant differences in suicidal ideation between age groups in former and current users of OCP (Table 2).

**Overall prevalence of suicidal ideation**

The prevalence of suicidal ideation was higher in women who were Black (OR, 1.78; 95%CI, 1.21 to 2.62), and Hispanic (OR, 2.40; 95%CI, 1.56 to 3.70), women with a low income (OR, 2.71; 95%CI, 1.68 to 4.36), and middle income (OR, 1.98; 95%CI, 1.19 to 3.28), those who only completed primary education (OR, 1.90; 95%CI, 1.25 to 2.87), women who used antidepressants (OR, 2.99; 95%CI, 1.99 to 4.49) and smokers (OR, 1.61; 95%CI, 1.13 to 2.27). The prevalence of suicidal ideation was lower in former smokers (OR, 0.59; 95%CI, 0.35 to 0.97).

**Prevalence of suicidal ideation among OCP groups**

There were disparities between OCP groups in relationships of smoking status (P for interaction = 0.001), history of diabetes (P for interaction = 0.001) and thyroid problems (P for interaction = 0.001). In terms of smoking status, only current smokers (*p* < 0.001) were more likely to report suicidal ideation compared to their non-smoking counterparts in the former user of OCP group and never user of OCP group. Moreover, women with a history of thyroid problems and currently using OCP (*p* < 0.001) had a lower likelihood of having suicidal ideation compared to those without such a history and who are not taking OCP. Similarly, women with a history of diabetes and currently using OCP (*p* < 0.001) had a lower likelihood of having suicidal ideation compared to women not using OCP (Table 2).

There were significant differences in correlates in individual OCP groups. In terms of race/ethnicity, Hispanic (OR, 4.29; 95%CI, 2.15 to 8.55) and Black women (OR, 3.40; 95%CI, 1.63 to 7.08) were more likely to report suicidal ideation compared to White women in the never user of OCP group. Hispanic women were more likely to experience suicidal ideation (OR, 2.22; 95%CI, 1.31 to 3.76) than their White counterparts in the former user of OCP group. There were no differences between OCP groups (P for interaction = 0.999) (Table 2). Women with the low income (OR, 2.84; 95%CI, 1.56 to 5.15) and those with the middle income (OR, 1.99; 95%CI, 1.15 to 3.46) had a higher likelihood of having suicidal ideation compared to those with higher income in the former user of OCP group. There were no differences between OCP groups (P for interaction = 0.693). Regarding education, women who completed only primary education (OR, 2.45; 95%CI, 1.35 to 4.44) and high school education (OR, 1.79; 95%CI, 1.01 to 3.17) had a higher likelihood of experiencing suicidal ideation in comparison to women in higher education in the former user of OCP group. Those with high school education (OR, 0.13; 95%CI, 0.18 to 0.93) were less likely to experience suicidal ideation in comparison to women in the higher education in the current user of OCP group. There were no differences between OCP groups (P for interaction = 0.134). In addition, women taking antidepressants had a higher likelihood of experiencing suicidal ideation compared to women not using antidepressants in the never user of OCP group (OR, 3.25; 95%CI, 1.71 to 6.19) and the former user of OCP (OR, 2.85; 95%CI, 1.73 to 4.70). There were no differences between OCP groups (P for interaction = 0.826). Women with CVD were more likely to report suicidal ideation compared to women without such problems in the current user of OCP group (OR, 9.86; 95CI%, 1.55 to 62.80). There were no differences between OCP groups (P for interaction = 0.052). These significant differences remained after adjusting for socioeconomic and lifestyle factors.

## Discussion

In the present study, which encompassed a large representative sample of 6,239 US women aged 18-55 years, 3.6% reported experiencing suicidal ideation in the past two weeks with no evident disparity between OCP groups. The highest prevalence of suicidal ideation was observed among those with the lower educational attainment (7.8%). The relationships of correlates with suicidal ideation, such as smoking status, history of diabetes, and history of thyroid problems appeared to differ across OCP groups.

