Interplay of Health Literacy, Dietary Behaviors, and Psychological Adjustment in Adult Females Experiencing Menstrual Irregularities

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ABSTRACT: The objective of the current study was to investigate the structural relationship among health literacy, eating, and adjustment problems in female adults with irregular menstruation. The cross-sectional research design was used. The 200 sample of female adults aged 19 or above was recruited from different cities using the snowball sampling technique. The data was collected using three scales, i.e., the health literacy scale, the eating disorder examination questionnaire, and the scale of adjustment problem for adults. The data analysis was done using descriptive statistics and structural equation modeling. The result indicated the significant structural relationship among variables. The values of GFI, AGFI, and CFI are .977, .913, and .942, respectively. The model is said to be best fitted and indicates a significant relationship. The health literacy and eating problems have a significant negative relationship, whereas health literacy has shown a non-significant relationship with adjustment problems. The eating problem and adjustment problem have a significant positive relationship.

KEYWORDS: Health Literacy, Eating Problems, Psychological Adjustment, Menstrual Irregularities, Structural Equation Modeling

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Introduction

The cyclic processes that take place rhythmically during a woman's reproductive period are known as the menstrual cycle. Puberty usually starts between the ages of 12 and 15 and ends at the menopause, which lasts between the ages of 45 and 50. The menstrual cycle typically lasts 28 days; however, depending on physiological factors, it can last anywhere from 20 to 40 days (Sembulingam & Sembulingam, 2016). Menstruation has become a worrying sign of the overall mental health of women. Assessing psychopathology is important when working with patients who have irregular menstruation or an early menarche. On the other hand, any mental evaluation should include questions about reproductive characteristics, such as age of menarche and irregular menstruation. Another study on adolescent Korean girls indicated that irregular menstrual cycles were positively correlated with mental health issues. In order to promote menstrual cycle regularity and assist prevent linked chronic problems later in life, mental health should receive more attention (Toffol et al., 2014; Yu et al., 2017).

In South Asian populations, irregular menstrual cycles among adult women have been closely linked to elevated psychological distress including increased stress, anxiety, and depressive symptoms as well as

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disruptions in sleep patterns and diminished productivity in both professional and academic settings These findings have renewed the point that menstrual regularity is not only a biological phenomenon but also a very important indicator that defines the extent of success that women achieve with respect to their health, the management of stressor in their lives and social and emotional balance(Sarwar & Rauf, 2021; Tufail et al., 2022).

In a more restrictive situation, where menstruation is a tabooed experience and not enlightened, as in the case of Pakistan, it would be more challenging for the adult women to recognize the irregular period, seek medical help, and develop appropriate coping mechanisms (Malik et al., 2023; Proff et al., 2023). The menstrual abnormalities in such cases become an important indicator of the interaction of the biological processes, mental adjustment, lifestyle preferences, and health literacy (Attia et al., 2023), which in their absence require a multidimensional approach to women as the key to understanding their health outcome (Meherali et al., 2024).

Menstruation is a physiological condition unique to females that is manifested in the periodic preparation of the uterus for gestation by the shedding of the uterine mucosa (Thiyagararajan, Basit, and Jeanmonod, 2024). The World Health Organization (WHO) also emphasizes that menstrual health does not merely amount to a biological process, but a state of absolute physical, mental, and social well-being with regard to the menstrual cycle, and it has a more holistic psychosocial and quality-of-life connotation (Hennegan et al., 2021). The menstrual cycle takes place under the control of the hypothalamic-pituitary-ovarian axis; it includes the hormonal fluctuations that control ovulation and endometrial preparation (Thiyagarajan et al., 2024). The average period of the cycle is between 24 and 38 days, and the bleeding duration is no more than 2-7 days (American College of Obstetricians and Gynecologists [ACOG], 2015; Bull et al., 2019). Menstrual irregularities include deviations of these parameters (amenorrhea, oligomenorrhea, menorrhagia, and metrorrhagia) (National Institute of Child Health and Human Development [NICHD], 2022). It is estimated that in South Asia, up to 30 percent of reproductive-aged females have some form of menstrual irregularities at some point in their lives (Bae et al., 2018). In South Asian countries, it is often high, which is attributed to factors like nutritional deficiencies, psychosocial stress, poor reproductive health literacy, and socio-cultural limitations to talk about menstrual health. For example, a community study of school-going adolescent girls in Dhaka found that 28.9% reported menstrual irregularities, and those with irregular cycles had higher odds of depression and anxiety (Akter et al., 2024). A large cross-sectional survey in Punjab, India, reported an overall prevalence of 60.6% for various menstrual problems (most commonly dysmenorrhea), with mental health status and lifestyle factors significantly associated with menstrual disturbances (Sharma et al., 2022). In Pakistan, Mughal et al. (2021) reported that a substantial proportion of women presenting to gyne/endo clinics had menstrual abnormalities, many with comorbid endocrine disorders such as insulin resistance, hyperandrogenism, hypothyroidism, and hyperprolactinemia. Moreover, a study carried out in Sialkot reported that adult females having irregular menstruation exhibited high levels of psychological distress, poor quality of life, and poor day-to-day functioning in comparison to adult females who have regular menstrual cycles (Sarwar and Rauf, 2021). The COVID-19 epidemic also emphasized the vulnerability of menstrual cycles to the influence of psychosocial stress, whereby research findings indicated new-onset abnormal menstruation in Pakistani women who are exposed to increased stress conditions (Tufail et al., 2022).

