Exploring the Relationship between Contraceptive Method, Disordered Eating, and Past Mental Health Problems: A Mediation Analysis

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Abstract

Background: The relationship between contraceptive use, past mental health problems, and current disordered eating behaviors is an emergent area of exploration in behavioral health research. With the evolution of contraceptive methods over time, understanding their potential interplay with mental health conditions is pivotal, especially among younger populations, for whom reproductive decisions and disordered eating behaviors are most prevalent.

Objective: This exploratory study sought to determine if contraceptive use has an influence on current disordered eating behaviors and if past mental health problems serve as a mediating factor in this relationship.

Methods: A nationally representative sample of students from occupational, applied science, and university institutions was utilized. Employing a cross-sectional design, extensive baseline data were collected through questionnaires. Respondents were classified into hormonal oral contraception and non-hormonal contraception groups. Mediation analyses were conducted to ascertain if any direct or indirect effects of contraceptive use on disordered eating behaviors were mediated through past mental health problems.

Results: The mediation analyses did not identify significant direct or indirect effects of contraceptive use on current disordered eating behaviors through the lens of past mental health problems. Influential factors shaping the relationship between the studied variables included age, social support, and cognitive and behavioral coping mechanisms. No evidence was found to suggest past mental health issues mediated the connection between contraceptive use and current disordered eating.

Limitations: The cross-sectional design of the study hampers causation or directional conclusions. The broad categorization of contraceptive methods and the aggregate scoring for past mental health problems may obfuscate specific influences. Relying on self-reported data also raises concerns of potential biases like recall and social desirability biases.

Conclusion: This exploratory study offers an in-depth assessment of the proposed relationships between contraceptive use, past mental health conditions, and disordered eating behaviors in a student demographic. Although no significant associations were unearthed, the findings should be interpreted with circumspection due to the study's inherent constraints. Future research should emphasize longitudinal frameworks, delve into the granularities of contraceptive types and mental health conditions, and encompass more diverse cohorts to foster a richer understanding of these complex interrelationships.

Introduction

In recent years there has been an increasing amount of discourse happening on social media on the effects and side effects of hormonal contraception (Le Guen et al., 2021; Schneider-Kamp & Takhar, 2023). The online interaction happening around the subject of hormonal contraception and especially the side effects that go paired with hormonal contraception has lead to a change in attitude towards especially oral contraception (Schneider-Kamp & Takhar, 2023). A systematic review on the reasons for rejecting hormonal contraception in western countries has identified eight main reasons (Le Guen et al., 2021). These reasons include: physical side effect; altered mental health; negative impact on sexuality; concerns about future fertility; invocation of nature; concerns about menstruation; fears and anxiety; and delegitimization of hormonal contraception side effects (Le Guen et al.m 2021). Among these reasons two reasons have formed the main focus of this study. One is the physical side effects, and in particular weight gain and disordered eating. The second is mental health side effects. In recent years there has been some contradictory research on contraception method, disordered eating and mental health problems (Bengsdotter et al., 2018; Bird & Oinonen, 2011; Hall et al., 2013; McVay, Copeland & Geiselman, 2011; Toffol et al., 2020). Given the seemingly contradictory results of these studies, the question of how contraceptive use is related to disordered eating emerges. Is there a direct relationship between contraception method and disordered eating or is this relationship mediated by past mental health problems.

Prevalence and etiology of eating disorders

The prevalence of eating disorders among young females has been reported in numerous studies for years (Brown & Levinson, 2022; Dahlgren & Wisting, 2016; Galmiche et al., 2019; Morton, 2016). A literary review by Galmiche et al., (2019) has found a point prevalence of 6 to 9% in adolescence. They also found that the onset of most eating disorders such as anorexia nervosa and boulimia nervosa are before the age of 24 years, for some disorders even before 22 years. For binge eating disorder the onset seems to be more spread out (Galmiche et al, 2019). Although it's hard to draw conclusion on eating disorders over time, due to the changing diagnostic criteria, it could be stated that the prevalence has more than doubled over time since 1992, especially the EDNOS (Eating Disorder Not Otherwise Specified) (Galmiche et al., 2019; Dahlgren & Wisting, 2016). Indicating that different symptoms of disordered eating are more prevalent now than in the past.

The cause of eating disorders is hard to determine. Some studies have found that both genetic and environmental factors influence the development of eating disorders (Blodgett et al., 2015; Culbert et al., 2015; Krug et al., 2015; Levine & Murnen, 2009). One study by Krug et al., (2015) has found that family and media were indirectly associated with eating disorders. Whereas, another study has found that media is most likely only a variable risk factor, rather than the main cause of eating disorders (Levin & Murnen, 2009) A study conducted with individuals with and without eating disorders on the perceived causes of eating disorders, has found that those with eating disorder list causes such as psychological and emotional problems and traumatic life event as possible causes of their disordered eating (Blodgett et al., 2015). A research review has concluded that certain factors, such as personality characteristics and sociocultural influences, are thought to be causes of eating disorders can at most be considered correlates of eating disorders (Culbert et al., 2015). Proving causality of eating disorders seems to be difficult and it is worth exploration. Understanding the discourse around hormonal contraception is important, given its widespread use and the emerging concerns voiced by individuals globally.

Oral contraception and disordered eating

Some research has focused on the effects of oral contraception on disordered eating. It raises the question about the potential influence of contraceptive use on the development and manifestation of eating disorders (Bengsdotter et al., 2018; Bird & Oinonen, 2011; Hall et al., 2013; McVay, Copeland & Geiselman, 2011; Toffol et al., 2020). One of these studies among Finnish females has found that oral contraception was used less frequently by those who recently received care for mental health disorders. Use of oral contraception was especially uncommon among woman who recently received care for eating disorders. It should be noted that the observed differences had a small effect size (Toffel et al., 2020). A study by Bird & Oinonen (2011) has found that women who have experienced mood and/or physical side effect while using oral contraception appear to be at risk of increased body dissatisfaction and drive for thinness. One further study has found that elevated levels of eating disorder symptoms are associated with discontinuation of oral contraceptives (Hall et al. 2013). However other research found that fear of fatness was only a significant predictor for hunger level in non-oral contraception users. This relationship was not found in oral contraception users (McVay, Copeland & Geiselman, 2011). Finally, it's worth to note that a meta-analysis on the reasons why individuals choose to discontinue oral contraception, found that women reported increased hunger and appetite and weight gain as a reason to discontinue hormonal

contraception (Le Guin et al., 2021). Given the information theses study supply one would expect there to be some sort of relationship between contraception method and disordered eating. Even though the direction of this relation remains unclear. With the prevalence of eating disorders on the rise, and their onset often during reproductive years, it is important to understand how hormonal interventions like contraception might intersect with these complex conditions.

Past mental health and contraception

Another factor to consider when exploring the relationship between contraception method and disordered eating is past mental health problems. Additionally, (past) mental health problems have been suggested to have a relationship to current eating disorders and contraceptive methods and use (Bengsdotter et al., 2018; Edwards et al., 2020; Hall et al., 2013; McCloskey et al., 2021; Skovlund et al., 2016; Stidham Hall et al., 2013; Toffel et al., 2020; Wit et al., 2020). One study found that ongoing or previous symptoms of mood, anxiety and eating disorders predict worsening of mood symptoms during oral contraception use (Bengsdotter et al., 2018). The study conducted by Toffel et al (2020) has found that the lower rates of oral contraception use among women who have had recent care for eating disorders, also applies to personality disorders, although to a lesser extent than with eating disorders. Another study among former oral contraceptive users suggests that women with a past of depression/ anxiety are more likely to discontinue oral contraceptive use, although causality was difficult to prove. Another study suggests that hormonal contraception, in particular in adolescents, was associated with subsequent diagnosis of first depression and use of antidepressants. On the other hand, a cohort study has found that there is no association between oral contraception and depressive symptoms in a group of females over all ages, however 16-year-old girls who used oral contraception, reported higher scores of depressive symptoms (Wit et al., 2020). Similarly, a literature study on contraception for woman with psychiatric disorders have found that women with psychiatric disorders have reported similar or lower rates of mood symptoms with hormonal contraceptives and non- hormonal contraceptive users, meaning that there is no difference between hormonal contraceptive and non-hormonal contraceptive use (McCloskey et al., 2021). Some of these studies have found that (past) mental health issues such as depression and anxiety may alter an individual's approach to contraception, but other studies have found no relationship between contraception and (past) mental health issues, or at least not beyond adolescence. Lastly, Le Guen et al., (2021) has found that one reason for discontinuation of contraception is due to mental health

side effects such as more irritability, mood swings, sadness and symptoms of depression. The relationship between past mental health problems and contraceptives underscores the importance of nuance, comprehensive research and implications.