We believe that this is the first study to present national prevalence and correlates of suicidal ideation among US women using OCP. Previous studies focused on suicidality or suicide attempts or completions among OCP users (Beral et al., 1999; Colditz, 1994; Hannaford et al., 2010; Vessey et al., 1989; Charlton et al., 2014; Skovlund et al., 2018; Edwards et al., 2022) and reported various results, from a non-significant increase in the risk of suicide completion among the OCP users (Beral et al., 1999; Colditz, 1994; Hannaford et al., 2010; Vessey et al., 1989) to a positive association between OCP and death by suicide (Charlton et al., 2014), suicidality with those with a history of depression being at higher risk (Jung, Cho, and Kim, 2019), to increased risk of suicidal behaviour among young OCP users (Edwards et al., 2022), and a positive association between contraceptive use and suicide attempts and completions (Skovlund et al., 2018).

The discrepancy in results on the hormonal contraceptive use and suicide risk has been also high-lighted in the recent systematic review (Amarasekera et al., 2020) mainly due to the variation is par-ticipants selection, and lack of control for important confounding variables such as family history of mental health disorders or childhood adversity. Interestingly, only one study found that hormonal contraceptive users were less likely to report a past-year suicide attempt compared to non-users of hormonal contraception (Keyes et al., 2013). The present work supplies latest estimates on the prevalence of suicidal ideation among adult females in the USA, and further examined correlates among OCP users to identify populations at high risk of suicidal ideation.

**Correlates**

The study found that several factors were consistently associated with suicidal ideation in the overall population, including Black race and Hispanic ethnicity, low and middle family poverty ratio, lover educational attainment, smoking, as well as current use of antidepressants, which was similar to previous research (Chin, Lee, and So, 2011; Clarke et al., 2010; Dendup et al., 2020; Simon et al., 2006). The increased risk of suicidal ideation among Black females could be explained by race-based discrimination. In fact, a recent meta-analysis found that racial discrimination has a small but significant effect both on suicidal ideation and on suicide attempts among different ethnic/race monitories, including Black and Hispanic people (Coimbra et al., 2022). Moreover, discrimination was found to be associated with suicidal ideation in Black youth (Assari, Lankarani and Caldwell, 2017). The association between low and middle household income and suicidal ideation as well as lower educational attainment and suicidal ideation may be explained by the fact that both lower educational attainment and lower socioeconomic status result in insufficient quality of medical care and difficulties in accessing such care in US (Caballo et al., 2021). As suicidal ideation is often caused by physical or mental health problems, insufficient health care can intensify suicidal thoughts. In addition, a recent study found that increasing educational attainment reduces the risk of suicidal behavior (Rosoff et al., 2020). Furthermore, the mechanisms underlying the association between smoking and suicidal ideation may be explained by the fact that nicotine in cigarettes disrupts the brain's stress response (Quattrocki et al., 2000), lowers the levels of serotonin (Malone et al., 2003) and monoamine oxidase (Fowler et al., 2003), thereby contributing to negative emotions which make it harder for smokers with suicidal thoughts to quit (Quattrocki et al., 2000). Several studies found that the association between smoking and suicidality could be a consequence of mental disorders as well as alcohol abuse/dependence (Anthony et al., 2000; Schumann et al., 2004). Indeed, our study showed that those women who stopped smoking were significantly less likely to have suicidal thought compared to women who never smoked, this suggests that smoking cessation is associated with improved mood (Taylor et al., 2014) that subsequently can reduce suicidal ideation. In the present study, we also found the association between current antidepressant use and suicidal ideation. Antidepressants are typically prescribed to treat or prevent clinical depression. For women to be prescribed antidepressant medication, they must experience moderate to severe symptoms of depression and suicidal ideation can be one of these symptoms. Therefore, it is possible that women in our study who were taking antidepressant medications were also suffering from depression or other mental health problems. However, recent literature shows that there is a significantly higher risk of suicide attempt in the first week of antidepressant treatment than in subsequent weeks and the risk of suicide death is fairly constant throughout the first 6 months of antidepressants use (Simon et al., 2006). A recent systematic review and meta-analysis found that antidepressants double the occurrence of events in healthy adults that can lead to suicide (Bielefeldt, Danborg and Gøtzsche, 2016). This suggests that it is likely that antidepressants increase suicides at all ages.

