

# Empowering Iraqi Female Students Toward Healthier Preconception Behaviors

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This study explores the efficacy of a health beliefs model-based intervention in enhancing pre-pregnancy health behaviors among female college students at the University of Baghdad's English Department. Despite initial similarities in health behaviors between the control (n=72) and experimental (n=72) groups, significant improvements were observed in the experimental group post-intervention, indicating a successful impact of the intervention on health behaviors (first posttest:  $p < 0.001$ ; second posttest:  $p < 0.001$ ). Conducted from October 2023 to March 2024, this randomized controlled trial utilized pretests, posttests, and intervention sessions to evaluate outcomes. Results underscore the potential of incorporating such targeted health programs into existing university health curricula to foster better pre-pregnancy health practices among young women, thereby improving long-term health outcomes. This intervention fills a crucial gap by demonstrating sustainable behavior change, which is essential for proactive health management in this demographic.

**Keywords:** Expanded Health Belief Model, Preconception, Health Behaviors, Female Collegians

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## INTRODUCTION

Women's preconception health, which is the health status of women before pregnancy, plays a vital part in the determination of maternal and child outcomes. Within the predominant demographic groups, female students at college as the minority groups have health behaviors that can have a significant impact on their preconception health (Southern et al., 2021). The reproductive and maternal health of female university students is highly dependent on their preconception health behavior, which therefore needs to be well-known and promoted among them (Barker et al., 2018). Youth female students in college are, in many cases, at a stage of their lives, where they are finding a balance in the social, academic, and personal spheres (Mohr et al., 2023). What the person does and the habits he/she takes at this phase of life are some of the major factors that can control their future reproductive health (Power et al., 2021). Based on the analysis of the Centers for Disease Control and Prevention (CDC), having healthy habits before pregnancy helps to minimize the risk of poor maternal and infant outcomes, as the agency reports. Thus, it is paramount to scrutinize the health behaviors of female collegians to get an idea of the areas that would need to be intervened and supported (Saidi et al., 2021). The studies show that factors like diet, physical activity, substance use, psychology, and health care services are the main contributors to preconception health. Balancing the diet of female collegians with the nutrient-rich foods that are required for reproductive fitness is essential. A well-balanced nutrition can increase the chances of getting pregnancy and lower the risk of a baby having birth defects (Atrash et al., 2020; Kandel et al., 2021). As well as that, numerous studies have been carried out, which show that regular physical activity is a very important element of the lives of female collegians and it is directly connected with reproductive health (Power et al., 2021).

Of the available health belief models, the Expanded Health Belief Model (EHBM) has emerged as a comprehensive framework that combines individual perceptions, cues to action, and self-efficacy as predictors of health-related behaviors (Tosh et al., 2023). The Health Belief Model (HBM), which forms the foundation of the EHBM, asserts that people will be more likely to take preventive measures if they perceive the health risk to be severe, they believe that the health risk is susceptible to certain individuals and they are convinced that preventive actions will benefit them (McHugh et al., 2020; Kader & Faraj, 2023). The EHBM contributes to the aforementioned factors by incorporating other factors such as self-efficacy, modifying factors, and cues to action making the theoretical foundation of health interventions very strong (Niama & Naji, 2022). Because this framework is used to fill gaps in the current research that narrowly focuses on female college students, who need interventions of this nature, this study aims to apply this

framework to the context of preconception health (Athbi & Hassan, 2019). Randomized control trials being the most reliable, rigorous, and the gold standard for evaluating the effectiveness of interventions, provide the best mechanism to evaluate cause and effect relationship (JumaElywy & Naji, 2023; Faghih et al., 2024). In this study, the randomized controlled trial design is used to determine the effect of the EHBM-based intervention on the health behaviors of the female college student population. Randomization which is the most successful method in reducing bias and confounding variables strengthens the internal validity of the study, therefore other factors do not interfere with the relationship between the intervention and outcomes and it is possible to draw a conclusion about the causation of the relationship.

## METHODOLOGY

### Study Design

A Randomized controlled trials study design was employed, utilizing an adopted pre-post-test I and II approach for both the study and control groups was conducted during the period from October 1st, 2023 to March 11th, 2024.

