

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. 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.

KEYWORDS

mental health problems, NHANES, OCP, oral contraceptive pill, suicidal ideation, women

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1 | INTRODUCTION

Suicide is the deliberate act of taking one's own life. Beyond suicides, many people display suicidal thoughts and behaviors. Suicidal thoughts are termed "suicidal ideation" and include thinking about or considering suicide¹ whereas suicidal behaviors include nonfatal 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.²

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.³ Suicide attempts can result in negative consequences such as injury, hospitalization and loss of independence, while they can also impose a significant financial burden on society.⁴ Therefore, it is crucial to recognize 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 15–49 years in the US.⁵ The most commonly prescribed OCP is the combined estrogen and progesterone pill.⁶ 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.⁷ 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, ($n = \sim 17,000$ to 167,000), all found a nonsignificant increase in the risk of suicide completion among the OCP users.^{8–11} In a more recent study utilizing a US cohort a positive association between OCP and death by suicide was observed,¹² 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.¹³

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 behavioral 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.

2 | MATERIALS AND METHODS

2.1 | 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).¹⁴ 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.¹⁵

2.2 | 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 6239 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.¹⁶).

2.3 | 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.¹⁷

2.4 | 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.

2.5 | Sociodemographic 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 behavioral 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,¹⁴ 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.¹⁸ 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.¹⁹ 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.

2.6 | 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 US civilian noninstitutionalized population.²⁰ 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.). A two-sided $p < 0.05$ was considered statistically significant.

3 | RESULTS

A total of 6,239 women (Weighted $N = 67,687,062$) aged 18–55 were included in the final data analysis. Of those, 1742 women reported never using OCP (27.9%), 3823 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.¹⁶).

3.1 | Prevalence of suicidal ideation by OCP use

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

3.2 | 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, 0.96–0.76) and 25–34 years old never users of OCP (OR, 0.23; 95% CI, 0.85–0.62) 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).

3.3 | Overall prevalence of suicidal ideation

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

3.4 | Prevalence of suicidal ideation among OCP groups

There were disparities between OCP groups in relationships of smoking status (p for interaction = 0.001). In terms of smoking status,

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, year					
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/m ²	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/m ²	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/m ²	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)

TABLE 1 (Continued)

	No. of Participants (Weighted %)	Prevalence of Suicidal Ideation by OCP Use, % (95% CI)			
		All	Never Users	Former Users	Current Users
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

Abbreviations: CI, confidence interval; CVD, cardiovascular disease; m², square meter; NA, not applicable due to the limited sample size; OCP, oral contraceptive pill; SE, standard error; y, year.

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)				p for interaction
	All	Never Users of OCP	Former Users of OCP	Current Users of OCP	
OCP use		1 [Reference]	0.99 (0.71 to 1.39)	0.95 (0.44 to 2.01)	
Age group, year					
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]	

(Continues)

TABLE 2 (Continued)

	Odds Ratio (95% CI)				<i>p</i> for interaction
	All	Never Users of OCP	Former Users of OCP	Current Users of OCP	
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)	0.134
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)	
>High school	1 [Reference]	1 [Reference]	1 [Reference]	1 [Reference]	
Smoke status					
Never	1 [Reference]	1 [Reference]	1 [Reference]	1 [Reference]	0.001
Former	0.59 (0.35 to 0.97)	0.80 (0.31 to 2.05)	0.65 (0.36 to 1.19)	NA	
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/m ²	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)	0.729
25- < 30 kg/m ²	1 [Reference]	1 [Reference]	1 [Reference]	1 [Reference]	
≥30 kg/m ²	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]	0.826
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)	
History of diabetes					
No	1 [Reference]	1 [Reference]	1 [Reference]	1 [Reference]	NA
Yes	1.03 (0.55 to 1.92)	0.69 (0.24 to 2.06)	1.21 (0.58 to 2.55)	NA	
History of CVD					
No	1 [Reference]	1 [Reference]	1 [Reference]	1 [Reference]	0.052
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)	
History of cancer					
No	1 [Reference]	1 [Reference]	1 [Reference]	1 [Reference]	0.755
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)	
History of thyroid problems					
No	1 [Reference]	1 [Reference]	1 [Reference]	1 [Reference]	NA
Yes	0.84 (0.49 to 1.47)	0.41 (0.15 to 1.10)	1.06 (0.56 to 2.00)	NA	

Note: Bold font indicates statistical significance.