**Correlates among different OCP groups**

The present study observed disparities in suicidal ideation among OCP groups. Current smokers were more likely to experience suicidal ideation in the former users of the OCP group. There was no association between current smoking and suicidal ideation in the current OCP group and the non-users of OCP. Women may stop using OCP due to experiencing depressive symptoms or other health concerns. However, due to the cross-sectional nature of this study, we could not control for survival bias. In fact, women who suffer from symptoms of depression at the beginning of OCP use are approximately half as likely to continue OCP use at six months compared to women without depressed mood (Westhoff et al., 2007; Sanders et al., 2001; Rosenberg and Waugh, 1998; Hall et al., 2012). Thus, those who stopped using OCP due to adverse response to it may be at increased risk for suicidal ideation. This could explain why they were also smoking as smoking can be considered as a contributing factor for suicidal ideation and suicide (Poorolajal and Darvish, 2016). Interestingly, women with a history of thyroid problem and currently using OCP have a lower likelihood of having suicidal ideation compared to those without such a history and who are not taking OCP. Similarly, women with a history of diabetes and currently using OCP reported lower risk of experiencing suicidal ideation in comparison to those without such a history and who are not taking OCP. The reason behind these findings is elusive and further research of a qualitative nature is required to elucidate such associations. However, it can be speculated that women with long-term chronic health conditions such as thyroid problems or diabetes spend a greater amount of time with medical professionals, it may be that common mental health complications such as depressive symptoms, which can increase one’s risk of suicidal ideation (Jahn et al., 2011), are identified and treated before suicidal ideation onset.

**Strengths and Limitations**

The strengths of this work included the utilization of nationally representative samples of US women aged 18-55 years, the investigation into prevalence in overall and each OCP user group, as well as the exploration of several sociodemographic and lifestyle factors in overall and each OCP group. However, this study has to be seen in light of some limitations. First, while we were able to control numerous confounding variables, the cross-sectional nature of the study precludes any temporal relationship between onset of suicidal ideation and OCP use. Second the PHQ-9 is a diagnostic tool intended to screen adults for presence of depression and evaluate its severity, not to assess suicidal ideation. Despite the limited measure of suicidal ideation, item 9 of the PHQ-9 can be a strong predictor of suicide attempt (Simon et al., 2013). Third, the focus of this paper was to analyse the prevalence of suicidal ideation among OCP users aged 19-55 years. Both the American College of Obstetricians and Gynecologists and the North American Menopause Society recommend that women continue contraceptive use until menopause or age 50–55 years as spontaneous pregnancies can occur among women aged >44 years (Hillard et al., 2007; Shifren and Gass, 2014). Due to the age limit of 55 years, there is a risk of sampling bias as we potentially omitted the risk of suicide ideation in women above 55 years of age. In addition, NHANES does not provide data on previous psychiatric morbidity which is an important confounder that is likely to be unevenly distributed among OCP users and nonusers. Lastly, the covariates used in this study were self-reported, which may be subject to recall bias or social desirability bias.

**Conclusion**

In conclusion, notwithstanding the limitations of the study measurement, the present study contributes valuable insights into the prevalence and correlates of suicidal ideation among US female. Future research should investigate the correlates associated with suicidal ideation among former users of OCP, and current users of OCP to better inform effective interventions. These findings are important in suicide prevention considering that suicidal ideation almost always precedes suicide attempts and completion (Robins et al., 1959; Crosby et al., 2002; De Leo et al., 2005).

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**Credit authorship contribution statement**

JG, LS, CC, and RW participated in the design, investigation, data analysis, writing of the manuscript, evaluation of the study and contributed to critical revision. DK, MR and JM contributed to critical revision.

**Ethics statement**

We did not seek ethical approval for this study as NHANES data is publicly available.

All participants are required to provide written informed consent to participate in the NHANES study.