### Study Sitting and Sample

The research was conducted only in Baghdad University at the College of Languages, Department of English. Non-probability "purposive" sampling which is the type of sampling method purposefully considering the accuracy and the representativeness of the data to be collected was employed. The female student's sample was taken, and there was a total of 144 participants, where 72 for each group. The research activity involved forming one group as the study group and forming the other as the control group.

### Procedure

The investigation was carried out at Baghdad University at the College of Languages, Department of English. A questionnaire was used in an answer-close form, and upon interrogating a group of 10 female students, it was discovered that 80% of them had suboptimal awareness towards preconception healthy behaviors. While indicating the targeted interventions the urgency is also indicated. The intervention-based health belief model is then instigated after a careful study of the needs and review of relevant literature, including expert suggestions. The program went through a series of revisions resulting in best practices the expert group considered that the intervention was a perfect fit for female students of reproductive age. The intervention-based health belief model, as well as improvements in the female student's awareness of preconceptions, is very critical for those age groups in this specialized field.

## Study Instruments

This questionnaire consists of two parts including the following.

Part I: Socio-demographic characteristics include students' age, grade, living arrangement, and socio-economic status.

Part II: Preconception healthy behaviors were adopted and modified, measured on a 5- Likert scale, the higher average indicates a good healthy behavior. The questionnaire was validated by experts and then its reliability was verified through a pilot study. The Cronbach-alpha value at current was 0.81 which indicates higher reliability.

## Data Collection

All female participants, encompassing both the experimental and control groups, completed a demographic data form to provide essential background information. During the subsequent pretest session lasting approximately 25-30 minutes, each student's preconception health behaviors were assessed to establish a baseline measure. The participants from both groups shared classroom sessions to facilitate their engagement in the health beliefs model intervention. The experimental group further underwent a comprehensive thirty-question test designed to evaluate their preconception behaviors. Classroom sessions were conducted, lasting between one hour and one and a half hours, to ensure an ample platform for the intervention and discussions on health beliefs.

## Statistical Analysis

Data collection from the sample was carried out using SPSS-24 and MS Excel (2010), which were later analyzed using the statistical analysis tool. The presentation was descriptive and was done through tables, averages and standard deviation whereby data was presented and analyzed. To determine the average scores, the researcher also created categories using the mean as the foundation and used such terms as poor, moderate, and good. The inferential strategy entailed performance of the statistical analysis tools including the independent sample t-test, post hoc test, and eta square ( $\eta^2$ ). Using these tests, the researchers initiated the analysis of the relation between variables, determining differences in statistical values, checking against nominal standards, and calculating effect size. The most common significance level most tests were set to be 0.05.

## RESULTS AND DISCUSSION

### Result

[Table 1. About here.]

The findings reveal that the study group consisted of participants aged 19 to 24, with an average age of  $20.41 \pm 1.218$  years, while the control group also had participants within the age range of 19 to 24, with an average age of  $20.84 \pm 1.469$  years. A significant portion of both study (76.4%) and control (43.1%) groups were in their second year of the study. In terms of living arrangements, a majority of participants in both the study (72.2%) and control (79.2%) groups resided with their parents. Regarding socio-economic status, the majority of study participants fell within the lower-middle class category, comprising 66.7% in the study group and 61.1% in the control group.

[Table 2. About here.]

In the study group, initial observations revealed that 75 % of female university students exhibited a low response towards preconception health behaviors during the pre-test period, conducted before the experimental controlled trial. Following the trial in the post-test I, the findings demonstrated a notable shift, with 61.1% expressing fair responses. Subsequently, a month later, these students displayed the same responses as posttest I. Contrastingly, in the control group, the initial findings indicated that 77.8% of female university students had low responses. This trend persisted in post-test I, where the same percentage (76.4%) continued to express low responses. Notably, after a month had elapsed, the control group's responses remained consistent, with a percentage (72.2%).

[Table 3. About here.]

