Addiction Research & Theory

ISSN: 1606-6359 (Print) 1476-7392 (Online) Journal homepage: www.tandfonline.com/journals/iart20

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To cite this article: Jasmine G. Warren, Victoria M. Fallon, Laura Goodwin, Suzanne H. Gage & Abigail K. Rose (2026) The menstrual cycle, hormonal contraception and alcohol use across a single cycle, Addiction Research & Theory, 34:2, 152-161, DOI: 10.1080/16066359.2025.2542778

To link to this article: https://doi.org/10.1080/16066359.2025.2542778

Published online: 08 Aug 2025.

ADDICTION RESEARCH & THEORY
2026, VOL. 34, NO. 2, 152–161
https://doi.org/10.1080/16066359.2025.2542778

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RESEARCH ARTICLE

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The menstrual cycle, hormonal contraception and alcohol use across a single cycle

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ABSTRACT

Objective: Existing literature suggests an association between menstrual cycle and alcohol use. The present study investigated the relationship between menstrual cycle phases and hormonal contraception (naturally cycling [NC] and hormonal contraceptive [HC]) and alcohol use, while considering potentially influencing variables using multiple assessments over one cycle.

Methods: 50 females (32 NC and 18 HC) completed a series of online questionnaires over one menstrual cycle.

Results: We found that HC users craved and consumed more alcohol than NC participants. Menstrual cycle phase predicted levels of craving for the NC group. For the NC group, baseline units, craving, and mood predicted consumption; and the predictors of craving were baseline units, mood, phase, and relationship status. In the HC group, there were no predictors of consumption, but craving was predicted by: baseline units, mood, and impulsivity. There were no differences in drinking motives by group or phase.

Conclusions: HC may affect drinking behavior whereas the effect of menstrual phase remains unclear. This has implications for HC use and menstrual awareness for health practices, e.g. for those with alcohol use disorders. Importantly, this study suggests the future direction of research into the topic such as additional methods to explore the association as well how to investigate underlying mechanisms.

ARTICLE HISTORY
Received 4 July 2024
Revised 28 July 2025
Accepted 30 July 2025

KEYWORDS
Menstrual cycle; alcohol; craving; hormonal contraception; stress; impulsivity

Introduction

There are sex-differences in patterns of alcohol use, consequences of drinking, and treatment outcomes, however, the underlying mechanisms of female alcohol use remain unclear (Lynch et al. 2002). Reviews have suggested a role of sex-hormones, including those associated with the female menstrual cycle (Erol and Karpyak 2015; Becker and Koob 2016). This suggests sex-specific therapies are a potential avenue for the treatment of Alcohol Use Disorder (AUD) in females, and these could be informed by evidence concerning the associations between hormones and drinking behavior. The human menstrual cycle sees fluctuations in these ovarian hormones. A typical menstrual cycle is 28 ± 9 days in length (Munro et al. 2017). The cycle has two phases: the Follicular (FP) and the Luteal (LP) which are characterized by different levels of gonadal hormones; see Figure 1. These can be broken down further into a total of four phases: Menstrual (days bleeding, typically days 1–7); Follicular (days from menstrual to ovulation, typically days 8–14); Luteal (days from ovulation to premenstrual, typically days 15–21); and Premenstrual (days 22–28 or until the next menstrual phase). Existing literature has primarily focused on two phases (FP and LP) and whilst this allows for comparison, the hormonal profile still provides variation within these two phases. As such, the present research accounts for this by using the four defined phases.

Animal models have demonstrated that ovarian hormones play an important role in substance abuse, for example they modulate the neural systems that mediate substance administration (Anton 1999; Wetherill et al. 2016). Further, estradiol (estrogen) has been found to increase drug self-administration whereas progesterone counteracts this effect in animal models (Becker and Hu 2008; Quinones-Jenab and Jenab 2012; Wetherill