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Combined altogether, the findings indicate that irregular menstruation is both a biological and psychosocial problem, and the general image of the problem has to encompass health literacy, lifestyle, and psychological adaptation, particularly in a culturally limited environment, where women may lack the information and access to medical care.

Health literacy is the most important in the management of menstrual health and the psychological consequences associated with the latter, with its definition being the ability to acquire, understand, and take action with health information to make informed health decisions (Meherali et al., 2024). Health literacy is a large factor in empowering women in Pakistan, where the issue of menstruation remains under the cultural veil, to identify and help treat any menstrual aberrations in an effective way (Proff et al., 2023). The study by Shah et al. (2023) in Gilgit, Pakistan, also revealed that a significant number of young girls lacked adequate education and awareness on menstrual hygiene, and this could be attributed to culture and socialization. It is not only menstrual health that is impacted by this ignorance, but it also has further implications on psychological health.

Research indicates that mental health literacy is closely linked with psychological adjustment, such as levels of depression, anxiety, and overall well-being, where higher literacy is associated with better outcomes (Aziz et al., 2025).

Additionally, women perceive and respond to menstrual-related symptoms based on their health literacy. A current qualitative study that analyzed patients with polycystic ovary syndrome. A lower level of adjustment directly hinders the quality of life. It was found that low mental health literacy was linked to a notably lower life quality and self-efficacy. Health literacy has a direct and indirect effect on the quality of life (structural equation) (Guo et al., 2023). A recent qualitative research among reproductive-age women reported that having limited mental health literacy is significantly related to lower quality of life and self-efficacy, and health literacy positively influences the quality of life in a structural equation (Safaralinezhad et al., 2025).

Evidence from Pakistan indicates that poor menstrual literacy, such as limited knowledge about cycles and hygiene management, is widespread and contributes to psychological distress among adolescent girls (Shah, Khan, & Khan, 2023). Similar findings have been reported in other settings, where inadequate menstrual knowledge was associated with higher anxiety and depressive symptoms among young women (Ssesanga et al., 2024). Importantly, intervention-based research shows that improving menstrual literacy through targeted approaches, including digital tools like mobile applications, can enhance self-management and significantly reduce psychological distress (Cunningham et al., 2024). These studies highlight the significance of health literacy in controlling the health of menstruation and how it relates to psychological adjustment.

Evidence suggests that lower health literacy is associated with poorer psychological adjustment, including higher levels of depression and anxiety (Zhong et al., 2024).

Problematic eating is comprised of maladaptive eating behaviors and attitudes, which are restrictive eating, emotional eating, binge eating, and clinically diagnosable eating disorders, such as anorexia nervosa, bulimia nervosa, and binge eating disorder (American Psychiatric Association, 2022). Such behaviors affect not only physical but also psychological well-being, due to which stress, anxiety, and depressive symptoms are the consequences (Solmi et al., 2021). The issue with the dietary habits is also directly related to

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reproductive health in adult females, as the lack of nutrients or maladaptations in diets can disrupt ovulatory processes, leading to abnormal menstruation (Nagata et al., 2019). One of the examples is the lack of such essential vitamins as iron, vitamin D, and protein, which have been associated with menstrual disorders and susceptibility to amenorrhea (Meczekalski et al., 2014). Conversely, hormonal imbalance, perimenopause, and menopause may be the result of overeating or a high-fat diet (Roop, 2018).