The findings indicate there was no statistically significant difference in the enhancing preconception health behaviors of female collegians between the study group ( $2.14 \pm 0.349$ ) and the control group ( $2.11 \pm 0.329$ ) at pretest time ( $t=0.633$ ;  $p=0.528$ ), with the absence of a substantial effect size ( $\eta^2= 0.00$ ). However, there were significant differences in such perceived behaviors between the study ( $3.53 \pm 0.493$ ) and control groups ( $2.13 \pm 0.354$ ) in the posttest I ( $t=19.568$ ;  $p=0.000$ ), with a large effect size ( $\eta^2= 0.73$ ). Additionally, significant differences in such perceived behaviors persisted between the study ( $3.52 \pm 0.508$ ) and control groups ( $2.15 \pm 0.386$ ) at post-test II ( $t=18.124$ ;  $p=0.000$ ), accompanied by a large effect size ( $\eta^2= 0.69$ ).

[Table 4. About here.]

The female participants in the study group from the colleges exhibited a noteworthy variation in their enhancement of preconception health behaviors, as evidenced by significant statistical differences between the pretest and posttest I ( $p= .000$ ), as well as between the pretest and posttest II ( $p= .000$ ). Specifically, such preconception health behaviors in the posttest I significantly differed from that in the pretest ( $p= .000$ ) and

did not differ significantly from that in posttest II ( $p = .870$ ). Similarly, such preconception health behaviors in the posttest II significantly differed from that in the pretest ( $p = .000$ ) and did not differ significantly from that in posttest I ( $p = .870$ ).

In contrast, the female participants in the control group showed no significant statistical differences in preconception health behaviors between the pretest and posttest I ( $p = .737$ ) or between the pretest and posttest II ( $p = .463$ ). Specifically, such preconception health behaviors in posttest I did not statistically differ from that in the pretest ( $p = .737$ ) or posttest II ( $p = .690$ ). Likewise, such preconception health behaviors in posttest II did not differ significantly from that in the pretest ( $p = .463$ ) or posttest I ( $p = .690$ ).

## DISCUSSION

### Socio-Demographic Characteristics of the Study Sample

The assessment of healthcare attitudes in female students from a college demonstrates a strong similarity among them, particularly in terms of age range, which is 19 to 24 years. The participants and the control group show just a narrow age range with the participant average being  $20.41 \pm 1.218$  years and the control group having an average of  $20.84 \pm 1.469$  years. Such homogeneity increases the likelihood of validity of the findings to the young women who fall within the given age range. In the same vein, the Al-Rusafa Education directorate confirms the findings of the research, and it was discovered that the age groups of most students in the study cohort were in line with the demographic characteristics of the research (Faghih et al., 2024).

The study is going to compare two groups, the study group is almost 76.4% second-year students and the control group is more than 43.1% second-year students. The contraction in the second year points to its possible weightiness, implying that targeted interventions and educational programs, on preconception health behaviors, are needed. The paper ascertains the significance of researching those factors that may occur in the second year of college and can be the reason for the trends. Another study in Al-Nasiriyah City, Iraq, by the College of Education for Pure Sciences, shows that the participants' language level was also at the intermediate stage (Karim & Naji, 2018).

The type of living that college women have with their parents, mainly their behavior before pregnancy, is critical in shaping preconception health behaviors. In both the study and the control study, 72.2% and 79.2% of the respondents respectively indicated that they are still living with their parents. This shows that the family and support system are still the most influential factors in determining the attitudes and practices of the youth. Bringing the research in line with similar findings among students of Baghdad and the University of Mosul demonstrates that such a pattern is a cultural norm for this age and education

stage (Ahmed & Naji, 2023; Muhealdeen, 2023). By getting the picture of how home settings predispose to healthy or unhealthy habits one can use that information for targeted approaches. Studies are therefore required into the actualities of the abovementioned problems and the establishment of a sound model of issues linked to this life stage.

The present research indicates the importance of socioeconomic status on the depreciation of preconception health among female college students. The research suggests a relatively big number of participants belonging to the lower-middle class which makes me conclude that financial barriers are a major problem when it comes to health care that is required before conception. The study highlights the role the policymakers and health care professionals in identifying and addressing the distinct issues that the lower-middle class encounters. This specific socio-economic group can be the focus of targeted efforts which can be aimed at reducing the impact of the financial constraints on their access to resources that are critical for them to get optimal preconception health. The study output is evidenced by the same observations in other locations, which proves the existence of interventions designed for the socio-economic reality of this group (Raa'd, 2022; Salih & Noori, 2021).