Confounders

Although the primary focus of this study is to explore the relationship between contraceptive use, past mental health problems, and current disordered eating, it is important to consider several other factors that may influence these relationships. Namely, age, social support, cognitive and behavioral coping will be controlled for in the model.

First, age is a known factor to consider in research involving disordered eating and contraceptive use. The onset of eating disorders often occurs in early adolescence (Davies et al., 2022; Volpe et al., 2016), and contraceptive use patterns can change significantly throughout a woman's life (Behboudi-Gandevani et al., 2017). Therefore, controlling for age will allow us to better understand the relationships between the main constructs without the confounding influence of age-related changes. Similarly, social support is a key factor in both mental health and disordered eating. High levels of social support have been associated with lower reports of mental health problems and disordered eating (Castillo, 2016; Maulik, Eaton & Bradshaw, 2010; Kamenov et al., 2016). By controlling for social support, we can understand the relationships between contraceptive use, past mental health problems, and current disordered eating beyond the beneficial effects of having strong social support. Lastly, cognitive coping and behavioral coping are important to consider. Coping has been selected based on its relevance to mental health and disordered eating in previous research (Gloria & Steinhardt, 2016; Han et al., 2023; Hernando et al., 2019; Kelly, Lydecker & Mazzeo, 2012; McFillin et al., 2012). These studies have found that for both mental health problems and disordered eating in relationship with coping, there seems to be a significant relationship. The more maladaptive the coping, the more likely one is to experience disordered eating and/ or mental health problems. By controlling for coping, we will be able to better understand the unique contributions of contraceptive use and past mental health problems to current disordered eating. Recognizing and accounting for these confounders is important in ensuring that the exploration into contraception use and disordered eating provides valid insights.

Considering the complexity and contradictions within the existing body of research, the relationship between contraceptive use and current disordered eating emerges as a topic in need of further exploration. Does contraceptive use directly relate to current disordered

eating, or could this relationship be partly or fully mediated by past mental health problems? Therefore, the primary focus of this study will be to investigate these relationships, particularly focusing on the role of contraceptive methods, current disordered eating, and past mental health problems.

To address these questions and provide a clearer understanding of these interrelations, the following research objectives have been formulated.

Research objectives

This study aims to address the following research objectives:

1. Investigate the association between current contraceptive use and current disordered eating among females.
2. To examine the potential mediating role of past mental health problems in the relationship between contraceptive method and current disordered eating.

Research questions

Based on the mixed and limited prior evidence, no a priori hypothesis can be formulated, preserving the exploratory nature of the current study. However, using the framework of statistical mediation as proposed by Baron & Kenny (1986), we can formulate the following research questions:

RQ 1:Is there a relationship between oral contraception use and disorderd eating?

RQ2: Is there a relationship between contraceptive method and past mental health problems?

RQ3: Is there a relationship between past mental health problems and current disordered eating, controlling for contraceptive method.

RQ4: Is the potential relationship between contraceptive method and current disordered eating (partially) mediated by past mental health problems?

To answer the above exploratory research questions, a the statistical framework of mediation analysis according Baron & Kenny (1986) was performed. This analysis estimated the direct effect of contraceptive method on current disordered eating, while controlling for potential confounding variables such as social support, elected coping styles, and age. Additionally, the mediation analysis estimates the indirect effect of past mental health problems on current disordered eating.

Methods

Design and Procedure

The data is made available through the WARN-D study. The motivation for the WARN-D study is to investigate the possibility of tailormade prevention programs in order to know when early intervention is required for which people (Field, Rieble & Proppert, 2022). WARN-D aims to follow 2000 students in the Netherlands for 2 years. It is considered to be a multicohort design with 4 cohorts of 500 students. Participants were recruited through both online and offline advertising. The study consists of 4 stages (Field, Rieble & Proppert, 2022). But for the purpose of this thesis only data from stage one, an extensive baseline assessment, will be used, collected in cohort 1 (November 2021) and cohort 2 (November 2022). The baseline was measured through a ± 75-minute Qualtrics online survey

Participants

Students had to meet the following criteria for inclusion in the WARN-D study: being ≥18 years old; being fluent in reding Dutch of English; studying at a Dutch educational institution pursuing an MBO (vocational school), HBO (higher vocational school), or WO (university) degree; currently living in the Netherlands, Germany or Belgium; having a European bank account; and a smartphone that runs on Android or iOS so that the apps required for later stage are functional (Field, Rieble & Proppert, 2022). Participants were excluded under the following criteria: moderate levels of current depression, which is measured by a score of ≥ 2 on the 2-item Patient Health Questionnaire (PHQ-2) as well as a score of ≥ 14 on the 9-item Patient Health Questionnaire (PHQ-9); current mania which is measured through the corresponding items on the American Psychiatric Association's (APA) DSM-5 Self-Rated 1 Cross-Cutting Symptom Measure- Adult (level 1 screener) ≥ 2 on either of the two items, as well as the APA's Altman Self-Rating Mania Scale (level 2 screener) sum score ≥ 6; current thought disorders, measured through the level 1 screener; primary substance use disorders, measured by the Alcohol, Smoking and Substance Involvement Screening Test (ASSIST), with a cutoff of ≥ 27 for any substance; reporting current treatment for any of the four mental health problems mentioned above; moderate current suicidal ideation, measured by a score of 2 on item 4 of the Beck Scale for Suicide Ideation; and lastly, indicating that seeing an estimate of daily burnt calories could increase the participant's

stress levels (Field, Rieble & Proppert). Further inclusion criteria applied for this thesis were: women of reproductive age (18-40 years); using oral contraceptive methods or non-hormonal contraceptive method, as well as non-contraceptive use. The final sample consisted of 591 female participants. 177 participants indicated they use oral contraception, and 414 participants used a non-hormonal contraception or no contraception.

Measurements

Only baseline responses were used for the analysis, so only measurements at baseline that are relevant to the current study will be explained below. The following variables are included in the analyses:

Contraceptive method

Contraceptive method was measured in the questionnaire with the following question: "What type of contraception do you use? You can choose multiple answers. If applicable, please provide the name of the product you are using". The following multiple-choice options were given. No contraception or only physical contraception (e.g. condoms, calendar method, fertility tracking), oral contraception (e.g. the pill), hormonal intra-uterine device (e.g. Mirena IUD, Skyla IUD), other hormonal contraception (e.g. a patch, implant), copper intra-uterine device, I am not sure what type of contraception I use, I prefer not to say.

Participants who answered, no contraception of only physical contraception, oral contraception and copper intra-uterine device, were included in the analysis. No contraception or only physical contraception and copper intra-uterine device was recoded to non-hormonal contraception and 'oral contraception' was recoded to hormonal contraception. Other hormonal contraceptive methods were excluded due to the ambiguous information on the locality of these methods. Participants who were unsure of contraceptive method or who preferred not to say were also excluded from the analyses, due to the fact that it is unsure which contraceptive method they should be allocated to.

Past mental health problems

Past mental health problems were measured in the questionnaire with the following question: "Have you ever in your life had any of the following emotional or mental health problems?". Participants were given nine options to which they could answer "yes" or "no". It was possible to answer yes to multiple options. The following options were given: depression;

manic-depression, mania or bipolar disorder; panic attacks (a sudden rush of fear or discomfort, accompanied by e.g. sweating, fear of dying, nausea, and breathlessness); Problems with anxiety (excessive worries, fears, compulsions, obsessions); substance use problems (alcohol or drugs); eating disorder; posttraumatic stress disorder (PTSD); attention deficit (hyperactivity) disorder (AD(H)D); any other serious emotional problem. For the analyses a sum score of all previous mental health problems was calculated. The higher the score, the more past mental health problems a participant has experienced.