Health literacy is also a factor in eating habits, especially in women who have menstrual disorders. Research has indicated that women who are more informed about their health tend to have a better grasp of how food affects their menstrual cycle. This awareness helps them make smarter choices about what they eat, which can lead to fewer symptoms and a more comfortable experience overall (Ciołek et al., 2023). A study by Kilfoyle et al. (2016) found that health literacy was associated with reproductive health knowledge when compared to different topics that influence health behaviors. Besides, Guzeldere et al. (2024) discovered that women with menstrual disorders are likely to eat high sugar content foods and are not balanced in their diets, which highlights the role of health literacy in their diets. Conversely, low health literacy will also guarantee a state of women not knowing about the association between diet and menstrual functioning, and that will most probably heighten the possibility of disordered eating and secondary irregular menstruation.

Emerging research from Pakistan emphasizes the detrimental effects of limited health literacy on women's menstrual health. The study at Sargodha was conducted as a cross-sectional one with the aim of ascertaining the health-related quality of life (HRQoL) of female primary dysmenorrhea students. The results indicated that low HRQoL was accompanied by a low level of menstrual health literacy, which suggests that the ignorance of menstrual health may increase the intensity of menstrual symptoms and have a harmful effect on well-being (Dar et al., 2025). Moreover, limited access to the proper information and cultural taboos were also a cause of the poor hygiene practice of menstruation that could result in irregular cycles of menstruation and other reproductive health complications in the rural areas, like Gilgit (Shah et al., 2023). These results show that health literacy should be improved to achieve improved health outcomes during menstruation. Through menstrual health education for women and girls, they will be in a position to make informed decisions and thus enhance their health practices and the rates of menstrual irregularities. All this leads to the realization that eating issues are not only a significant health outcome but also a possible mediating variable between health literacy and irregular menstruation among adult females.

Health literacy has a role in the interpretation of women on nutrition information, the symptoms of eating problems, and the management of emotional upset. As an illustration, one of the studies correlating health literacy and eating attitudes among adolescents discovered that low health literacy is significantly related to more maladaptive eating attitudes (e.g., restrictive, binge, emotional eating) (Çinkili & Tural Bujuk, 2024). Health literacy may influence dietary preferences and the possibility of seeking proper care in the situation of eating problems. Poor health literacy may lead to the development of maladaptive eating habits by women, preventing them to learn about nutrition or becoming aware of the symptoms of eating disorders (Kells et al., 2023).

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Psychological adjustment is the capability of people to cope with the demands of life well, remain emotionally stable, and operate in an adaptive fashion in social and interpersonal situations. The effects of poor psychological adjustment include high levels of stress, anxiety, depression, low self-esteem, social withdrawal, and poor coping, which may have adverse effects on mental and physical health (Choe and Yu, 2025; Lazarus and Folkman, 1984). Further, it was discovered that most women who experience irregular menstruation do not adjust to marriage and have bad sex lives (Soylu, 2022).

Supportive evidence shows that the problems of psychological adjustment may be the cause of irregular menstruation. Indicatively, a research study by Rafique and Al-Sheikh (2018) was done among Saudi female health sciences students, where the researchers concluded that academic stress was the most important factor in relation to the incidence of menstrual dysfunctions, including irregular cycles. In the same vein, a study conducted by Maurya et al. (2022) in India showed that adolescent girls with medium to severe cases of depressive symptoms were more prone to menstrual irregularities, which points to the role of mental health in the menstrual health issue. Under the stress condition, one of the studies by Singh et al. (2015) found that an increase in stress was correlated with premenstrual symptoms and dysmenorrhea among women students, which indicates that stress might intensify menstrual symptoms. In Pakistan, a study by Tufail et al. (2022) reported that pandemic-related stress caused new-onset disorders of menstrual cycle rhythm. All these results together bring out the predictive features of psychological adaptation problems concerning the menstrual health of mature females.