Abbreviations: CI, confidence interval; CVD, cardiovascular disease; m2, square meter; NA, not applicable due to the limited sample size; OCP, oral contraceptive pill; y, year.

only current smokers ($p < 0.001$) were more likely to report suicidal ideation compared to their nonsmoking counterparts in the former user of OCP group and never user of OCP group (Table 2).

There were significant differences in correlates in individual OCP groups. In terms of race/ethnicity, Hispanic (OR, 4.29; 95% CI, 2.15–8.55) and Black women (OR, 3.40; 95% CI, 1.63–7.08) 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, 1.31–3.76) than their White counterparts in the former user of OCP group. There were no differences between OCP groups (p for interaction = 0.999). Women

with the low income (OR, 2.84; 95% CI, 1.56–5.15) and those with the middle income (OR, 1.99; 95% CI, 1.15–3.46) 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, 1.35–4.44) and high school education (OR, 1.79; 95% CI, 1.01–3.17) 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, 0.18–0.93) 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, 1.71–6.19) and the former user of OCP (OR, 2.85; 95% CI, 1.73–4.70). 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; 95% CI, 1.55–62.80). There were no differences between OCP groups (p for interaction = 0.052) (Table 2). These significant differences remained after adjusting for socioeconomic and lifestyle factors.

4 | DISCUSSION

In the present study, which encompassed a large representative sample of 6239 US women aged 18–55 years, 3.6% reported experiencing suicidal ideation in the past 2 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 relationship of smoking status with suicidal ideation 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^{8–13,21} and reported various results, from a nonsignificant increase in the risk of suicide completion among the OCP users^{8–11} to a positive association between OCP and death by suicide,¹² suicidality with those with a history of depression being at higher risk,²² to increased risk of suicidal behavior among young OCP users,²¹ and a positive association between contraceptive use and suicide attempts and completions.¹³

The discrepancy in results on the hormonal contraceptive use and suicide risk has been also high-lighted in the recent systematic review²³ mainly due to the variation in participants 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 nonusers of hormonal contraception.²⁴ The present work supplies latest estimates on the prevalence of suicidal ideation among adult females in the United States, and further examined correlates among OCP users to identify populations at high risk of suicidal ideation.

5 | 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, lower

educational attainment, smoking, as well as current use of antidepressants, which was similar to previous research.^{25–28} 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 minorities, including Black and Hispanic people.²⁹ Moreover, discrimination was found to be associated with suicidal ideation in Black youth.³⁰ 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 United States.³¹ 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.³² 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,³³ (Quattrochi et al., 2000), lowers the levels of serotonin³⁴ and monoamine oxidase,³⁵ thereby contributing to negative emotions which make it harder for smokers with suicidal thoughts to quit.³³ (Quattrochi 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.^{36,37} 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 mood³⁸ 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.²⁸ A recent systematic review and meta-analysis found that antidepressants double the occurrence of events in healthy adults that can lead to suicide.³⁹ This suggests that it is likely that antidepressants increase suicides at all ages.

5.1 | 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 6 months compared to women without depressed mood.^{40–43} 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.^{44,45}

6 | 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.⁴⁵ Third, the focus of this paper was to analyze 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.^{46,47} 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.

7 | 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.^{48–50}

AUTHOR CONTRIBUTIONS

Julia Gawronska: Conceptualization; investigation; writing—original draft; methodology; validation; formal analysis; project administration. **Chao Cao:** Conceptualization; investigation; methodology; validation; writing—review and editing. **Ruixuan Wang:** Methodology; writing—review and editing. **Dong Keon:** Writing—review and editing. **Masoud Rahmati:** Writing—review and editing. **Matthew Jewiss:** Writing—review and editing. **Lee Smith:** Conceptualization; investigation; writing—original draft; writing—review and editing; methodology; validation; supervision.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

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

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. All authors have read and approved the final version of the manuscript. J. G. 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

The lead author Julia Gawronska 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.

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