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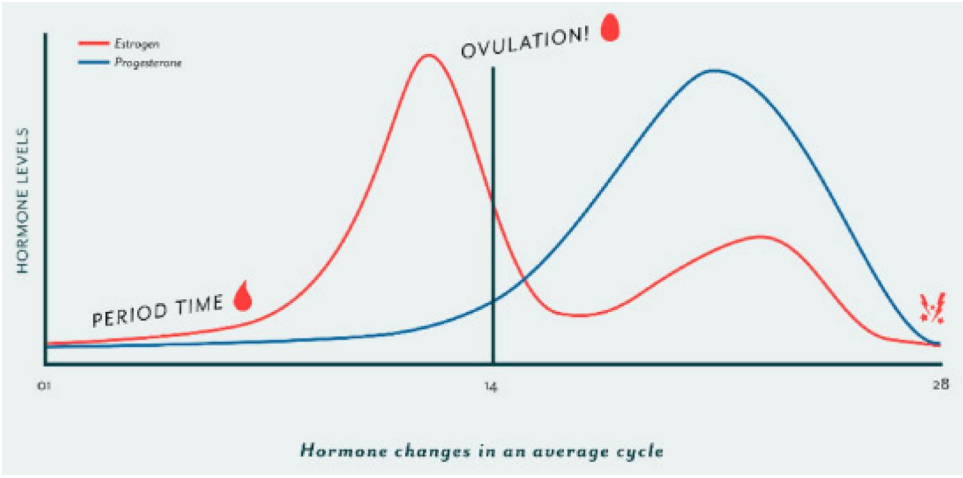

Figure 1. Diagram of estrogen and progesterone levels across the menstrual cycle for NC females (Clue 2019).

et al. 2016). However, in human research, conflicting findings are common (Carroll et al. 2015; Warren, Fallon 2021). Carroll et al. (2015) included 13 papers and concluded that the premenstrual phase is associated with increases and decreases in consumption, and report that inconsistencies could be due to methods used. Interestingly, Warren, Goodwin (2021) included a sample of hormonal contraceptive (HC) users as a quasi-control group. They found that those using HC (which stabilizes hormone levels) had higher overall consumption compared to naturally cycling (NC) participants. A more recent systematic review by Warren, Fallon (2021) found just 16 papers that investigated the relationship between menstrual cycle and alcohol use in non-AUD samples and concluded that the relationship was unclear. This uncertainty may be due to inconsistencies in study quality, design, and methodology, which is highlighted by others in the field (Carroll et al. 2015; Becker and Koob 2016). Given the limits in existing research (Carroll et al. 2015; Erol and Karpyak 2015; Becker and Koob 2016; Warren, Fallonr 2021), Warren, Fallon (2021) suggested that future research consider using cycle-tracking methods, and multiple assessments rather than retrospective self-reports.

In addition, existing reviews have suggested that possible influencing factors such as hormonal contraception, craving, mood, stress, and impulsivity should also be accounted for in study designs as predictor variables (Carroll et al. 2015; Warren, Fallon 2021), as they have been independently linked to both alcohol use and the menstrual cycle. Craving has been reported to predict alcohol consumption, including in relation to the menstrual cycle (Epstein and Sheldon 2006; West and Brown 2013). Additionally, mood is associated with both alcohol use and the menstrual cycle independently (Dluzen and Liu 2008). Negative moods are often associated with the LP, while positive moods are known to be more associated with the FP (Pierson et al. 2021). Given mood can also fluctuate as a result of menstrual symptomology, consideration of physical and mental menstrual cycle symptoms as predictors may be important (Reed et al. 2008). Further, negative emotional states have been shown to increase alcohol consumption indirectly through increases in craving (Waddell et al. 2021). Therefore, craving for alcohol may be affected by menstrual phase as well as predicting alcohol consumption by phase.

Stress has also been shown to increase motivation to drink (Amlung and Mackillop 2014), and women experience different stress levels depending on cycle phase, with the greatest stress responses occurring during the LP of the menstrual cycle (Vichnin et al. 2006; Studd and Panay 2004). Another factor for consideration is impulsivity which fluctuates over the menstrual cycle and is associated with increased alcohol consumption (Granö et al., 2004; Pine and Fletcher 2011). It is important also to consider HC use, given that HC previous research has found differences across HC and NC groups with regard to patterns of alcohol craving (Warren, Goodwin 2021). As hormone levels with HC use are relatively stable, fluctuations found in the NC group would not be the same as those in the HC group. Finally, we will consider drinking motives to explore whether motives for consumption fluctuate with cycle phase, given there has been some report of this previously (Joyce et al. 2021). It is possible that drinking may occur *via* or negative reinforcement motives depending on the mood experienced during different cycle phases (Sutker et al. 1983; Pierson et al. 2021).