Disordered eating

In order to measure current disordered eating, the SCOFF questionnaire (Hill et al., 2010) was added to the baseline measurement. The SCOFF is made up of five questions: "Do you ever make yourself sick (vomit) because you feel uncomfortably full?". "Do you worry you have lost control over how much you eat?", "Have you recently lost more than 6 kg in a three month period?", "Do you believe yourself to be fat when others say you are too thin", "Would you say that food dominates your life?". For every "yes" a point is added to a sum score. Adding up all points, it gives a final score for current disordered eating. In clinical practice the SCOFF has a cut-off value of two to indicate risk of the existence or the development of an eating disorder (Botella et al., 2013; Morgan, Reid & Lacey, 2018). However, for the purpose this analysis, the sum score will be used rather than creating a binary variable. A higher score indicates more current disordered eating thoughts or behaviors.

Social support

To measure social support, five questions were added to the baseline questionnaire. Participants would answer on a five-point Likert scale: Not at all, a little, somewhat, a lot, and extremely. The five questions were: "How much do the people in your personal life make you feel loved and cared for?", "How much can you depend on the people in your personal life for help when you need it?", "How much do the people in your personal life understand the way you feel about things?", "How often do the people in your personal life make unreasonable demands on you?" , "How often do the people in your personal life argue with you or say things that make you feel bad?". For the analyses the scores of the last two questions were reverse scored. All scores were added to the sum total. The total was used in the analysis. The higher the score, the higher the perceived social support is.

Behavioral Coping

In order to assess the participants behavioral emotional coping styles, the Behavioral Emotion Regulation Questionnaire (BERQ) was added to the baseline questionnaire (Kraaij & Garnefsky, 2019). In the questionnaire the BERQ was introduced with the following statement and question: "Everyone gets confronted with negative or unpleasant events now and then and everyone responds to them in their own way. What do you generally do when you experience negative or unpleasant events? Read the sentences below and indicate how often they apply to you.". The BERQ consists of twenty statements to which the participants could answer in a five-point Likert scale: Almost never, sometimes, regularly, often, and (almost) always. Scores on separate items add up to five different scales: seeking distraction, withdrawal, actively approaching, seeking social support, and ignoring. The higher the score on a certain scale the more likely one is to use that type of coping when confronted with stressful situations. (Kraaij & Garnefsky, 2019). For the analyses the scores for the withdrawal and ignoring scales were inverted. These scales are considered to be maladaptive cognitive coping styles (Kraaij & Garnefski, 2019). Therefore the higher one's score on one of these scales the more likely it is that an individual has a maladaptive coping style. Inversion of these scales are necessary to ensure that scores added shows the total score for adaptive behavioral coping. Scores for all scales were added up to a total BERQ score. The higher the total score the more adaptive cognitive coping one engages in.

Cognitive Coping

Similarily to behavioral coping, the cognitive emotional coping styles were assessed through the Cognitive Emotion Regulation Questionnaire (CERQ) (Garnefsky & Kraaij, 2006). In the questionnaire the CERQ was introduced with the following statement and question: "Everyone gets confronted with negative or unpleasant events now and then and everyone responds to them in their own way. What do you generally think when you experience negative or unpleasant events? Read the sentences below and indicate how often they apply to you". The CERQ consists of eighteen statements to which the participants could answer in a five-point Likert scale: Almost never, sometimes, regularly, often (almost) always. Scores on separate items add up to nine different subscales: self-blame, acceptance, rumination, positive refocusing, refocus on planning, positive reappraisal, putting into perspective, catastrophizing, and other-blame. The higher the score on a certain scale, the more likely one is to use that type of coping when faced with stressful situations (Garnefsky & Kraaij, 2006). For the analyses scores for the self-blame, rumination, catastrophizing, and other-blame were inverted. These scales are considered to be maladaptive cognitive coping

styles (Garnefsky & Kraaij, 2006). Therefore the higher one's score on one of these scales the more likely it is that an individual has a maladaptive coping style. Inversion of these scales are necessary to ensure that scores added shows the total score for adaptive cognitive coping. Scores for all scales were added up to a total CERQ score. The higher the total score the more adaptive cognitive coping one engages in.

Age

Participants older than 40 years were excluded due to the potential confounding effects of hormonal changes that occur after this age. By focusing on individuals within the age range of 18-40 yeas, the aim is to control for the variability in hormonal levels that could have influenced the outcome measures.

- For the scales you use, add existing validity evidence like cronbachs alpha that is reported or evaluated ideally in student population.

Ethics

The data collection was approved by the Leiden University Research Ethics Committee Leiden (2021-09-06-E.I.Fried-V2-3406). The study was exempted from having to obtain ethics approval under the Medical Research Involving Human Subjects Act.

Analyses

Mediation Analyses

First, descriptive statistics were generated, as well as frequencies for the variable contraceptive method. Multiple independent t-tests were run to determine if the hormonal and non-hormonal groups differ significantly from each other on any of the variables included in the analyses. Before analyses all variables were standardized by calculating their z-score. The mediation analyses was conducted in several stages. First, a linear regression model was performed to assess the direct effect of contraceptive method on current disordered eating, while controlling for potential confounding variables of age, social support and coping style. This step is indicated by the 'c' in *Figure 1* below. This analysis determined if there is a significant relationship between contraceptive method and current disordered eating when accounting for other factors.

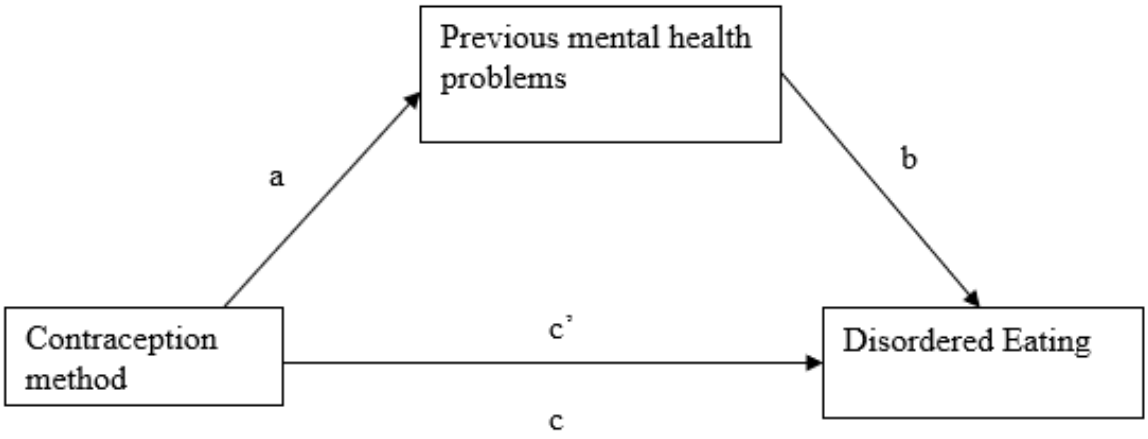
Next, the effects of contraceptive method on past mental health problems, while controlling for age, social support, behavioral coping and cognitive coping, was analyzed. A

regression model was estimated, treating current contraceptive method as the predictor and past mental health problems as the outcome variable.. The analysis also controlled for the potential confounding variables of age, social support and coping style. This step provided insight into the relationship between contraceptive method and past mental health problems, indicated by ‘a’ in *Figure 1* below.

Another regression model was estimated, treating past mental health problems as the predictor and current disordered eating as the outcome variable, controlling for contraceptive method. Indicated by ‘b’ in *Figure 1* below . Additional control variables, age, social support and coping styles, were included in this analysis. This step provided insights into the relationship between past mental health problems and current disordered eating.

Finally, the mediating role of past mental health problems (indicated by 'b') in the relationship between contraceptive method and current disordered eating was examined using mediation analyses conducted with the PROCESS macro in SPSS. These analyses estimated both the direct effect of contraceptive method on current disordered eating ('c') and the indirect effect through past mental health problems ('a x b'). Control was implemented for potentially confounding variables, including age, social support, and coping style.To assess the significance of the indirect effect, a bootstrap procedure with 5,000 repetitions was employed. This resampling technique provided robust confidence intervals for the estimates, capturing the uncertainty around the indirect effect. The bootstrap results were examined to determine the statistical significance of the indirect effect and to gain insights into the potential mediating mechanism.