### Overall Preconception Health Behaviors of Female Collegians

The intervention type that investigates the preconception health behaviors of female students from the university, which is experimental, produced very exciting results that suggest the effectiveness of this intervention type. The initial report demonstrated a cause for alarm, and it was discovered that 75% of the participants had very poor levels of preconception health practices in the pre-test period. This showed that it was rather obvious that women were less aware of health issues or were less likely to be involved with these issues before their pregnancy. This is the same finding confirmed by many studies aimed at determining the level of health education on reproductive health among university students (Abed & Abd, 2021). Individuals who have enacted the controlled trial will find that their attitude toward positive behavior is significantly different post-trial. The posttest showed that the percentage of participants with fair responses was 61.1%, and this could be considered a step forward for the participants as they know the significance of preconception health behaviors. It has been just a few weeks to realize that this positive change might be a key factor that proves that the applied interventions may achieve the expected goals by changing health-related behaviors (McHugh et al., 2020).

To ensure the sustainability of the change, a post-test II, which was administered after a month, was further conducted to follow up on the observed change. Interestingly, the same students in the study group responded fairly, which may be an indication of the durable effects of the intervention on preconception health practices. This persistence is in line with the concept of behavior change maintenance by making it clear that

creating and maintaining a long-term positive health outcome requires a sustained effort.

Whereas, the control group showed a decreased trend over time. At the same time, the first results showed that 77.8% of women in the control group had low levels of attitudes to preconception health behaviors. The proportion of subjects reporting low responses was notably high and remained largely unchanged in the test I post-test as 76.4% of them reported it. The absence of growth among control group members illustrates the need for a targeted intervention to have better behavioral changes in the context of preconception health. The constant 72.2% engagement low rate in the control group even in a month time after the study's completion showed that the behaviors of low engagement are persistent without any intervention. These results emphasize the design of such educational programs and interventions that will focus on the identifying and handling of university students' specific preconception health behavioral adoption and maintenance challenges.

### **Comparison the Preconception Health Behaviors of Female Collegians between Study and Control Groups**

The research was designed to examine the effectiveness of the initiatory program for increasing preconception health abilities among female collegians. The findings, based on the statistics, show there is no significant difference in the health behaviors of the study and control group at the pretest stage ( $t=0.633$ ;  $p=0.528$ ), with an effect size ( $\eta^2$ ) of 0.00. These findings indicate that the process of the intervention did not show plausible effects on the behaviors of the participants about preconception health.

However, the difference between the scores of the pre-and post-intervention tests showed that there was a marked improvement in the preconception health behaviors among the study group ( $3.53\pm 0.493$ ) compared to the control group ( $2.13\pm 0.354$ ) ( $t=19.568$ ;  $p=0.000$ ), with a large effect size ( $\eta^2$ ) Such a result reveals that the program has made a noticeable improvement of the preconception standard of health practices among female collegians right after the implementation.

Also, the 3-month-long effect of the intervention was observed in post-test II where there still were significant differences in perception of preconception health behaviors (study group means =  $3.52\pm 0.508$ , control group mean =  $2.15\pm 0.386$ ) ( $t=18.124$ ;  $p=0.000$ ) accompanied by a large This supports the idea that the results of the intervention were not only short-term but also that the effects of the intervention in the promotion and support of healthy behaviors in preconception health were durable over time.

The observed effects follow the realization of targeted interventions, which are the best strategy for enhancing health behavior among pre-pregnancy women (Pinar et al., 2020; Saidi et al., 2023). These findings point out, therefore, the possible outcome of interventions in

academic institutions, mostly in female college students, and, as well, they are added to the available literature on preconception health promotion.

Such studies provide a temporal perspective that shows the criticality of considering the period when evaluating the effectiveness of health programs. The fact that the initial period of an intervention is statistically insignificant is another indicator of the need for a more prolonged period to see some obvious changes. The fact that the effects are long-lasting and displayed in the posttest I and II confirms from a scientific perspective that the EHB-Based intervention is effective in promoting preconception health behaviors in the targeted population.