The aims of the present study were to use a novel method to investigate the association between the menstrual cycle, alcohol use, and craving using an

ecologically valid method. This method was chosen as previous literature had relied on between-subjects effects, laboratory methods, and diary methods which may not be appropriate for investigating the phenomena. Also, alcohol use and predictors were measured over one menstrual cycle with approximately three assessments in each phase, in a random manner. The two groups of participants were: naturally cycling (NC) and hormonal contraception users (HC). We hypothesized that (i) alcohol consumption and craving will differ between the two groups with the HC having higher levels, (ii) menstrual cycle phase will be predict alcohol consumption, (iii) menstrual phase will be associated with craving for alcohol, (iv) the predictors of alcohol consumption will be different for the two groups, (v) the predictors of alcohol craving will be different for the two groups, (vi) finally, drinking motives will be different by both group and phase.

Materials and methods

This study was preregistered on the Open Science Framework (https://osf.io/c6kju/).

Participants

Biologically female participants who menstruate were recruited *via* opportunity sampling (i.e. online advertisements; social media posts). Participants were 50 (32 NC and 18 HC) female social drinkers who met the following criteria: (1) aged 18–35; (2) fluent English speaker; (3) had not had a child through childbirth; (4) did not have menstrual cycle irregularities (self-defined); (5) were either naturally cycling (no hormonal contraception), or using the combined pill as hormonal contraception; (6) had access to an Apple or Android smartphone; (7) consumed at least one alcoholic beverage on at least one occasion each week. The number of participants was based on simulation research by Maas and Hox (2005) suggesting that sample size >50 participants leads to unbiased standard errors in multilevel models.

The exclusion criteria were: (1) had ever received treatment for an alcohol use disorder, currently seeking such treatment, or trying to cut down consumption; (2) were peri-menopausal, menopausal, or post-menopausal; (3) had undergone a hysterectomy; (4) had a condition that requires hormone replacement; (5) were taking any medication which may be affected by drinking alcohol (e.g. cold and flu medication and antibiotics); (6) were breastfeeding or pregnant; (7) had a diagnosis of Premenstrual Dysphoric Disorder. This study was approved by the Ethics Committee at the host university.

Materials

Time line follow back *(TLFB)*

A retrospective diary that measures daily alcohol use over a fixed period of time and has shown reliability in previous studies. For a measure of typical alcohol use (baseline consumption), participants were asked to provide their unit consumption with help from a unit guide, for the previous week. For the analyses, units in the past 24 h were used as the dependent variable; higher values equate to higher consumption. The TLFB is especially reliable and valid for self-administered web-based methods for reporting drinking behavior among young adults (Litten and Allen 2012; Yu Rueger et al. 2012; Rose et al. 2013; Hareskov Jensen et al. 2023).

Daily stress inventory-short form (DSI–SF)

A 24-item, 6-point Likert scale used to measure the number of stressful events (DSI-Event) and their perceived subjective impact (DSI-Impact) in the last 24 h; higher values indicate more objective stressors and higher experiences of subjective stress, respectively. The DSI has high reliability, internal consistency, and congruent validity DSI–SF (Brantley et al. 2007).

Momentary impulsivity scale (MIS)

A 4-item, 5-point Likert scale used to give a single total score of state impulsivity with higher scores indicating higher impulsivity. MIS has high internal consistency, reliability, and validity (Tomko et al. 2014; Stevens 2019).

Alcohol urge questionnaire (AUQ)

An 8-item, 7-point Likert scale used to assess self-reported current craving with higher scores indicating higher levels of craving for alcohol. The scale has been validated and scores high for reliability (Bohn et al. 1995; MacKillop 2006).

Positive and negative affect scale-short form (I-PANAS-SF)

A 20-item, 5-point Likert scale used to measure mood over the past week. The measure produces totals for positive and negative mood independently with higher values representing higher positive/negative mood states. I-PANAS-SF has proven to have high reliability and validity in previous studies (Thompson 2007; Karim et al. 2011).