Figure 1



Mediation graph contraceptive method, current disordered eating and previous mental health problems

Results

Descriptive statistics

The mean age of the participants was 22.11 years, with a standard deviation of 3.173. The age ranged from 18 to 39 years. Regarding contraceptive use, 30% of the participants reported using hormonal contraception, while 70% reported using non-hormonal methods. The mean score on the SCOFF questionnaire, which assesses current disordered eating, was 0.79, with a standard deviation of 1.08. The scores on this variable ranged from 0 to 5, indicating a range of current disordered eating behaviors observed in the sample. The participants' past mental health problems were measured using the 'Mh_prob_ever_sum' variable, with a mean score of 2.18 and a standard deviation of 1.63. The scores ranged from 0 to 8, reflecting different levels of mental health issues experienced in the past. Perceived social support, assessed by the 'Socsup_total' variable, had a mean score of 16.70 and a standard deviation of 2.761, with scores ranging from 8 to 23. Behavioral coping strategies, as measured by the 'Berq_total' variable, had a mean score of 56.59 and a standard deviation of 12.07. The scores on this variable ranged from 24 to 87, reflecting various coping approaches adopted by the participants. Lastly, cognitive coping strategies, measured by the 'Cerq_total' variable, had a mean score of 49.67 and a standard deviation of 8.52, with scores ranging from 25 to 73, indicating the different cognitive processes used in response to negative or stressful events.

Assumption Checks

Before conducting the analyses, several assumption checks were performed to ensure the appropriateness of the statistical analyses. These checks included assessing linearity, normality, homoscedasticity, multicollinearity, and independence of observations.

Linearity, normality, and homoscedasticity were examined using graphical methods and statistical tests. Multicollinearity was assessed through variance inflation factors (VIFs). The assumption of independence was met, as the data was collected from a cross-sectional survey design, and each participant's responses were treated as independent (See Appendix A).

Scatterplots and histograms indicated that the relationships between the predictor variables - age, past mental health problems, social support, behavioral coping, cognitive coping, and contraceptive method - and the outcome variable, disordered eating, appeared linear. These variables were also approximately normally distributed. The Shapiro-Wilk test confirmed the normality assumption ($p > 0.05$), except for contraceptive method, which slightly deviated from normality due to a higher number of participants using non-hormonal contraceptive methods. However, given the large sample size ($N = 585$), we considered the parametric assumptions robust.

The scatterplots of the standardized residuals against the standardized predicted values indicated a equidistant distribution of residuals, supporting the assumption of homoscedasticity. Regarding multicollinearity, the calculated variance inflation factors (VIFs) were all well below the threshold of 10, ranging from 1.00 to 1.50, indicating no evidence of multicollinearity among the predictor variables. For detailed visual representations of the assumption checks, including scatter plots and histograms please refer to Appendix B, C, D and E.

Correlation analysis

The Pearson correlation analyses were conducted to understand the relationships between age, current disordered eating (SCOFF score), past mental health problems (Mh_prob_ever_sum), social support (Socsup_total), behavioral coping strategies (Berq_total), cognitive coping strategies (Cerq_total), and the use of hormonal contraception (see Table 1).

There was a small, positive, and statistically significant correlation between age and past mental health problems ($r = .16$, $p < .001$), indicating that older participants reported

more past mental health problems. Age was also negatively correlated with cognitive coping strategies (r = -.10, p = .021), suggesting that older participants used fewer cognitive coping strategies. However, these correlations are quite small and should be interpreted cautiously. SCOFF score, an indicator of current disordered eating, was moderately correlated with past mental health problems *(*r= .31, p < .001), showing that participants with higher SCOFF scores, indicative of more severe current disordered eating, reported more past mental health problems. SCOFF score was negatively correlated with social support (r = -.15, p < .001), behavioral coping strategies (r = -.21, p < .001), and cognitive coping strategies (r = -.24, p < .001). This suggests that participants with higher SCOFF scores reported lower social support, used fewer behavioral coping strategies, and fewer cognitive coping strategies. Past mental health problems showed a negative correlation with social support (r = -.18, p < .001), behavioral coping strategies (r = -.14, p < .001), and cognitive coping strategies (r = -.24, p < .001), indicating that participants with more past mental health problems reported lower social support and used fewer both behavioral and cognitive coping strategies. Social support was positively correlated with both behavioral coping strategies (r = .37, p < .001) and cognitive coping strategies (r = .27, p < .001), suggesting that participants with higher social support also reported using more of both behavioral and cognitive coping strategies. The use of behavioral coping strategies and cognitive coping strategies were also positively correlated (r = .34, p < .001), indicating that participants who reported using more behavioral coping strategies also used more cognitive coping strategies. Lastly, the use of hormonal contraception was positively correlated with social support (r = .11, p = .008), indicating that participants using hormonal contraception reported slightly higher social support.

It's important to note that while these correlations are statistically significant, they are generally small to moderate in size, suggesting these variables are associated but are not strongly predictive of each other (Cohen, 2003). Also, the nature of correlation does not indicate a cause-effect relationship, but merely the existence of a relationship between the variables.

Table 1

Correlations across main variables and control variables

	1	2	3	4	5	6
1 Age	-					
2 Disordered eating	.00	-				
3 Past mental health problems	.16**	.31**	-			
4 Social support	-.03	.15**	-.18**	-		
5 Behavioral coping	.03	-.21**	-.14**	.37**	-	
6 Cognitive coping	-.10*	-.23**	-.24**	.27**	.34**	-
7 Contraception method	-.04	.02	-.05	.11**	.06	-.03

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 lever (2-tailed).

T-test

Independent samples t-tests were conducted to examine differences between groups using hormonal and non-hormonal contraceptive methods across various variables. Levene's test was utilized beforehand to ensure the assumption of equal variances.

For the variable 'past mental health problems', equal variances were assumed, $F(1, 583) = 0.001$, $p = .971$. The t-test revealed no significant difference between the hormonal ($M = 2.18$, $SD = 1.63$) and non-hormonal ($M = 2.11$, $SD = 1.57$) contraception groups, $t(583) = -1.24$, $p = .216$. In the case of 'disordered eating', the assumption of equal variances was met, $F(1, 583) = 0.065$, $p = .799$. No statistically significant difference was found in scores between the hormonal ($M = 0.79$, $SD = 1.08$) and non-hormonal ($M = 0.81$, $SD = 1.09$) groups, $t(583) = 0.60$, $p = .549$. For 'age', equal variances were also assumed, $F(1, 583) = 3.12$, $p = .078$. The t-test demonstrated no statistically significant difference between the hormonal ($M = 22.11$, $SD = 3.17$) and non-hormonal ($M = 22.38$, $SD = 3.18$) groups, $t(583) = -0.95$, $p = .34$. However, for 'social support', equal variances were not assumed due to a violation, $F(1, 583) = 4.77$, $p = .029$. A significant difference emerged in scores between the hormonal ($M = 16.70$, $SD = 2.76$) and non-hormonal ($M = 16.03$, $SD = 2.72$) groups, $t(402.457) = 2.89$, $p = .004$. Given the significant result in Levene's test for social support, an additional Mann-Whitney U test was performed on the variable social support to avoid the risk of Type 1 errors. In the Mann-Whitney U test, social support significantly differed

between groups, $U = 30807.50$, $Z = -2.84$, $p = .004$. Regarding 'behavioral coping', equal variances were assumed, $F(1, 583) = 0.17$, $p = .681$. No significant difference was found between the hormonal ($M = 56.59$, $SD = 12.07$) and non-hormonal ($M = 55.04$, $SD = 11.58$) groups, $t(583) = 1.43$, $p = .154$. Lastly, for 'cognitive coping', equal variances were assumed, $F(1, 583) = 0.41$, p = .522. The *t*-test indicated no significant difference between the hormonal ($M = 49.67$, $SD = 8.52$) and non-hormonal ($M = 49.43$, $SD = 8.65$) groups, $t(583) = -0.70$, $p = .486$.

These findings suggest no apparent differences between the hormonal and non-hormonal contraception groups across most variables. An exception was found in social support, where the hormonal contraceptive group reported significantly higher scores. This may be due to a tendency for individuals in a relationship to use hormonal contraception, thereby experiencing more social support due to their relationship status. However, as this was not the main focus of this study, further exploration into this relationship was not conducted.