A potential protective factor emerges here, which is health literacy. More attentive to stressors, higher coping mechanisms, mental health assistance, and response to physiological manifestations of maladaptive adjustment are people who are more attentive to their health literacy. Indicatively, a study by Majeed et al. (2022) observed that the higher the health literacy of the university students, the lower the number of menstrual abnormalities and better coping mechanisms. On the same note, Tran et al. (2025) also pointed out that female medical students who were more exposed to premenstrual syndrome tended to adjust to changes less often, which is why knowledge of the health information directly lowers the chance of adapting to changes. On the other hand, maladaptive coping could be worsened by low health literacy, which made girls susceptible to psychological distress and irregular menstruation, as reported in a study conducted by Shah et al. (2023), which showed that girls who had limited knowledge about menstrual hygiene practices were more prone to menstrual irregularities.

Psychological functioning is closely connected with eating behaviors. There is a connection among restrictive eating, bingeing, and purging and the high rates of depression, anxiety, and low self-worth (Fairburn et al., 2003). One of the common manifestations of maladaptive eating habits is observed among people with emotional dysregulation, which leads to the violation of the neuroendocrine balance and abnormal menstrual cycles (Klump et al., 2013). The clinical evaluation shows that patients with eating disorders have weakened psychological strength, no autonomy, and poor coping strategies compared to their non-clinical peers (Treasure et al., 2020). Moreover, disordered eating attitudes and internalizing symptoms show a high overlap in subclinical populations as well, meaning that emotional instability and problematic eating patterns are mutually correlated (Stice et al., 2017).

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Taken together, existing research highlights a multifaceted relationship among health literacy, eating behaviors, psychological adjustment, and menstrual health. However, much of the prior work has emphasized how psychological distress and maladaptive eating predict menstrual irregularities, rather than exploring how underlying health literacy shapes these outcomes in women already experiencing irregular cycles. Given that irregular menstruation is a salient marker of women's health, examining health literacy as a predictor of maladaptive eating and adjustment difficulties provides an important extension to the literature. In contexts such as Pakistan, where limited reproductive health knowledge and cultural taboos restrict women's ability to manage menstrual concerns, low health literacy may directly contribute to disordered eating patterns and poor psychological adjustment. Therefore, this study aims to investigate the predictive role of health literacy in eating and adjustment problems among adult females with irregular menstruation.

Hypothesis of the Study

Health literacy would be a predictor of eating and adjustment problems among adult females with irregular menstruation.

Research Methodology

Research Design

The study has used a cross-sectional research design.

Participants

Adult females with irregular menstruation were the population of the study.

Inclusion Criteria

1. Only adult females aged 19years and above were included
2. Females with irregular menstruation were recruited
3. Irregular menstruation duration was at least below or above 12 cycles per year.

Exclusion Criteria

1. The adult females with mental disorders or health problems were excluded from the study.
2. The adolescent populations were excluded from the study.
3. The females with hormonal problems other than irregular menstruation were excluded.

Sampling Technique

The snowball sampling technique was used for the selection of participants. Data was collected from the female adult population from Gujrat, Lala Musa, and Kharian city using snowball sampling using a Google form. Those females were taken whose menstruation was less than or more than 12 cycles per year, and away from 21-35 days, with an age of 19 or above. These respondents were available.

Measures

To gather data from respondents, the following instruments were used.

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Demographics Form

A socio-demographic form includes age, education, marital status, family system, participant's profession, number of children, weight of respondents, residence type, number of menstrual cycles in a year, start of menarche, marriage duration of respondent, duration of menstrual cycle, and social status. Informed consent was also provided.

Health Literacy Scale

Health Literacy Scale HLS-16 (Sorensen, 2012) was used for the current study. The one variable is health literacy, which was measured by using the health literacy scale. The scale comprises 16 questions. This scale has three sub-domains: health care, illness avoidance, and health promotion. The index score of the scale increases from 0 to 50. The content validity was 0.86 (Emiral et. al., 2018). The cut-off scores for adequate and low literacy are located between 52.5 and 55.5 (Maat et al., 2014). The original version was developed in the European culture in English. This is translated into Urdu by Bibi and Maqsood (2019) in a project for use in Pakistan.

Scale of Adjustment Problems for Adults (SAA)

The psychological adjustment difficulty in Urdu was measured using the Scale of Adjustment Problems for Adults. The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition, criteria for adjustment disorders served as the foundation for the scale (American Psychiatric Association, 2013). According to Naz et al. (2018), it consists of 48 items with three subscales: conduct, depression, and anxiety. The scale's convergent validity was r =.626**, and its divergent validity was r =.058, with a reliability of. .929. This scale has a cutoff point of 71 (Naz et al., 2022).