Menstrual attitude questionnaire *(MAQ)*

A 33-item, 7-point Likert scale used to measure the menstrual attitudes of the participants, in this study it

was used to characterize the sample. There are five subscales: debilitating; bothersome; natural; anticipating onset; and denial of affect; higher scores indicative of stronger attitudes on each subscale. This measure has previously been validated in female samples and has proven to have high reliability (Brooks-Gunn and Ruble 1980; McPherson and Korfine 2004).

Daily record of severity of problems *(DRSP)*

A 24-item, 6-point Likert scale used to measure menstrual symptomology over the past week; higher scores represent higher menstrual symptomology. This measure has previously been validated in female samples and has proven to have high reliability (Endicott et al. 2006; Henz et al. 2018).

Drinking motives questionnaire-revised *(DMQ-R)*

A 10-item, 5-point Likert scale used to evaluate the extent to which participants consumed alcohol for one of four reasons: to socialize, for conformity; to cope; for enhancement; with higher scores suggesting stronger motivations. The scale is reported to have high reliability and validity (Martin et al. 2016). Participants were only given these questions if they had consumed alcohol to determine the motives for that period of consumption (Cooper 1994).

Period tracker application

Clue ©, a period tracker smartphone application was used to monitor cycle phase for NC participants. The algorithm estimates the next period, fertile window, and premenstrual phase which allows the determination of cycle phases. The algorithm is based both upon general cycle data from millions of users, as well as the imputed data for each individual (Wheeler et al. 2022).

Procedure

The study was divided into three parts. In part one, there was a Zoom call lasting approximately 30 min where participants followed a link to the online survey platform (Qualtrics) to report their demographic information (age; ethnicity; postal code [for SES calculation using the Multiple Index of Deprivation]; relationship status; and occupation); followed by cycle information or contraceptive information; and TLFB; this took 10 min on average.

In part two, the researcher used the Clue cycle information to identify the cycle stage of the participant. Then participants received links to three sets of questionnaires in each of the four cycle phases (menses; FP; LP; premenstrual). The first of the set were the following questionnaires: AUQ; DSI-SF; DRSP; I-PANAS-SF; and MIS, which on average took 8 min to complete. The second (administered the following day) included: TLFB (24 h); and if they did consume alcohol, they were given the DMQ-R (specifying motives for the past 24 h) which took 2 min on average. Participants were not told when the assessments would be requested to minimize the impact of the study on drinking behavior.

Part three was a 30-min Zoom call whereby participants completed the final survey: MAQ; a COVID-19 question (asking whether COVID-19 had impacted their alcohol consumption); and debrief questions (asking what participants thought the study aims were). The survey took 6 min to complete on average.

Planed analyses

For clarity, the present study breaks the cycle into four phases: Menses (days bleeding), FP (after menses to ovulation); LP (after ovulation to a week before menses); Premenstrual (PM; the week preceding menses). SPSS was used to conduct two ANOVAs for consumption and craving to test the effect of group; and two MANOVAs to assess whether the four outcome drinking motives varied by group, and then phase (NC only).

For the analysis, multilevel modeling is the most appropriate method for the repeated measures and due to the nature of nested data; it considers the dependence between observations due to clustering of the data (e.g. within participants). Use of multilevel modeling allows for unequal number of data points across participants (resulting from missing data) (Hayes 2006). These models allow for the examination of the associations of alcohol consumption and craving independently. This part of the analysis was conducted using R. The reference phase for the models was menses (NC group). Additionally, stress, impulsivity, mood, and menstrual symptoms were included in the models as predictors of consumption and craving.

Results

Participant characteristics

The mean age of participants was 25.01 (±4.66) for the NC group and 22.60 (±4.10) for the HC group. For the HC group, the median length of time an individual had used contraception was 18 months. Additionally, reasons for using contraception were as follows: 12.66% gynecological issues; 33.13% protection against pregnancy; 44.44% a combination of

reasons; 0.06% other. For the NC group, the median cycle length was 29 days, and the length of menses was 5 days. For the NC group, on starting of the study: 14 were in the FP; 10 in the LP; and 8 were in the PM phase. See Table 1 for full demographics and Table 2 for descriptive statistics. Finally, there was no significant difference for total MAQ scores between the two groups $t(46) = -1.68$, $p = .34$.