Mediation analyses

First, a linear regression model was conducted to assess the direct effect of contraceptive method on current disordered eating, controlling for potential confounding variables: age, social support, and cognitive and behavioral coping (step 'c' in *Figure 1* above). The regression model (see Table 2) was significant, $F(5, 584) = 9.21$, p < .001, explaining 7.9% of the variance in disordered eating ($R^2 = .079$). After adjusting for the number of predictors, the explained variance was approximately 7.1% (adjusted $R^2 = .071$). From the ANOVA, it was concluded that the variables contraceptive method, age, social support, behavioral coping, and cognitive coping combined significantly related to disordered eating. However, individually, contraceptive method showed no significant predictor on disordered eating ($B = 0.03$, $t(584) = -0.83$, $p = .405$). Behavioral coping ($B = -0.14$, $t(584) = -3.04$, $p = .002$) and cognitive coping ($B = -0.17$, $t(584) = -4.01$, $p < .001$) significantly related to disordered eating. Both effects were negative, suggesting that lower scores of behavioral and cognitive coping correlated with higher reports of disordered eating. These results indicate that contraceptive method did not significantly relate to disordered eating, suggesting no significant relationship between contraceptive method and disordered eating. The effects found in the regression analyses appear to be driven by the effects of behavioral coping and cognitive coping on disordered eating

Table 2

Linear regression effect contraception method on disordered eating

Model		*B*	SE	*t*	*p*
1	Constant	.00	.04	.00	1.000
	Contraception method	.03	.04	.83	.405
	Age	-.01	.04	-.25	.806
	Social support	-.06	.04	-1.27	.205
	Behavioral coping	-.14	.04	-3.04	.002
	Cognitive coping	-.17	.04	-4.01	<.001

Dependent variable: Disordered eating

Note: All variables have been standardized before analyses

Next, the effect of contraceptive method on past mental health problems was analyzed. A regression model was estimated, treating current contraceptive method as the predictor and past mental health problems as the outcome variable ('a' in Figure 1 above). This analysis controlled for potential confounding variables such as age, social support, behavioral coping, and cognitive coping. This step provides insight into the relationship between contraceptive method and past mental health problems. The regression model (see Table 3) was significant, $F(5, 584) = 11.90$, $p < .001$, explaining 9.3% of the variance in past mental health problems ($R^2 = .093$). After adjusting for the number of predictors, the explained variance was approximately 8.5% (adjusted $R^2 = .085$). From the ANOVA, it can be concluded that the variables contraceptive method, age, social support, behavioral coping, and cognitive coping combined have a significant predictor on past mental health problems. However, when considering the individual effect of each variable, contraceptive method does not significantly relate to past mental health problems ($B = -0.04$, $t(584) = -0.95$, $p = .341$). In contrast, age ($B = 0.14$, $t(584) = 3.41$, $p < .001$), social support ($B = -0.10$, $t(584) = -2.35$, $p = .019$), and cognitive coping ($B = -0.19$, $t(584) = -4.48$, $p < .001$) significantly relate to past mental health problems. Both social support and cognitive coping have negative effects, suggesting that lower scores are associated with higher reports of past mental health problems. Conversely, age shows a positive effect, indicating that older individuals report higher levels of past mental health problems. These results suggest that contraceptive method does not significantly relate to past mental health problems and thus, there appears to be no significant

relationship between contraceptive method and past mental health problems. The significant predictors observed in the ANOVA are attributable to the effects of age, social support, and cognitive coping on past mental health problems.

Table 3

Linear regression effect contraception method on past mental health problems

Model		B	SE	t	p
1	Constant	.00	.04	.00	1.000
	Contraception method	-.04	.04	-.95	.341
	Age	.14	.04	3.41	<.001
	Social support	-.10	.04	-2.35	.019
	Behavioral coping	-.03	.04	-.79	.432
	Cognitive coping	-.19	.04	-4.48	<.001

Dependent variable: Past mental health problems

Note: All variables have been standardized before analyses

Another regression model was estimated, treating past mental health problems as the predictor and current disordered eating as the outcome variable. Indicated by 'b' in *Figure 1* above. Additional control variables, contraceptive method, age, social support and behavioral coping and cognitive coping styles, were included in this analysis. This step provided insights into the relationship between past mental health problems and current disordered eating. The regression model (see Table 4) was significant, $F(6, 584) = 16.07$, $p < .001$, explaining 14.3% of variance in disordered eating, $R^2 = .143$. After adjusting for the number of predictors, the explained variance was approximately 13.4%, adjusted $R^2 = .134$. From the ANOVA it can be concluded that the variables past mental health problems, contraceptive method, age, social support, behavioral coping and cognitive coping combined have a significant predictor on disordered eating. When considering all the variables individual effect on disordered eating, past mental health problems has a significant relationship on disordered eating $B = 0.27$, $t(584) = 6.57$, p <.001. Indicating that the number of reported past mental health problems has a positive effect on disordered eating, suggesting that the higher scores of past mental health problems, relate to higher scores on disordered eating. Furthermore, behavioral coping has a significant predictor on disordered eating, $B = -0.13$, $t(584) = -2.93$, $p = .003$. Cognitive coping has a significant predictor on disordered eating, $B = -0.12$, $t(584) = -2.89$, $p = .004$.

Bothe effects are negative, suggesting that the lower the behavioral coping and cognitive coping scores, the higher the reports on disordered eating. These results indicate that the number of reported past mental health problems has a significant predictor on disordered eating. Therefor there is a significant relationship between the number of reported past mental health problems and disordered eating.

Table 4

Linear regression effect past mental health problems on disordered eating

Model		*B*	SE	*t*	*p*
1	Constant	.00	.04	.00	1.000
	Past mental health problems	.27	.04	6.57	.000
	Contraception method	.04	.04	1.12	.262
	Age	-.05	.04	-1.17	.241
	Social support	-.03	.04	-.67	.504
	Behavioral coping	-.13	.04	-2.93	.003
	Cognitive coping	-.12	.04	-2.89	.004

Dependent variable: Disordered eating

Note: All variables have been standardized before analyses

Finally, the mediating role of the number of reported past mental health problems in the relationship between contraceptive method and current disordered eating was tested add reference of the paper explaining this method of testing the indirect effect, also cite it in Analysis section (see Table 5). Indicated by ‘c’’ in Figure 1 above. Mediation analyses was conducted using the PROCESS macro in SPSS, estimating the indirect effects of current contraceptive method on current disordered eating through past mental health problems, while controlling for potentially confounding variables of age, social support and coping style. The bootstrapping procedure, with 5000 resamples, was applied to estimate confidence intervals for the indirect effect, providing a robust measure of the uncertainty around the estimates. Linear regression models were conducted to investigate the direct effects of contraceptive method on disordered eating while controlling for covariates age, social support, behavioral coping, and cognitive coping. The model explained 14.29% of the variance in disordered eating, $F(6, 578) = 16.07$, $p < 0.001$. The direct effect of contraceptive method on disordered

eating was not statistically significant ($B = 0.04$, $t = 1.12$, $p = 0.262$), indicating that there is no relationship between hormonal contraceptive use and disordered eating. Furthermore, mediation analysis was performed to examine the indirect effect of contraceptive method on current disordered eating through the mediator the number of reported past mental health problems. The indirect effect was found to be not statistically significant (Estimate = -0.01, BootSE = 0.01, 95% CI [-0.03, 0.01]), suggesting that the number of reported past mental health problems do not mediate the relationship between hormonal contraceptive use and current disordered eating. In summary, the results suggest that hormonal contraceptive use does not have a significant direct or indirect effect on current disordered eating through the number of reported past mental health problems, indicating no mediation. This means that the relationship between hormonal contraceptive use and current disordered eating is not significant, either directly or indirectly through the number of reported past mental health problems.

Table 5

Direct and indirect effect of contraceptive method on current disordered eating through past mental health problems.

Effect	Estimate	Std. Error	*t*	*p*	95% CI Lower	95% CI Upper
Direct	0.04	0.04	1.12	0.262	-0.03	0.12
Indirect	-0.01	0.01	NA	NA	-0.03	0.01

Note: Dependent variable: disordered eating; Independent variable: contraceptive method; Mediator variable: past mental health problems

All variables have been standardized before analyses

It is important to note that in all analyses, cognitive coping was significantly associated with both mental health problems and current disordered eating. This suggests that higher scores of cognitive coping are associated with lower reports of mental health problems and current disordered eating, controlling for other factors in the model. It is important to note that while this relationship is statistically significant, it does not establish causation, and further research may be needed to fully understand this association.