### **Comparison of the Preconception Health Behaviors of Female Collegians between Periods of Measurement**

The results of the study show that the experimental group made a remarkable and positive difference in the improvement of preconception health behaviors among college female participants. Data shows that the groups had statistical differences between the pre-test and post-test I ( $p= .000$ ) and between the pre-test and post-test II ( $p= .000$ ) which point out the effectiveness of the intervention in inducing behavioral changes in health. The findings of this study are consistent with the literature that has been recommending attention to preconception health as a means of promoting positive pregnancy outcomes (Hanson et al., 2017; Johnson et al., 2006). The lack of any noticeable differences between posttest I and posttest II ( $p = .870$ ) is further evidence of the continuity of positive effects of the intervention on preconception behavioral health.

On the other hand, the control group, just like the experimental group, did not show any statistical differences in preconception health behaviors, between the situation before the first test (pre-test I) and the situation after the first test (post-test I) ( $p = .737$ ), or between the situation before the second test (pre-test II) and the situation after the second test (post-test II) (The fact that the control group did not experience any substantial modifications in health behaviors is in line with the thesis that personalized interventions are a key factor that contributes to positive behavioral outcomes (Stephenson et al., 2018). The posterior probability of the lack of statistical differences in posttest I and posttest II among the control group ( $p= .690$ ) also indicated the continuity of preconception health behavioral practices over time in the absence of any specific interventions.

These findings add to the expanding base of evidence that advocates for the importance of tailored approaches in improving preconception health behaviors among women of reproductive age. The outcome of this research reinforces the notion that integration of such interventions in college institutions is important to equip women with adequate knowledge and skills that are vital for good preconception health. Nevertheless, we need to address the limitations of the research, like doing more research on the long-term effects and whether we can generalize the findings to all diverse populations or not.

## CONCLUSIONS

The Expanded Health Belief Model-Based Intervention was effective in enhancing preconception health behaviors among female collegians, as demonstrated by significant improvements in the study group compared to the control group. The positive effects were sustained over time within the study group.

## RECOMMENDATIONS

Enhancing the integration of this evidence-based intervention into established health programs is key to fostering proactive improvement in overall health outcomes within the specified target population. To effectively convey preconception health practices to female students, we propose the development of an engaging and informative handout. This resource will employ clear and straightforward language, complemented by eye-catching graphics, ensuring widespread distribution and comprehension among the intended audience.