Compliance

In total, 571 random assessments (RA) were provided from a possible 600 (95.17%). Of completed responses, 33 data points were incomplete for which R (package 'mice' was used to impute the missing data points).

Hypothesis 1: Alcohol consumption and craving will differ between the two groups

The analysis revealed a significant main effect of group on consumption, F(1, 569) = 8.27, p =.004, $\eta 2 = 0.01$, with HC users consuming more alcohol than NC participants. Additionally, HC users scored significantly higher on alcohol craving than those in the NC group consumption, F(1, 569) = 14.41, p <.001, $\eta 2 = 0.02$. See Figures 2 and 3.

Hypotheses 2 and 3: Menstrual cycle phase (reference phase, menses) as a predictor of consumption and craving

Consumption: A two-level model (assessment > participant) was a significantly better fit than a single level model (χ^2 (1) = 25.77, p<.001), with 15.36% variance attributable to the participant level, as such the two-level model was used. Phase was included as a third level, however, was not significant.

Craving: A two-level model (assessment > participant) was a significantly better fit than a single level model (χ^2 (1) = 57.02, p<.001), with 24.61% variance attributable to the participant level, as such the two-level model was used. Phase was included as a third level; however, this was not significant.

Hypotheses 4 and 5: Group as a predictor of consumption and craving

NC consumption

The model with predictors was a better fit than the two-level model (χ^2 (15) = 55.75, p<.001) with the regression model accounting for 8.56% of variance at the measurement level and 77.46% of variance at the participant level. There were significant positive associations between baseline units and alcohol consumption ($B = 0.08$, (SE=.02), p<.001, 95%, CI = 0.04 to 0.12) and craving for alcohol and consumption ($B = 0.17$, (SE=.04), p<.001, 95%, CI = 0.10 to 0.24). Whereas there was a significant negative association between negative mood and alcohol consumption (B=-0.10, (SE=.04), p=.008, 95%, CI = −0.18 to −0.03), meaning when participants scored lower on negative mood, they were more likely to consume alcohol.

HC consumption

A two-level model (assessment > participant) was a significantly better fit than a single level model (χ^2 (1)= 14.91, p<.001), with 15.19% variance attributable to the participant level, as such the two-level model was used. The model with predictors was not a better fit for the data than the simple two-level model, (χ^2

Table 1. Participant characteristics.

		Count	
Characteristic		Number	Percentage
Ethnicity	Asian	2	4
	Caucasian/White	46	92
	Multiple	2	4
Multiple Index of Deprivation	1 = most deprived	2	4
	2	4	8
	3	5	10
	4	11	22
	5	7	14
	6	7	14
	7	4	8
	8	3	6
	9	3	6
	10 = least deprived	4	8
Relationship status	Single	14	28
	In a relationship	30	60
	Engaged	5	10
	Married	1	2
Employment status	Employed	12	24
	Student	23	46
	Student and employed	15	30

Table 2. Descriptive statistics.

	Mean (SD)	
Measure	NC	HC
TLFB (units in 24 h period)	2.95 (4.31)	4.10 (5.23)
AUQ (current craving)	23.85 (6.42)	25.98 (6.68)
DMQ Social motives	9.21 (5.73)	9.39 (5.77)
DMQ Coping	7.17 (3.88)	8.18 (4.23)
DMQ Enhancement	9.68 (5.42)	9.89 (5.13)
DMQ Conformity	5.98 (2.66)	6.10 (2.61)
DSI	2.89 (1.04)	3.09 (1.10)
I-PANAS Positive	22.34 (7.93)	18.82 (6.76)
I-PANAS Negative	18.05 (7.01)	16.88 (6.58)
MIS	7.17 (3.03)	10.29 (3.34)
MAQ Debilitating	4.54 (0.69)	4.03 (1.16)
MAQ Bothersome	4.64 (1.00)	4.83 (1.32)
MAQ Natural	4.73 (1.11)	4.75 (1.41)
MAQ Predict onset	5.59 (0.91)	4.99 (1.34)
MAQ Denial	1.96 (0.79)	2.13 (0.85)
DRSP	51.53 (20.79)	53.87 (22.36)