Discussion

The study aimed to explore the relationships between contraceptive use, past mental health problems, and current disordered eating. Analyses controlled for potential confounding variables, including age, social support, and cognitive and behavioral coping.

This study found no relationship between contraceptive use and disordered eating. There was also no relationship found between contraceptive use and past mental health problems. A relationship between past mental health problems and current disordered eating was found. However past mental health has shown to have no mediating role for the potential relationship between contraception method and disordered eating.

In sum, while the study controlled for known relationships with the main variables, the primary focus of contraceptive use, past mental health problems, and current disordered eating did not show the expected relationships, calling for future studies with different approaches. The implications and limitations of this study will be discussed per research question below.

Research question 1

The first research question of this study questioned the relationship between contraceptive use and current disordered eating. Despite the significant regression model, it was found that the effect of contraceptive use on current disordered eating was not statistically significant when controlled for potential confounding variables including age, social support, and cognitive and behavioral coping. This suggests that there is no direct relationship between contraceptive use and current disordered eating, contradicting several previous studies (Bengsdotter et al., 2018; Bird & Oinonen, 2011; Hall et al., 2013; McVay, Copeland & Geiselman, 2011). A possible explanation for this discrepancy could be the variability in the demographic characteristics of the study population. The present study considered a older range of age groups (18-39 years), which could potentially dilute the effect of contraceptive use on current disordered eating. A more focused study, specifically concentrating on age groups that are commonly associated with the onset of eating disorders (14-24 years) (Galmiche et al, 2019), might reveal different results.

Another critical factor to consider is the specific type of contraception used. Different hormonal contraceptives contain varying compositions and dosages of hormones, which may

differentially affect physiological and psychological parameters. Moreover, the duration of contraceptive use could also play a role. Extended use of hormonal contraceptives might lead to cumulative effects or might show a different trajectory in terms of side effects compared to short-term use. Additionally, the temporal relationship between the onset of contraceptive use and the start of disordered eating symptoms is essential to establish causality. Retrospective studies might introduce recall bias, while longitudinal studies can better delineate the sequence of events and determine causality. Future research should be meticulously designed to capture these nuances, thereby providing a clearer understanding of the potential relationship between contraceptive use and disordered eating.

Importantly, the findings do not undermine the influence of contraceptive use on health outcomes. They do, however, suggest that this influence may not be direct or may only exist under specific conditions or in combination with other factors. Notably, the regression model revealed a significant predictor of behavioral and cognitive coping on current disordered eating. These findings align with prior research indicating that more maladaptive coping is associated with a higher likelihood of current disordered eating (Gloria & Steinhardt, 2016; Han et al., 2023; Hernando et al., 2019; Kelly, Lydecker & Mazzeo, 2012; McFillin et al., 2012). This emphasizes the importance of psychological factors in understanding and managing current disordered eating. Interventions aiming at enhancing healthy coping skills could be beneficial in preventing or mitigating current disordered eating behaviors, but this is subject to future research. The apparent lack of a direct relationship between contraceptive use and current disordered eating could possibly give some counter weight to the rising online discourse on the side effects of hormonal contraception (Le Guen et al., 2021; Schneider-Kamp & Takhar, 2023).

Research question 2

Moreover, this study aimed to investigate the research question on the relationship between contraceptive use and past mental health problems. Our findings revealed no significant relationship between the method of contraception and past mental health issues. This outcome aligns with previous research conducted by McCloskey et al. (2021) and Wit et al. (2020), which similarly reported no influence of past mental health problems on the choice of contraceptive methods. Nonetheless, this finding appears to contradict other studies which posited an association between hormonal contraception use and a rise in mental health issues (Bengsdotter et al., 2018, Toffel et al., 2020). It's important to note, however, that the majority

of these studies primarily measured current episodes of mental health problems in relation to contraceptive use, leaving a gap in research exploring the relationship between past mental health issues and contraceptive use. The lack of a discovered relationship in our study does not definitively exclude the existence of one. Rather, it may suggest that it was not observed within our particular participant group. The scope of our research question, which sought to understand any ever-occurring past mental health problems, could still encompass relatively recent issues. Furthermore, our study did not consider potential contraceptive discontinuation due to past mental or physical health problems or dissatisfaction with the chosen contraceptive method. This oversight introduces potential selection effects. Selection effects refer to biases introduced by the way participants are selected or self-select into groups based on certain attributes. In this context, individuals who might have discontinued contraceptive methods because of past mental health issues may not have been adequately represented in our sample, thus leading to potential underestimations of the link between past mental health and contraceptive use.

To overcome this limitation, future research could employ stratified sampling techniques to ensure adequate representation of participants who discontinued contraceptive use due to mental or physical health problems. Additionally, prospective cohort studies that longitudinally track individuals' contraceptive choices, discontinuations, and associated reasons for these decisions, would provide clearer insights into the interplay between past mental health problems and contraceptive use. Moreover, gathering qualitative data through interviews or open-ended surveys can delve deeper into the motivations and experiences of participants, offering richer context and helping to untangle the complex interactions between contraceptive choice, discontinuation, and past mental health experiences

Also for future research, a more targeted study design is suggested. It could take into account both past and present mental health problems, as well as past or present contraceptive discontinuation and satisfaction levels. This would also include an examination of participants' motivations for choosing one contraceptive method over another.

Research question 3

The third research question was formulated to investigate the relationship between past mental health problems and current disordered eating, while controlling for the effect that contraceptive use has. The results showed that there is a positive relationship between past

mental health problems and current disordered eating, even after controlling for the confounding variables of age, social support, cognitive and behavioral coping and contraceptive method. This study found similar results to previous research, indicating that past mental health problems are positively associated with current disordered eating (Bengsdotter et al.,2018; Toffel et al., 2020). This means that higher reports of past mental health problems indicate higher scores for current disordered eating. This finding would be expected, seen as disordered eating is classified as a mental health problem. There has been copious research on the relationship between disordered eating and past mental health problems (Friborg et al., 2014; Martinussen et al., 2017; Bahji et al, 2019). Within this study only broad conclusions can be drawn as to the total of mental health problems. For future research it would be interesting to investigate specific symptoms such as anxiety, depression, compulsions and mania in their relationship to disordered eating and contraceptive use. This would give more insight into the individual differences in mental states and their approaches to different contraceptive methods.

Research question 4

The main focus of this study and the final research question was to investigate if the potential relationship between contraceptive method and current disordered eating is (partially) mediated by past mental health problems. From the results it can be seen that there is no direct relationship between contraceptive method and current disordered eating. And also, that there is no direct relationship between contraceptive method and past mental health problems. Furthermore, the relationship between past mental health problems and current disordered eating is significant, however this does not mean that the relationship between contraceptive method and current disordered eating is mediated by past mental health problems. In this study both the direct and indirect effect is statistically non-significant. Therefor the answer to this research question has to be that past mental health problems does not mediate the potential relationship between contraceptive method and current disordered eating. This result is unexpected based on previous research (Hall et al., 2013; McVay, Copeland & Geiselman, 2011). They have all found that contraception and disordered eating are related in one way or another. On the other hand, this study has similar results to the study that found that frequent use of oral contraception was low in woman who recently received care for eating disorders, this study found that past mental health does seem to have an effect on current disordered eating. However, contrary to the finding of Hall et al. (2013) and

McVay, Copeland and Geiselman (2020) the results of this study have not found a relationship with contraceptive use. The latter may be due to the fact that only current method of contraception was asked. For future research, satisfaction with contraceptive method and consistency of contraception use should be considered in the analyses as well. The conclusion from the mediation analyses remains that the relationship between contraceptive method and current disordered eating is not (partly) mediated by past mental health problems.