Eating Disorder Examination- Questionnaire (EDE-Q)

Eating disorder was measured by using the Eating Disorder Examination-Questionnaire (Fairburn & Beglin, 2008). There are 28 items in the scale, and it was free to use. It was translated into Urdu. EDE-Q has concurrent validity (Mond et. al., 2004) with four sub-scales of restriction, weight, shape, and eating concern. Its response options were not at all, slightly, moderately, or markedly. The world EDE-Q score's test reliability ranges from 0.66 to 0.83 for the sub-scales (Calugi et al, 2015).

Procedure

The sample of the study was selected using the snowball sampling technique. The sample was gathered from different cities using a Giggle form from respondents. The sample of 200 adult females with irregular menstruation was selected. Those females were selected whose menstruation was less than or more than 12 cycles per year and away from 21-35 days with an age of 19 or above. Informed consent from the respondents was taken, where the goals, procedures, and importance of the research were mentioned. In the instructions, participants were asked to read the items carefully before answering. The author's permission to use the scales in the current research was obtained through email.

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Data Analysis

The Statistical Package for the Social Sciences (SPSS, V 21.0) for Windows was utilized to compute the descriptive frequency distribution for statistical analysis, and the Analysis of Moment Structures (AMOS) program was employed to analyze Structural Equation Modeling (SEM).

Result

The statistical perspective on the relationship between the variables under investigation is presented in this section. The demographic details of women who experience irregular periods are described. Demonstrated that the majority of responders were single and between the ages of 20 and 24. The majority of responders have completed matriculation and master's degrees. Over 50% of those surveyed did not have a job. Most of the women live in urban localities and in a joint family system. Most of the females have a weight in the range 41 to 50, followed by 51to 60. Nearly half of the respondents have menstrual duration of less than 21 days and more than 35 days, and most have 10 to 14 menstrual cycles in a year. The majority of females start menstruation at the age of 13 to 15. Mostly females belong to the middle class.

Table 1

Model Fit Summary of Structure Equation Modeling (N=200)

Factors		Estimate	P
Eating disorder ⟵---	Health literacy	-.774	.018
Adjustment ⟵---	Health literacy	-.025	.164
Adjustment ⟵---	Eating disorder	.018	.000

The goodness-of-fit indices for the present SEM model were displayed in the model summary table. The association between the variables has been largely established by the model. The best-fitting model was indicated by the CMIN/DF ratio, which was 3.084. GFI, AGFI, and CFI have respective values of.977, .913, and.942. If these values are higher than 90, the model is considered best suited. Since the AGFI value was 91 and the CFI and GFI values were both higher than.90, it can be said that the model was suitable. As you can see, the NFI value was 919. NFI values range from 0 to 1, with values above 0.9 being deemed acceptable in the model. We can conclude that the model was well-fitted. Thus, it is proposed that health literacy influences women's adjustment, health literacy causes eating disorders, and eating disorders cause adjustment issues.
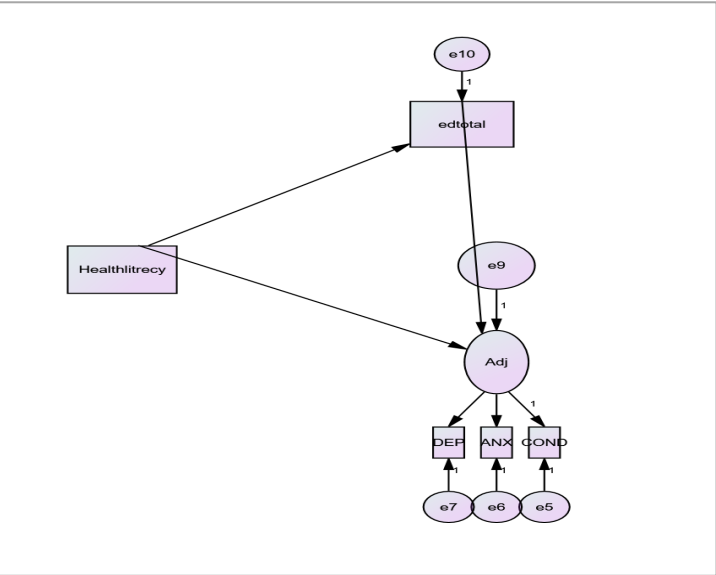
Table 2