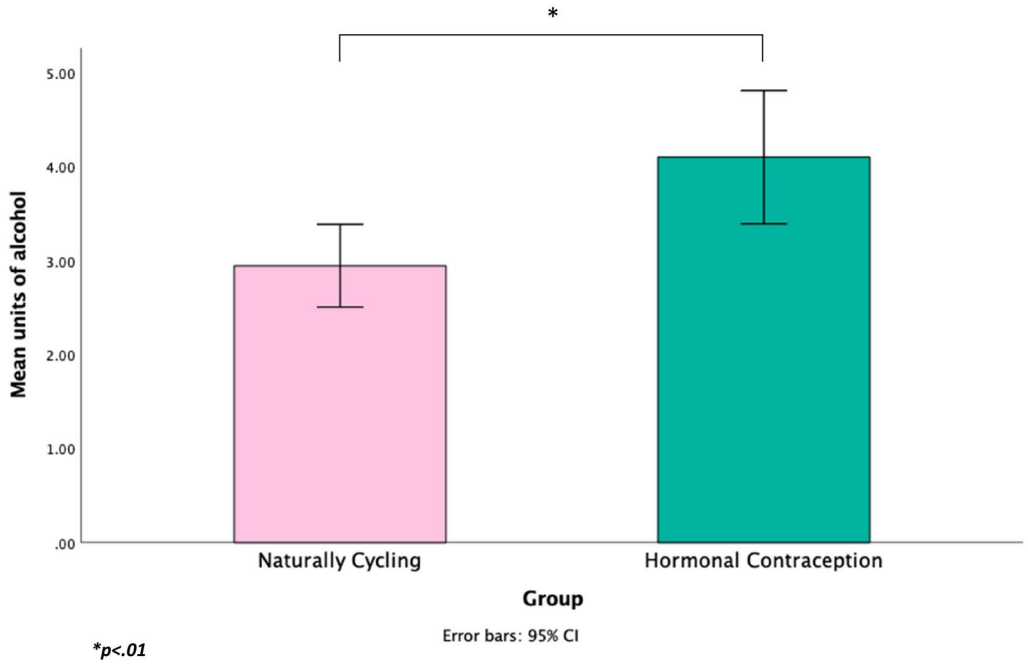

Figure 2. Bar chart displaying the mean amounts of alcohol consumed (units) in a 24-h period, comparing groups.

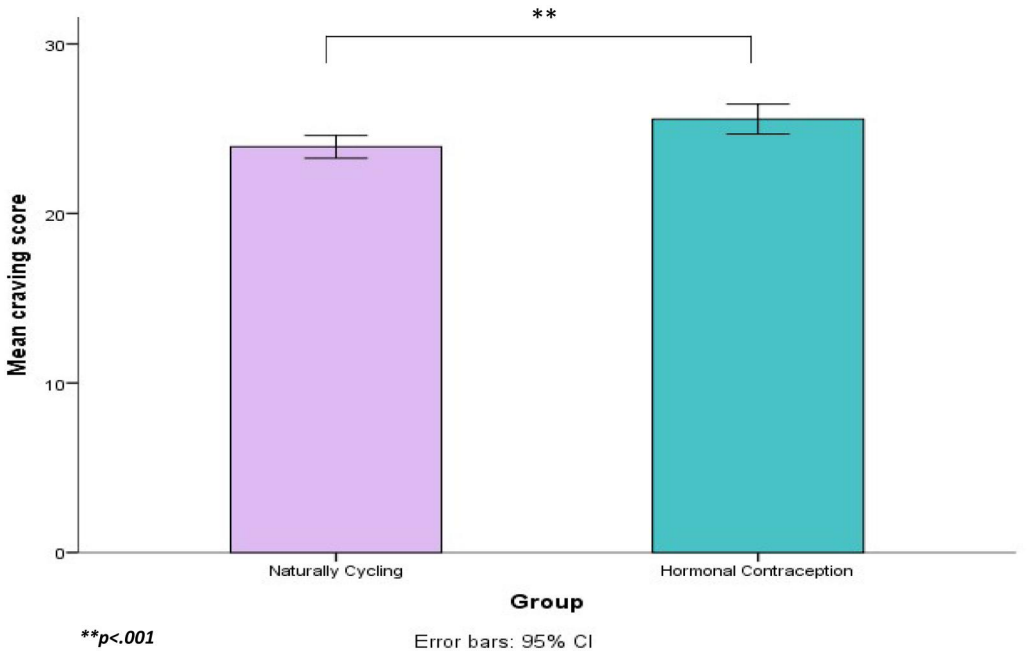

Figure 3. Bar chart displaying the mean AUQ (craving) scores across groups.