Implications and limitations

The study design has several strong aspects to which it would be acceptable to believe that the findings from this study would be found in the general population. Firstly, the sample has been taken from the student population from occupational, applied science and university institutions. It gives a broad view of the overall student population and resulted in a large sample size. Furthermore, specific to the interest of this study into contraceptive methods and disordered eating behavior, most respondents have the age in which both reproduction decisions and possible disordered eating is most relevant. And most importantly the extensive amount of information that has been collected through the baseline questionnaire. This gave the opportunity to investigate several different aspects of the relationship between contraceptive methods, current disordered eating and past mental health problems as well as control for relevant confounders.

However, the current study also has some limitations which could result in different findings when replicating this study. Firstly, the decision to add up the amount of mental health problems ever to a total score. This made it possible to perform a comprehensive analysis but does not give any insight into what type of previous mental health problems have more or less effect. For example, it could be possible that a past disordered eating and depression does mediate the relationship between contraceptive method and current disordered eating, but that anxiety and mania does not mediate that relationship. Secondly, grouping the respondents into hormonal oral contraception and non-hormonal contraception provides limited insight into the nuanced effects of different contraceptive types on disordered eating. The contraceptive landscape has evolved significantly since the 1960s, when the first hormone-based pill was introduced (Le Guin et al., 2021). Initial concerns about cancer risks and cardiovascular incidents led to significant media coverage and public concern, famously dubbed "pill scares" (Le Guin et al., 2021). In response, pharmaceutical companies introduced

products with lower doses of estrogens and also introduced progestin-only contraceptives like injectables, implants, and hormonal IUDs. However, the transition wasn't without issues. Newer estro-progestin contraceptives, although marketed as safer, were later found to have a higher thromboembolic risk than the older variants (Le Guin et al., 2021). Further complicating matters, some progestin-only methods faced controversies due to adverse physical side effects and increased risks of depression (Le Guin et al., 2021). These shifts in contraceptive formulation and associated controversies might explain the variability in literature conclusions. Over the years, the primary focus of health professionals and policymakers has been on the efficacy of contraceptives in preventing unintended pregnancies, sometimes at the expense of considering potential side effects or prioritizing patient-centered approaches (Le Guin et al., 2021). Given the diverse types of oral contraceptives and their evolving formulations over the years, future research focusing on specific types of hormonal contraception would not only require a larger sample size but also a keen understanding of the historical and medical context surrounding each type. This would help ensure the findings are rooted in the complexities of contraceptive choices and their potential side effects.

A major limitation of the current study is the cross-sectional nature of the study design. This design can establish correlations between different variables at a given point in time but cannot infer causation or directionality. In this case, it’s possible that current disordered eating could be influencing the choice of contraceptive method, rather than the other way around. A prospective cohort study design, where participants are followed over time, would be more informative in determining causal relationships. Moreover, the reliance on self-reported data is another limitation to consider. While this approach is cost-effective and practical, it can be prone to recall bias and social desirability bias, where participants might underreport or overreport certain behaviors or experiences to present themselves in a more favorable light. Additionally, despite efforts to control for confounding factors, there could still be some unmeasured or residual confounding that might relate to the study findings. For instance, socioeconomic status, lifestyle factors such as diet and exercise, or access to healthcare could also be influencing both contraceptive use and current disordered eating, which the study may not have adequately controlled for. Lastly, although the study has a large sample size and is nationally representative of a student population, cultural, regional, and international differences may limit the generalizability of the study's findings. Hormonal contraceptive use and prevalence of eating disorders can vary greatly by region and culture.

Therefore, the findings might not be applicable to populations with different cultural backgrounds or healthcare systems. Future research could benefit from including more diverse populations to improve generalizability.

Conclusion

In conclusion, this study attempted to investigate the relationship between contraceptive use, past mental health problems, and current disordered eating behaviors. Despite the comprehensive approach and control for numerous confounding variables, the study did not find significant direct or indirect effects of contraceptive use on current disordered eating behaviors through past mental health problems. It was observed that the relationship between these variables was primarily influenced by factors such as age, social support, cognitive and behavioral coping, which were seen to play significant roles in the occurrence of past mental health problems and current disordered eating behaviors. Notably, no evidence was found supporting that past mental health problems mediated the relationship between contraceptive use and current disordered eating. Nevertheless, these findings should not discourage the exploration of potential connections between contraceptive use and eating disorders, as the results do not necessarily rule out these relationships in the general population. Several limitations were identified in this study, which could be addressed in future research to provide a more nuanced understanding. These include a more comprehensive exploration of past mental health problems, closer examination of the specific types of contraceptives used, the influence of socioeconomic status, lifestyle factors, and the application of a prospective cohort study design. It would be important to explore these relationships to better comprehend the complex interplay between contraceptive use, mental health, and disordered eating. Future studies should build on the findings and limitations of this study, focusing on more targeted populations, diverse cultural backgrounds, different types of contraceptives, and specific types of mental health problems. These efforts could ultimately aid in informing more effective strategies for mental health and eating disorder prevention, intervention, and treatment in populations that use contraceptives.

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Appendix A

Multicollinearity check

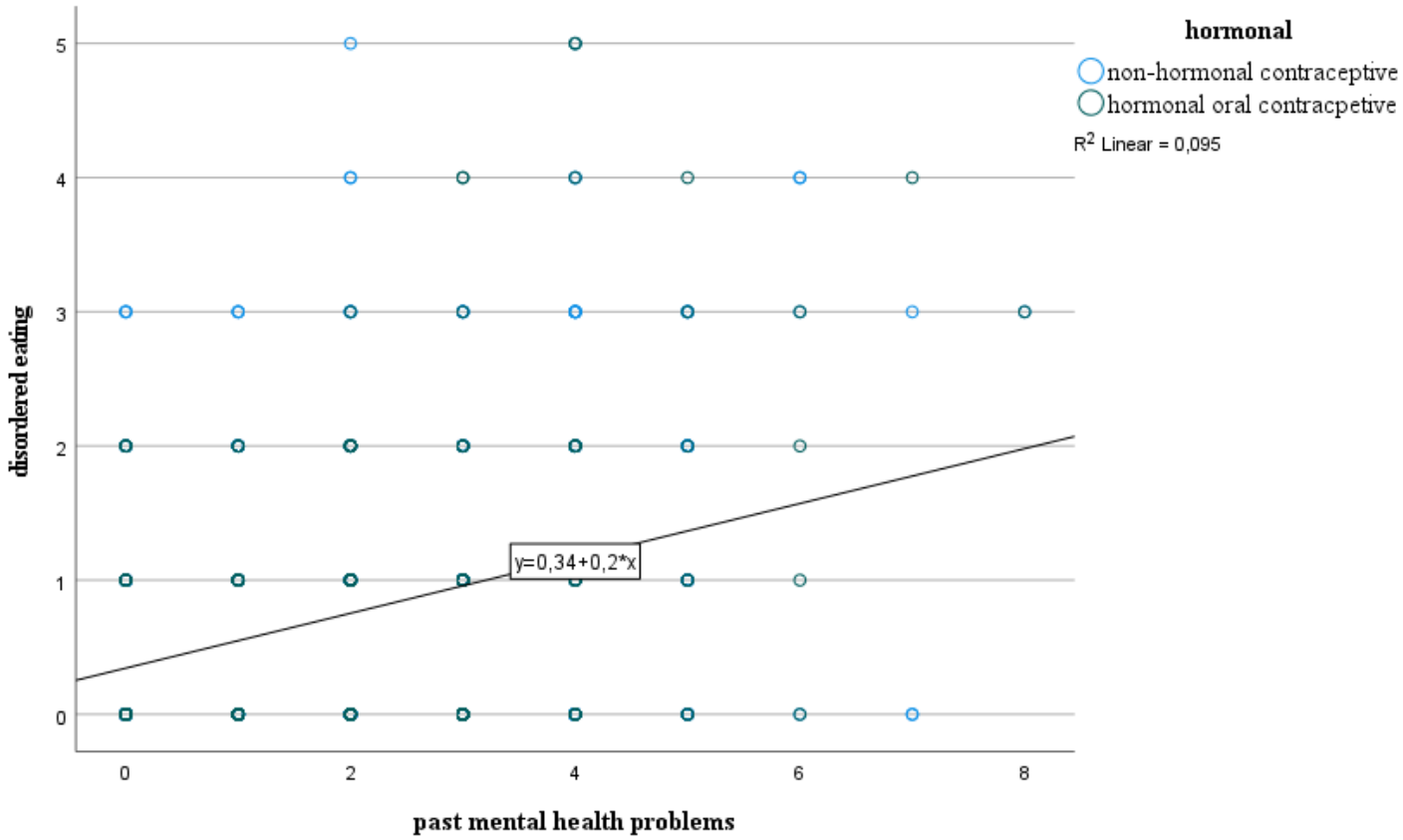
Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	9,625E-16	,038		,000	1,000		
	Zscore(age)	-,046	,039	-,046	-1,173	,241	,965	1,036
	Zscore(mh_prob_ever_sum)	,266	,040	,266	6,574	<,001	,907	1,103
	Zscore(Socsup_total)	-,028	,042	-,028	-,669	,504	,822	1,216
	Zscore(berq_total)	-,126	,043	-,126	-2,933	,003	,797	1,255
	Zscore(cerq_total)	-,123	,043	-,123	-2,884	,004	,819	1,221
	Zscore(hormonal)	,044	,039	,044	1,123	,262	,979	1,021