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**Consent for publication**

All authors have read and approved the final version of the manuscript. JG had full access to all of the data in this study and takes complete responsibility for the integrity of the data and the accuracy of the data analysis.

**Transparency statement**

JG affirms that this manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

**Declaration of competing interest**

The authors declared that they had no conflicts of interest.

**Data** **availability statement**

The data that support the findings of this study are openly available at <https://wwwn.cdc.gov/nchs/nhanes/Default.aspx>. Data can also be available on request from the corresponding author, [JG].

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| **Table 1. Weighted Prevalence of Suicidal Ideation According to Oral Contraceptive Pill Use and Sociodemographic and Lifestyle Factors Among US Women, NHANES 2005-2012** | | | | | |
|  | **No. of Participants (Weighted %)** | **Prevalence of Suicidal Ideation by OCP Use, % (95% CI)** | | | |
|  | **All** | **Never Users** | **Former Users** | **Current Users** |
| Overall | 6239 (100) | 3.6 (3.1 to 4.2) | 4.3 (3.3 to 5.6) | 3.7 (3.0 to 4.5) | 2.1 (1.0 to 4.5) |
| Age group, y |  |  |  |  |  |
| 18-24 | 1415 (17.5) | 2.7 (1.9 to 3.8) | 2.1 (1.3 to 3.5) | 4.1 (2.4 to 6.8) | 1.5 (0.5 to 4.0) |
| 25-34 | 1437 (23.3) | 3.1 (2.0 to 4.7) | 2.0 (0.9 to 4.2) | 3.6 (2.3 to 5.6) | 2.5 (0.6 to 9.3) |
| 35-44 | 1569 (26.5) | 3.6 (2.7 to 4.7) | 6.7 (4.4 to 10.0) | 3.1 (2.2 to 4.4) | 2.0 (0.6 to 7.1) |
| 45-55 | 1818 (32.7) | 4.5 (3.2 to 6.1) | 6.7 (3.9 to 11.2) | 4.0 (2.8 to 5.7) | 3.3 (0.5 to 20.6) |
| Race/ethnicity |  |  |  |  |  |
| Non-Hispanic white | 2531 (65.7) | 2.6 (2.0 to 3.4) | 2.3 (1.2 to 4.3) | 2.9 (2.1 to 3.9) | 1.8 (0.6 to 5.1) |
| Non-Hispanic black | 1463 (13.2) | 4.7 (3.6 to 6.0) | 5.5 (3.4 to 8.6) | 4.2 (2.9 to 6.1) | 6.1 (2.7 to 13.3) |
| Hispanic | 1757 (14.4) | 6.7 (5.4 to 8.3) | 7.3 (5.3 to 10.1) | 6.8 (5.2 to 8.9) | 3.0 (1.1 to 7.7) |
| Other | 488 (6.6) | 4.5 (2.4 to 8.0) | 4.2 (1.6 to 10.3) | 5.4 (2.3 to 12.0) | NA |
| Marital Status |  |  |  |  |  |
| Never married | 1610 (21.5) | 3.0 (2.3 to 4.0) | 3.2 (1.9 to 5.5) | 3.6 (2.6 to 5.0) | 1.5 (0.6 to 3.6) |
| Widowed/Divorced/Separated | 965 (14.7) | 6.0 (4.5 to 8.0) | 6.1 (3.4 to 10.8) | 6.2 (4.4 to 8.6) | 3.4 (1.2 to 9.2) |
| Married/Living with Partner | 3664 (63.8) | 3.2 (2.6 to 4.0) | 4.6 (3.3 to 6.4) | 3.0 (2.3 to 3.9) | 2.4 (0.8 to 6.7) |
| Family poverty ratio |  |  |  |  |  |
| <1.3 | 2588 (28.9) | 6.3 (5.2 to 7.5) | 5.9 (4.3 to 8.1) | 7.0 (5.6 to 8.8) | 3.1 (1.5 to 6.2) |
| 1.3-<3.5 | 1891 (30.2) | 3.8 (2.8 to 5.2) | 3.5 (2.1 to 5.9) | 4.0 (2.8 to 5.5) | 3.3 (0.8 to 13.0) |