(12)= 14.27, p=.28), indicating the predictors did not contribute to alcohol consumption for the HC group.

NC craving

The model with predictors was a better fit than the two-level model (χ^2 (14)= 31.67, p=.004) with the regression model accounting for 8.87% of variance at the measurement level and 54.58% of variance at the participant level. There were significant positive associations between baseline units and alcohol craving (B = 0.08, (SE=.04), p=.03, 95%, CI = 0.01 to 0.16) and positive mood and craving (B = 0.14, (SE=.04), p=.002, 95%, CI = 0.05 to 0.23). Those in the premenstrual phase craved alcohol more than those in the menstrual phase (B=-2.03, (SE=.84), p=.02, 95%, CI = −3.68 to −0.37), and those in relationships craved alcohol more than those who were single (B = 3.32, (SE = 1.33), p=.02, 95%, CI = 0.62 to 6.01).

HC craving

A two-level model (assessment > participant) was a significantly better fit than a single level model (χ^2 (1)= 21.07, p<.001), 19.03% variance attributable to the participant level, as such the two-level model was used. The model with predictors was a better fit than the two-level model (χ^2 (11)= 35.75, p<.001) with the regression model accounting for 11.12% of variance at the measurement level and 65.68% of variance at the participant level. There were significant positive associations between baseline units and alcohol craving (B = 0.12, (SE=.05), p=.01, 95%, CI = 0.03 to 0.22) and negative mood and craving (B = 0.21, (SE=.08), p=.01, 95%, CI = 0.05 to 0.37) meaning when individuals felt more negative, they craved alcohol more. Impulsivity was also positively correlated with alcohol craving (B = 0.41, (SE=.15), p=.009, 95%, CI = 0.10 to 0.71).

Hypothesis 6: Group and phase as predictors of drinking motives

Group

Due to the homogeneity of variance assumption being violated, a Welch test was used. There were no significant differences in drinking motives across the two groups (ps>.05). Phase: A MANOVA showed that there were no significant differences in drinking motives by phase (ps>.05).

Discussion

Using multiple assessments over one cycle, the current study aimed to identify whether differences in alcohol consumption and craving occurred between menstruating females who were NC and HC, as well as any effects of menstrual cycle phase. Also, to explore whether there were differences in predictors of consumption and craving across group and/or phase. In line with the first hypothesis, both consumption and craving differed between the groups, with HC scoring higher on both. Contrary to hypothesis two, there was no association between menstrual cycle phase and alcohol consumption. However, supporting hypothesis three, menstrual phase predicted craving for alcohol. Further, in line with hypotheses three and four, the predictors of consumption and craving were different between the two groups. For the NC group, baseline units, craving, and mood predicted consumption. While, for the HC group, none of the variables predicted consumption. Predictors of craving for the NC group were baseline units, mood, phase, and relationship status. Baseline units also predicted craving for the HC group, with the addition of mood and impulsivity. The final hypothesis is rejected as there were no differences in drinking motives by group or phase.

The differences between the two groups for consumption and craving provides further evidence for earlier pilot work which found the same pattern (Warren, Goodwin 2021). For consideration, those in the HC group did have a younger mean age and a large percentage of the sample were students which is important given students tend to drink more units than the general population (Gill 2002). On further investigation, 77% of the HC group were students and 69% of the NC group were students, this suggests the effect was not driven by student status across the groups. Another point for consideration is that if HC can lead to more negative mood states (Mengelkoch et al. 2025) which could lead to higher subjective craving and later consumption (Waddell et al. 2021). However, HC type does influence the effects seen on mood states (Mengelkoch et al. 2025). These arguments taken together provide a strong rational for future research to investigate the effect of HC on alcohol use and potential mechanisms.