[a]. Dependent Variable: Zscore(scoff_tot)

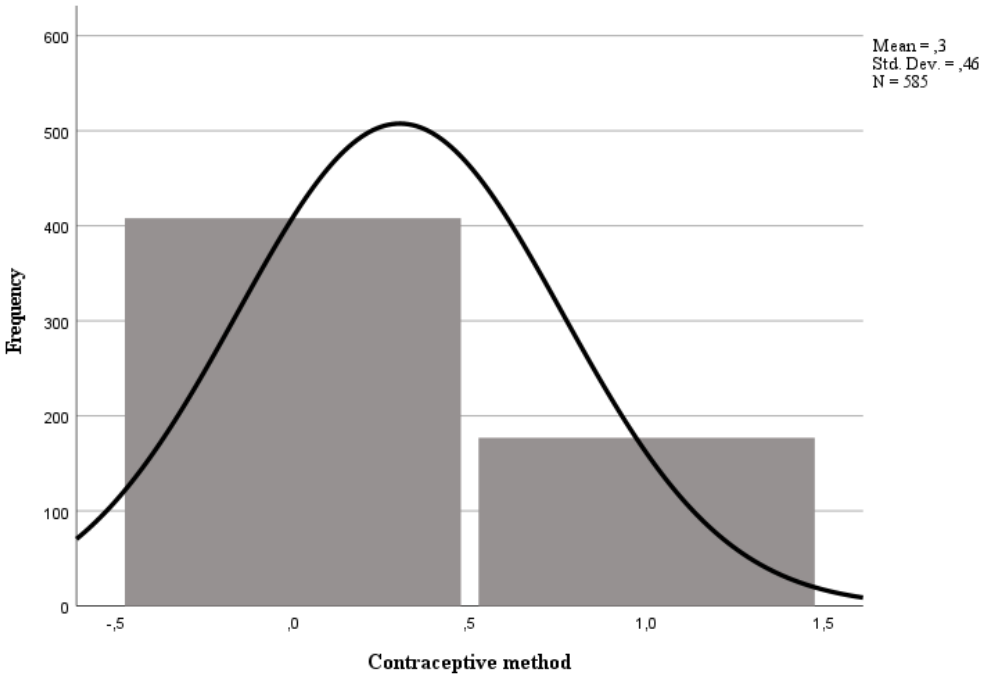
Appendix B

Scatterplot past mental health problems and disordered eating



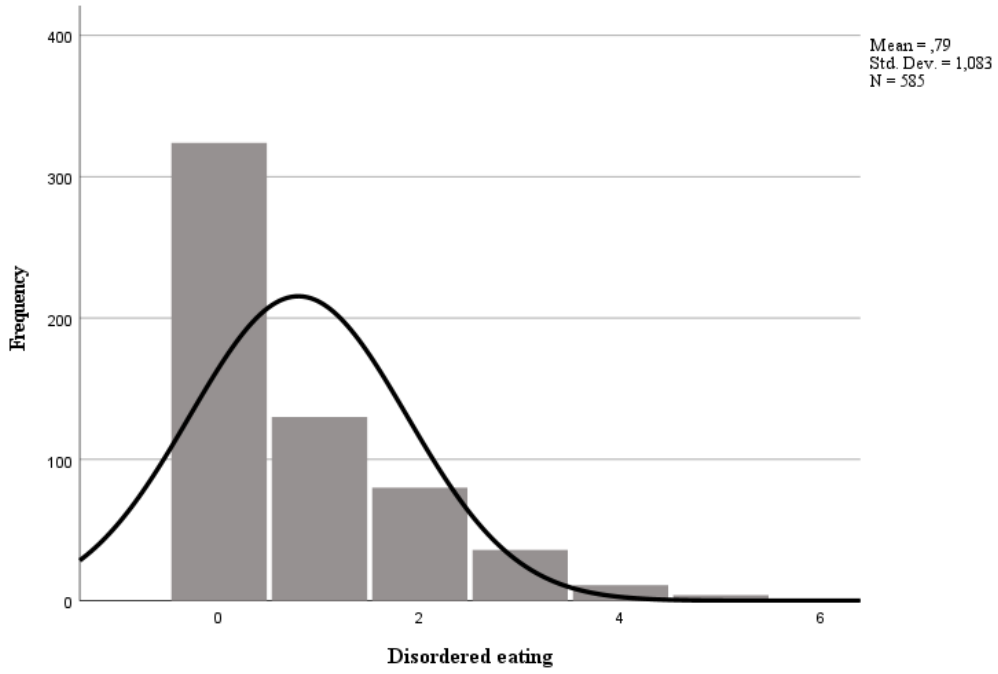
Appendix C

Histogram contraception method



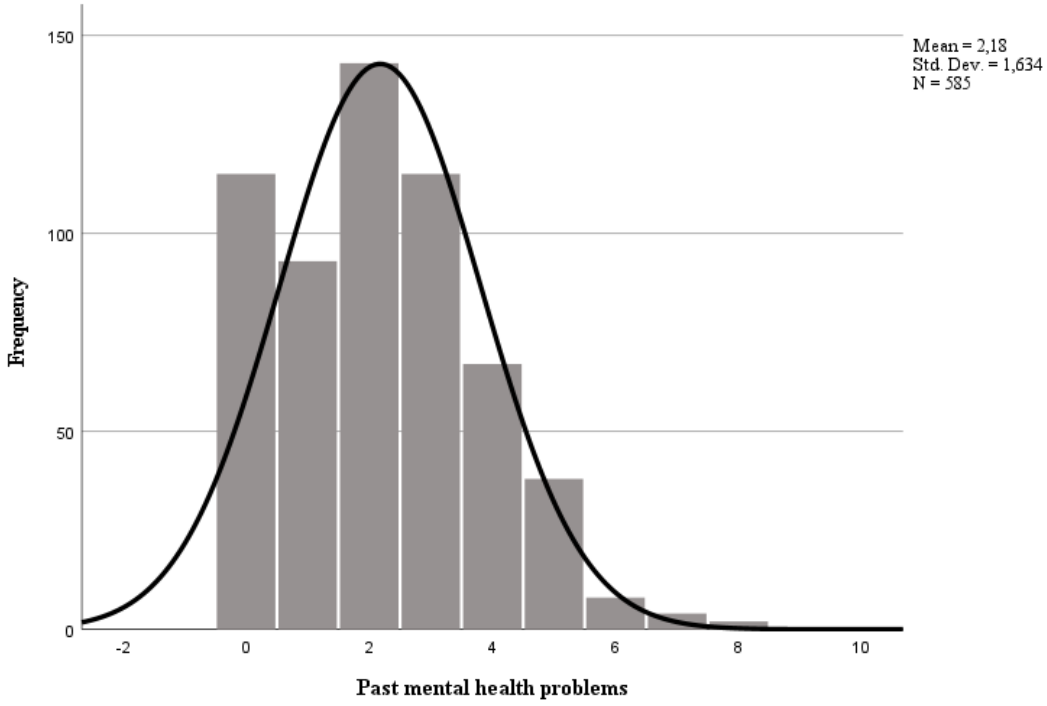
Appendix D

Histogram disordered eating



Appendix E

Histogram past mental health problems


150
100
50
0
Frequency
-2
0
2
4
6
8
10
Past mental health problems
Mean = 2,18
Std. Dev. = 1,634
N = 585