Regression Estimates of factors of Irregular Menstruation (N=200)

P Value	CMIN/DF	GFI	AGFI	CFI	NFI
.015	3.084	.977	.913	.942	.919

Table 4.3 shows the regression estimate of health literacy, adjustment problem, and eating problem in irregular menstruation females. The health literacy regression estimate was -.774 for eating disorder with p-value .018. This shows that there was a negative relationship between health literacy and eating disorders. The health literacy regression estimate was -.025 with a p-value of .164 for the adjustment problem. It

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indicates a non-significant negative relationship between health literacy and adjustment. The eating disorder regression estimate was .018 with a p-value of .00 for the adjustment problem. It indicates a positive relationship between the adjustment and eating disorders.

Figure 1

Structural Equation Modeling (path analysis) for Health Literacy, Eating Disorders, and Adjustment Problems

Note: Health literacy= health literacy, ed total= eating disorder total, adj= adjustment, DEP= depression, ANX= Anxiety, COND= conduct

Discussion

The present study focuses on how health literacy affects eating disorders and adjustment of adult females with irregular menstruation. The sample of 200 adult females was recruited for this study using snowball sampling. The structural equation modeling was run for the results. The values of indices show a significantly fitted model. The chi-square/df ratio was 3.084, and a value equal to or less than 3 was considered appropriate (Byrne, 2006). GFI, AGFI, and CFI had respective values of.977, .913, and.942. If these values are higher than 90, the model is considered best suited (Hooper et al., 2008 & Hu & Bentler, 1999). Thus, it may be said that the model was suitable. NFI value was .919, and a value above 0.9 was considered acceptable (Lohmoller, 1989).

The main objective of the study was further analyzed individually, as to how health literacy, eating disorders, and adjustment problems were related in adult females with irregular menstruation. Health literacy significantly predicted the eating disorder (regression estimate -.774, p-value, .018). It indicates that better health literacy leads to lower eating problems. The literature review also supported my results. Napolitano et al. (2019) conducted research in Italy on 420 teenage girls between the ages of 14 and 20. Just 22.8% of respondents correctly identified bulimia nervosa and anorexia. Those who were female, overweight or obese, and had at least one parent with a college degree or higher were more likely to know this information. Over one-third (38.8%) were afraid of gaining weight. Fear of gaining weight was more prevalent among females who were overweight or obese, did not understand the differences between anorexia and bulimia nervosa,

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avoided eating when they were hungry, and consistently and frequently engaged in dieting behavior. Forty-eight percent never dieted, whereas just 10.1% and 11.9% always and frequently did. Dieting behavior was more common among respondents who frequently or consistently felt a strong desire to lose weight and who were afraid of gaining weight. There is a pressing need to educate Italian teenagers about eating disorders, and medical professionals may be essential in disseminating information on eating disorders.

Further, health literacy was the non-significant predictor of psychological adjustment problem (regression estimate -.025, p-value, .164). Results indicated a non-significant negative relationship between health literacy and adjustment problems, which means that neither is related. The literature review does not support my findings. Here, adjustment was defined as psychological adjustment, which included three dimensions of depression, anxiety, and conduct issues. Previous literature confirmed the relation of health literacy, depression, and conduct issues (Lincoln, et al., 2006; Magallón-Botaya, et al., 2023)

Finally, an eating disorder was the significant predictor of adjustment problems (regression estimate, .018, p-value, .000). The findings stated that higher eating problems lead to more adjustment issues. A review of studies supported the findings of this study. The results indicate that the association between eating disorder and depressive psychopathology (Striegel-Moore, et. al., 2003; Herpertz & Remschmidt, 1993).

Conclusion and Recommendation

The study investigates the structural relationship between health literacy, eating disorders, and adjustment problems among adult females with irregular menstruation. The results show that eating disorders are directly impacted by health literacy, but there is no visible link between psychological adjustment and health literacy. Additionally, it was discovered that eating disorders affected psychological adjustment.