Considering the factors associated with alcohol consumption, for the NC group we found craving predicted consumption. This is in line with previous literature which has shown this effect (Epstein and Sheldon 2006; West and Brown 2013). Interestingly, for the HC group it was also found that negative mood predicted craving which suggests a possible mediation effect. As this was not hypothesized in the present study and as such was not analyzed, future research could explore this.

More positive mood scores were predictors of increased craving and consumption in the NC group. Perhaps it is the anticipation of the positive effects of consumption which drive the effect for craving (e.g. to enhance existing positive mood; Kuntsche et al. 2005). Interestingly, it was found that the NC group crave alcohol more during the premenstrual phase which is typically associated with more negative mood (Pierson et al. 2021). Though, in the current sample, negative mood was not experienced as strongly in the premenstrual phase. This is difficult to examine given the subjective nature of mood. As such, perhaps experimental manipulations may be beneficial to further understand this result.

Additionally, baseline units (number of units the week preceding study participation) were positively associated with alcohol consumption for the NC

group and craving across both groups. This is likely due to individual differences in alcohol use determining the average amount consumed in each drinking session. Without fluctuations in hormonal levels, the HC group may not act on predictors such as low mood. It could also be that individuals using HC may schedule drinking (e.g. at parties) and as such drink on those occasions regardless of other factors. This would also explain why baseline units did not predict consumption for that group. However, these are preliminary findings which need to be investigated more to increase reliability of the findings.

For the HC group, it was negative mood that led to an increase in craving for alcohol. This could be due to seeing alcohol as a source of coping with stressors (Kuntsche et al. 2005). Though, without the hormonal *push*, this craving did not translate to consumption. Impulsivity was also a predictor of craving exclusively for the HC participants, which is a novel finding. Another recent study has shown that HC is related to increased risk-taking behavior which concurs with this (Blake et al. 2022). Considering the HC group consume more alcohol, both negative mood and impulsivity should be included when studying the association.

Finally, there were no effects of group or phase on drinking motives which contradicts the findings by Joyce et al. (2018). Fluctuations in drinking motives would need more thorough investigation before conclusions could be drawn given this was only the second study to investigate this. Also, there was the unexpected findings that for the NC group, those in relationships craved more alcohol than those who were single. One explanation is that when living with a partner, individuals may be influenced by their partner's drinking habits which can increase craving and/or consumption (Kim et al. 2013). Overall, future alcohol researchers should consider menstrual cycle status (HC use) in their designs. If possible, they should also consider menstrual phase as there may be an association with alcohol use.

Although this is the first study to comprehensively investigate the effects of the menstrual cycle and HC on alcohol consumption and craving, it is not without its limitations. The duration of participation was one cycle which may not be sufficient as individuals can have varying cycles over time (Warren, Fallon 2021). To resolve this issue, future studies should aim to capture more than one cycle or look at longitudinal data. Additionally, the sample in this study was a relatively homogenous one, majority Caucasian with a high proportion of students. Given the focus was alcohol-related behaviors, it is important to investigate the relationship in non-student, older samples. Additionally, participants self-disclosed as having regular menstrual cycles. However, the general awareness of cycles and specifically what makes a typical cycle is not widely known (Warren et al. 2025) and as such there may have been participants in the sample who had irregular menstrual cycles.

Importantly, although differences in alcohol use were observed, there is still scope to understand the mechanisms behind this behavior. As such, future research should consider hormonal assays. A recent study showed how fluctuating progesterone levels affect alcohol use (Holzhauer et al. 2020). However, this is only one study with a focus on a single hormone and it is important to consider all the ovarian hormones together. Also, given the rapid changes in hormonal levels at different points in the cycle, future research should aim to explore as many measures as possible.

To conclude, this study investigated whether there was an association between the menstrual cycle, contraception, and alcohol use using an ecological design. Overall, the findings showed that HC users consumed more alcohol and had higher craving. There were also different predictors of craving and consumption across groups, with mood being a key predictor in NC participants. The findings highlight that future alcohol research should consider the menstrual cycle status of individuals included in their studies.

Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

The study reported was in part funded by the John Lennon Memorial Scholarship, this funding body had no influence over the research conducted or the publication process.

Open scholarship

This article has earned the Center for Open Science badges for Preregistered. The materials are openly accessible at https://osf.io/c6kju/.

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