| ≥3.5 | 1760 (40.8) | 1.6 (1.0 to 2.4) | 2.7 (1.2 to 6.2) | 1.5 (0.8 to 2.6) | 1.1 (0.3 to 4.3) |
| Education |  |  |  |  |  |
| <High school | 1436 (15.5) | 7.8 (6.0 to 10.0) | 7.5 (5.5 to 10.2) | 8.5 (6.0 to 11.9) | 3.1 (1.2 to 7.5) |
| High school | 1349 (21.0) | 4.2 (3.0 to 5.9) | 3.2 (1.7 to 6.0) | 5.0 (3.4 to 7.5) | 0.5 (0.1 to 4.0) |
| >High school | 3454 (63.5) | 2.4 (1.9 to 3.0) | 3.4 (2.2 to 5.4) | 2.1 (1.5 to 3.1) | 2.3 (1.0 to 5.5) |
| Smoke status |  |  |  |  |  |
| Never | 4127 (61.6) | 3.1 (2.5 to 3.8) | 3.7 (2.6 to 5.1) | 3.0 (2.3 to 3.8) | 2.5 (1.1 to 5.8) |
| Former | 808 (16.5) | 1.9 (1.2 to 3.1) | 3.3 (1.6 to 6.7) | 2.0 (1.2 to 3.5) | NA |
| Current | 1304 (21.9) | 6.3 (4.9 to 8.0) | 7.6 (5.1 to 11.2) | 6.5 (4.9 to 8.5) | 2.2 (0.9 to 5.1) |
| Weight status |  |  |  |  |  |
| <25 kg/m2 | 2216 (38.8) | 3.0 (2.3 to 4.0) | 3.9 (2.5 to 6.1) | 3.1 (2.2 to 4.5) | 1.6 (0.7 to 3.6) |
| 25-<30 kg/m2 | 1704 (27.1) | 3.8 (2.8 to 5.0) | 4.1 (2.4 to 6.9) | 3.8 (2.6 to 5.6) | 2.9 (0.8 to 9.7) |
| ≥30 kg/m2 | 2319 (34.1) | 4.1 (3.4 to 4.9) | 4.9 (3.2 to 7.3) | 4.1 (3.2 to 5.3) | 2.4 (0.7 to 7.6) |
| Current use of antidepressants |  |  |  |  |  |
| No | 5519 (85.1) | 3.0 (2.5 to 3.5) | 3.6 (2.7 to 4.8) | 3.0 (2.4 to 3.7) | 1.9 (0.8 to 4.4) |
| Yes | 720 (14.90) | 7.1 (5.3 to 9.6) | 10.9 (6.8 to 16.9) | 7.0 (4.8 to 10.1) | 3.9 (1.0 to 13.8) |
| Nulliparous |  |  |  |  |  |
| No | 4920 (77.3) | 4.0 (3.4 to 4.8) | 5.2 (3.9 to 7.0) | 3.9 (3.2 to 4.9) | 2.6 (1.3 to 5.1) |
| Yes | 1319 (22.7) | 2.1 (1.4 to 3.1) | 2.4 (1.3 to 4.6) | 2.1 (1.3 to 3.5) | 1.6 (0.4 to 5.5) |
| History of diabetes |  |  |  |  |  |
| No | 5906 (95.5) | 3.5 (3.0 to 4.1) | 4.2 (3.1 to 5.6) | 3.5 (2.9 to 4.3) | 2.2 (1.0 to 4.5) |
| Yes | 333 (4.5) | 6.1 (3.9 to 9.5) | 6.1 (2.8 to 12.6) | 6.5 (3.8 to 10.8) | NA |
| History of CVD |  |  |  |  |  |
| No | 6100 (98.1) | 3.5 (3.0 to 4.1) | 4.2 (3.1 to 5.5) | 3.6 (3.0 to 4.4) | 2.1 (1.0 to 4.4) |
| Yes | 139 (1.9) | 6.9 (4.1 to 11.5) | 10.6 (3.5 to 28.0) | 5.6 (2.9 to 10.6) | 9.8 (1.4 to 44.7) |
| History of cancer |  |  |  |  |  |
| No | 5953 (94.1) | 3.5 (3.0 to 4.0) | 4.0 (3.1 to 5.2) | 3.5 (2.9 to 4.3) | 2.1 (1.0 to 4.6) |
| Yes | 286 (5.9) | 5.8 (3.4 to 9.8) | 11.5 (3.7 to 30.6) | 5.3 (3.0 to 9.3) | 2.0 (0.3 to 14.2) |
| History of thyroid problems |  |  |  |  |  |
| No | 5686 (89.3) | 3.6 (3.1 to 4.2) | 4.5 (3.4 to 5.9) | 3.6 (3.0 to 4.4) | 2.2 (1.1 to 4.7) |
| Yes | 553 (10.7) | 3.3 (2.0 to 5.6) | 2.3 (0.8 to 6.0) | 3.8 (2.1 to 6.7) | NA |
| SE, standard error; y, year; OCP, oral contraceptive pill; m2, square meter; CI, confidence interval; CVD, cardiovascular disease. NA, not applicable due to the limited sample size. | | | | | |