## REFERENCES

- A. Abed, Hameda Najem, and Ibtisam K. Abd Ali. "Assessment of Associated Risk Factors with the Incidence Rate of Abortion Cases among Women at Maternity and Pediatric Hospital in Al-Diwaniyah City." *Iraqi National Journal of Nursing Specialties* 34, no. 2 (2021): 16-27.
- A. Ahmed, M. M., A. B. Naji, and N. M. Younis. "Efficacy of an educational program based on health belief model to enhancing weight control behaviors among employees in the University of Mosul: a randomized controlled trial." *Revis Bionatura* 8, no. 3 (2023): 28.
- A. Athbi, Hassan Abdullah, and Huda Baker Hassan. "Health beliefs of patients with coronary heart disease toward secondary prevention: the health beliefs model as a theoretical framework." *Indian Journal of Public Health Research & Development* 1, no. 1 (2019): 821-826.
- A. Atrash, Hani, and Brian Jack. "Preconception care to improve pregnancy outcomes: the science." *Journal of Human Growth and Development* 30, no. 3 (2020): 355-362.
- B. Barker, Mary, Stephan U. Dombrowski, Tim Colbourn, Caroline HD Fall, Natasha M. Kriznik, Wendy T. Lawrence, Shane A. Norris et al. "Intervention strategies to improve nutrition and health behaviours before conception." *The Lancet* 391, no. 10132 (2018): 1853-1864.
- F. Faghih, Masoumeh, Mohammad Hossein Kaveh, Mahin Nazari, Khadijeh Khademi, and Jafar Hasanzadeh. "Effect of health belief model-based training and social support on the physical activity of overweight middle-aged women: a randomized controlled trial." *Frontiers in Public Health* 12 (2024): 1250152.
- H. Hanson, Mark, Mary Barker, Jodie M. Dodd, Shiriki Kumanyika, Shane Norris, Eric Steegers, Judith Stephenson, Shakila Thangaratinam, and Huixia Yang. "Interventions to prevent maternal obesity before conception, during pregnancy, and post partum." *The lancet Diabetes & endocrinology* 5, no. 1 (2017): 65-76.
- J. Johnson, Kay, Samuel F. Posner, Janis Biermann, José F. Cordero, Hani K. Atrash, Christopher S. Parker, Sheree Boulet, and Michele G. Curtis. "Recommendations to improve preconception health and health care—United States." *Morbidity and Mortality Weekly Report* 55, no. 4 (2006): 1-23.
- J. JumaElywy, Gossoon, and Arkan B. Naji. "Efficacy of an Expanded Health Belief Model related to Perceived Benefits toward Climate Change in Promoting Response Actions among Collegians at the University." *Health Education and Health Promotion* (2023): 0-0.
- K. Kader, Mahir M., and Raad Kareem Faraj. "Health Belief Model Efficacy on improving hypertension control among old age at Kirkuk City, Iraq: A Randomized Controlled Trial." *Rawal Medical Journal* 48, no. 3 (2023): 770-770.
- K. Kandel, Pragma, Siew Lim, Stephanie Pirotta, Helen Skouteris, Lisa J. Moran, and Briony Hill. "Enablers and barriers to women's lifestyle behavior change during the preconception period: a systematic review." *Obesity Reviews* 22, no. 7 (2021): e13235.
- K. Karim, Noora, and Arkan Naji. "Health belief model and its relation to age and body mass index considering colorectal examinations among graduate students." *Iraqi National Journal of Nursing Specialties* 31, no. 2 (2018): 129-138.
- M. McHugh, John, Michelle Dalal, and Neeta Agarwal. "From preconception care to the first day of school: transforming the health of new families with lifestyle medicine." *American Journal of Lifestyle Medicine* 14, no. 5 (2020): 532-540.
- M. Mohr, Elizabeth, Martha Engelhardt, Mathilde Gaudion, Razan Al Munjid, Anne-Sophie Krautstengel, Lisa Patzelt, and Theda Borde. "Health literate maternity care of forced migrant women in Germany." *SSM-Qualitative Research in Health* 4 (2023): 100366.
- M. Muhealdeen, Hadeel Ezaldeen. "Effectiveness of Instruction Program on Adolescent Girls' Dietary Habits Diagnosed with Iron Deficiency Anemia." *Iraqi National Journal of Nursing Specialties* 36, no. 1 (2023).
- N. Niama, Ahmed Mahdi, and Arkan Bahlol Naji. "Efficacy of the health belief model on older adults' physical activity at a geriatric care home in

- Baghdad city." *Int J Health Sci* 6, no. S1 (2022): 6178-86.
- P. Pinar, Gul, and Tevfik Pinar. "The impact of health belief model based educational intervention on women's knowledge, beliefs, preventive behaviors and clinical outcomes about osteoporosis." *SAGE Open* 10, no. 3 (2020): 2158244020941473.
- P. Power, Tamara, Denise Wilson, Leah East, Belinda Cashman, Jasmine Wannell, and Debra Jackson. "Indigenous women's experiences of diabetes in pregnancy: A thematic synthesis." *Collegian* 28, no. 5 (2021): 541-550.
- R. Raa'd K, Faraj. "Effectiveness of the health action process approach on promoting the health behaviors of male high school students in Al-Rusafa district." *Iraqi National Journal of Nursing Specialties* 35, no. 1 (2022).
- S. Saidi, Latifa, Pierre D. Godbout, Camille Morais-Savoie, Pierre Philippe Wilson Registe, and Mathieu Bélanger. "Association between physical activity education and prescription during prenatal care and maternal and fetal health outcomes: a quasi-experimental study." *BMC Pregnancy and Childbirth* 23, no. 1 (2023): 496.
- S. Salih, Fatima, and Aysen Noori. "Effectiveness of an educational program on knowledge of high school students about substance abuse in Kirkuk City." *Iraqi National Journal of Nursing Specialties* 34, no. 1 (2021): 95-102.
- S. SENIAR, MAGROOM E., and BADEEAH M. NAJEEB. "The effect of educational program based on health belief model on anemic pregnant women's knowledge and perception regarding anemia." *International Journal of Pharmaceutical Research* 11, no. 3 (2019).
- S. Southern, E. T. H. I. O. P. I. A., O. W. H. Zone, and D. P. T. D. Conjoined. "A systematic review and meta-analysis on women's knowledge of preconception care." *Ethiop J Reprod Health (EJRH)* 13, no. 2 (2021): 2-15.
- S. Stephenson, Judith, Nicola Heslehurst, Jennifer Hall, Danielle AJM Schoenaker, Jayne Hutchinson, Janet E. Cade, Lucilla Poston et al. "Before the beginning: nutrition and lifestyle in the preconception period and its importance for future health." *The Lancet* 391, no. 10132 (2018): 1830-1841.
- T. Tosh, Conor, Kimberley Kavanagh, Angela C. Flynn, Judith Stephenson, Sara L. White, Raquel Catalao, and Claire A. Wilson. "The physical-mental health interface in the preconception period: analysis of 131 182 women planning pregnancy in the UK." *BJOG: An International Journal of Obstetrics & Gynaecology* 130, no. 9 (2023): 1028-1037.

**Conflict of Interest Statement:** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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**Table 1 /** Socio-Demographic Characteristics

	Classification	Study group		Control group	
		No.	%	No.	%
Age /years	19 years old	10	13.9	9	12.5
	20 years old	43	59.7	34	47.2
	21 years old	8	11.1	7	9.7
	22 years old	4	5.6	6	8.3
	23 years old	4	5.6	13	18.1
	24 years old	3	4.2	3	4.2
	<i>M±SD</i>		<i>20.41±1.218</i>		<i>20.84±1.469</i>
Grade	1 <sup>st</sup>	7	9.7	27	37.5
	2 <sup>nd</sup>	55	76.4	31	43.1
	3 <sup>rd</sup>	10	13.9	14	19.4
Living Arrangements	With parents	52	72.2	57	79.2
	With mother	14	19.4	9	12.5
	With father	1	1.4	1	1.4
	With relatives	5	6.9	5	6.9
Socioeconomic Status (SES)	Upper lower class	20	27.8	25	34.7
	Lower middle class	48	66.7	44	61.1
	Upper middle class	4	5.6	3	4.2

**Table 2 /** Responses regarding to Pre-conception Health Behaviors in Study and Control Groups

Periods	Study Group						Control Group					
	Low		Fair		High		Low		Fair		High	
	N	%	N	%	N	%	N	%	N	%	N	%
Pre test	54	75.0	17	23.6	1	1.4	56	77.8	16	22.2	0	0.0
Post test I	0	0.0	44	61.1	28	38.9	55	76.4	17	23.6	0	0.0
Post test II	0	0.0	44	61.1	28	38.9	52	72.2	20	27.8	0	0.0

**Table 3 /** Comparison between the Study and Control Groups responses at pre-post I and II tests of Preconception Health Behaviors

Periods	Groups	M	SD	t-value	d.f	$\eta^2$	Sig.
Pre-test	Study	2.14	.349	0.633	142	.00	.528
	Control	2.11	.329				
Post-test I	Study	3.53	.493	19.568	142	.73	.000
	Control	2.13	.354				
Post-test II	Study	3.52	.508	18.124	142	.69	.000
	Control	2.15	.386				

**Table 4 /** Multiple comparison of the preconception health behaviors between study and control groups periods

Groups	Behaviors (I)	Behaviors (J)	Mean Differences (I-J)	Std. Error	Sig.
Study Group	Pre-test	Post-test I	-1.38548*	.07603	.000
		Post-test II	-1.37303*	.07603	.000
	Post-test I	Pre-test	1.38548*	.07603	.000
		Post-test II	.01246	.07603	.870
	Post-test II	Pre-test	1.37303*	.07603	.000
		Post-test I	-.01246-	.07603	.870
Control Group	Pre-test	Post-test I	-.02002-	.05962	.737
		Post-test II	-.04385-	.05962	.463
	Post-test I	Pre-test	.02002	.05962	.737
		Post-test II	-.02383-	.05962	.690
	Post-test II	Pre-test	.04385	.05962	.463
		Post-test I	.02383	.05962	.690