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| **Table 2. Weighted Logistic Regression Models of Suicidal Ideation Among US Women Stratified by Oral Contraceptive Pill Use, Adjusted for Sociodemographic and Lifestyle Characteristics, NHANES 2005- 2012** | | | | | |
|  | **Odds Ratio (95% CI)** |  |  |  |  |
|  | **All** | **Never Users of OCP** | **Former Users of OCP** | **Current Users of OCP** | **P for interaction** |
| OCP use |  | 1 [Reference] | 0.99 (0.71 to 1.39) | 0.95 (0.44 to 2.01) |  |
| Age group, y |  |  |  |  |  |
| 18-24 | 0.58 (0.31 to 1.11) | **0.27 (0.96 to 0.76)** | 0.94 (0.45 to 1.99) | 0.32 (0.36 to 2.74) |  |
| 25-34 | 0.71 (0.38 to 1.30) | **0.23 (0.85 to 0.62)** | 0.94 (0.49 to 1.78) | 0.65 (0.54 to 7.85) | 0.069 |
| 35-44 | 0.70 (0.41 to 1.19) | 0.82 (0.37 to 1.83) | 0.71 (0.39 to 1.27) | 0.35 (0.24 to 5.05) |  |
| 45-55 | 1 [Reference] | 1 [Reference] | 1 [Reference] | 1 [Reference] |  |
| Race/ethnicity |  |  |  |  |  |
| Non-Hispanic white | 1 [Reference] | 1 [Reference] | 1 [Reference] | 1 [Reference] |  |
| Non-Hispanic black | **1.78 (1.21 to 2.62)** | **3.40 (1.63 to 7.08)** | 1.41 (0.86 to 2.31) | 3.44 (0.53 to 22.20) | 0.999 |
| Hispanic | **2.40 (1.56 to 3.70)** | **4.29 (2.15 to 8.55)** | **2.22 (1.31 to 3.76)** | 1.17 (0.17 to 8.17) |  |
| Other | 2.01 (0.93 to 4.37) | 2.43 (0.76 to 7.74) | 2.08 (0.78 to 5.55) | NA |  |
| Marital Status |  |  |  |  |  |
| Never married | 0.88 (0.58 to 1.33) | 1.04 (0.51 to 2.09) | 0.90 (0.54 to 1.48) | 0.54 (0.15 to 1.96) |  |
| Widowed/Divorced/Separated | 1.32 (0.92 to 1.91) | 0.91 (0.47 to 1.77) | 1.49 (0.96 to 2.33) | 0.81 (0.14 to 4.60) | 0.686 |
| Married/Living with Partner | 1 [Reference] | 1 [Reference] | 1 [Reference] | 1 [Reference] |  |
| Family poverty ratio |  |  |  |  |  |
| <1.3 | **2.71 (1.68 to 4.36)** | 1.59 (0.60 to 4.23) | **2.84 (1.56 to 5.15)** | 4.64 (0.92 to 23.32) |  |
| 1.3-<3.5 | **1.98 (1.19 to 3.28)** | 1.17 (0.43 to 3.14) | **1.99 (1.15 to 3.46)** | 5.94 (0.66 to 53.24) | 0.693 |
| ≥3.5 | 1 [Reference] | 1 [Reference] | 1 [Reference] | 1 [Reference] |  |
| Education |  |  |  |  |  |
| <High school | **1.90 (1.25 to 2.87)** | 1.28 (0.76 to 2.17) | **2.45 (1.35 to 4.44)** | 1.19 (0.34 to 4.18) |  |
| High school | 1.32 (0.86 to 2.02) | 0.84 (0.35 to 1.99) | **1.79 (1.01 to 3.17)** | **0.13 (0.18 to 0.93)** | 0.134 |
| >High school | 1 [Reference] | 1 [Reference] | 1 [Reference] | 1 [Reference] |  |
| Smoke status |  |  |  |  |  |
| Never | 1 [Reference] | 1 [Reference] | 1 [Reference] | 1 [Reference] |  |
| Former | **0.59 (0.35 to 0.97)** | 0.80 (0.31 to 2.05) | 0.65 (0.36 to 1.19) | NA | **0.001** |
| Current | **1.61 (1.13 to 2.27)** | 1.67 (0.98 to 2.85) | **1.65 (1.07 to 2.54)** | 1.27 (0.36 to 4.49) |  |
| Weight status |  |  |  |  |  |
| <25 kg/m2 | 0.96 (0.66 to 1.40) | 1.31 (0.55 to 3.08) | 1.03 (0.57 to 1.84) | 0.51 (0.19 to 1.38) |  |
| 25-<30 kg/m2 | 1 [Reference] | 1 [Reference] | 1 [Reference] | 1 [Reference] | 0.729 |
| ≥30 kg/m2 | 1.02 (0.68 to 1.56) | 1.06 (0.50 to 2.22) | 0.96 (0.56 to 1.63) | 0.70 (0.11 to 4.46) |  |
| Current use of antidepressants |  |  |  |  |  |
| No | 1 [Reference] | 1 [Reference] | 1 [Reference] | 1 [Reference] |  |
| Yes | **2.99 (1.99 to 4.49)** | **3.25 (1.71 to 6.19)** | **2.85 (1.73 to 4.70)** | 4.14 (0.94 to 18.34) | 0.826 |
| History of diabetes |  |  |  |  |  |
| No | 1 [Reference] | 1 [Reference] | 1 [Reference] | 1 [Reference] |  |
| Yes | 1.03 (0.55 to 1.92) | 0.69 (0.24 to 2.06) | 1.21 (0.58 to 2.55) | NA | **0.001** |
| History of CVD |  |  |  |  |  |
| No | 1 [Reference] | 1 [Reference] | 1 [Reference] | 1 [Reference] |  |
| Yes | 1.08 (0.59 to 1.99) | 1.71 (0.51 to 5.69) | 0.81 (0.35 to 1.87) | **9.86 (1.55 to 62.80)** | 0.052 |
| History of cancer |  |  |  |  |  |
| No | 1 [Reference] | 1 [Reference] | 1 [Reference] | 1 [Reference] |  |
| Yes | 1.60 (0.88 to 2.92) | 2.49 (0.64 to 9.63) | 1.51 (0.82 to 2.79) | 1.07 (0.82 to 13.95) | 0.755 |
| History of thyroid problems |  |  |  |  |  |
| No | 1 [Reference] | 1 [Reference] | 1 [Reference] | 1 [Reference] |  |
| Yes | 0.84 (0.49 to 1.47) | 0.41 (0.15 to 1.10) | 1.06 (0.56 to 2.00) | NA | **0.001** |
| OCP, oral contraceptive pill; y, year; m2, square meter; CI, confidence interval; CVD, cardiovascular disease. NA, not applicable due to the limited sample size. Bold font indicates statistical significance | | | | | |