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References

Akter, M., Sujan, M. S. H., Uddin, M. R., & Kundu, L. R. (2024). Menstrual irregularity and mental health problems among Bangladeshi adolescent girls: Prevalence and associated factors of mental health problems and menstrual irregularity among Bangladeshi adolescent girls. *Health Prospect*, *23*(3), 18-25. https://nepjol.info/index.php/HPROSPECT/article/view/61168

American College of Obstetricians and Gynecologists. (2015). Menstruation in girls and adolescents: Using the menstrual cycle as a vital sign (Committee Opinion No. 651). *Obstetrics & Gynecology, 126*(6), e143–e146. https://doi.org/10.1097/AOG.0000000000001215

American Psychiatric Association. (2022). Diagnostic and statistical manual of mental disorders (5th ed., text rev.). American Psychiatric Publishing.

Attia, G. M., Alharbi, O. A., & Aljohani, R. M. (2023). The Impact of Irregular Menstruation on Health: A Review of the Literature. *Cureus*, *15*(11). https://doi.org/10.7759/cureus.49146

Aziz, Z., Fazal, S., & Abbasi, P. N. (2025). Demographic Differences in Mental Health Literacy, Mental Health Status, Perceived Stress, Social Support, and Psychological Well-Being Among University Students in Pakistan. *Pakistan Social Sciences Review*, *9*(2), 249–259. https://doi.org/10.35484/pssr.2025(9-II)19

Bae, J., Park, S., & Kwon, J. (2018). Factors associated with menstrual cycle irregularity and menopause. *BMC Women's Health*, *18*(1). https://doi.org/10.1186/s12905-018-0528-x

Bibi, B., & Maqsood,F. (2019). Urdu translation of health literacy-EU-16 scale for use in Pakistan. (SRGP Report No: 21- 2044). Higher Education Commission. Islamabad Pakistan.

Bull, J. R., Rowland, S. P., Scherwitzl, E. B., Scherwitzl, R., Danielsson, K. G., & Harper, J. (2019). Real-world menstrual cycle characteristics of more than 600,000 menstrual cycles. *npj Digital Medicine*, *2*(1). https://doi.org/10.1038/s41746-019-0152-7

Byrne, B. M. (2006). *Structural equation modeling with EQS: Basic concepts, applications, and programming* (2nd ed.). Mahwah, NJ, US: Lawrence Erlbaum Associates Publishers.

Calugi, S., Ricca, V., Castellini, G., Sauro, C. L., Ruocco, A., Chignola, E., ... & Dalle Grave, R. (2015). The eating disorder examination: reliability and validity of the Italian version. *Eating and Weight Disorders-Studies on Anorexia, Bulimia and Obesity*, *20*(4), 505-511. https://doi.org/10.1007/s40519-015-0191-2

Choe, C., & Yu, S. (2025). Longitudinal cross-lagged analysis between depressive symptoms, social withdrawal, self-esteem, and school adaptation in multicultural adolescents. *Psychologica Belgica*, *65*(1), 1-14. https://doi.org/10.5334/pb.1310

ÇINKIL, Z., & TURAL BÜYÜK, E. (2024). The relationship between health literacy and eating attitudes of adolescents. *Journal of Public Health*. https://doi.org/10.1007/s10389-023-02187-7

Ciołek, A., Kostecka, M., Kostecka, J., Kawecka, P., & Popik-Samborska, M. (2023). An assessment of women's knowledge of the menstrual cycle and the influence of diet and adherence to dietary patterns on the alleviation or exacerbation of menstrual distress. *Nutrients*, *16*(1), 69. https://doi.org/10.3390/nu16010069

Cunningham, A. C., Prentice, C., Peven, K., Wickham, A., Bamford, R., Radovic, T., Klepchukova, A., Fomina, M., Cunningham, K., Hill, S., Hantsoo, L., Payne, J., Zhaunova, L., & Ponzo, S. (2024). Efficacy of the Flo app in improving health literacy, menstrual and general health, and well-being in women: Pilot randomized controlled trial. *JMIR mHealth and uHealth*, *12*, e54124. https://doi.org/10.2196/54124

Iram Naz et al. (2025) | https://doi.org/10.55737/trt/WR25.142

Interplay of Health Literacy, Dietary Behaviors, and Psychological Adjustment in Adult Females Experiencing Menstrual Irregularities

Dar, M., Khan, A., Shah, S. S., Aleem, A., Jaber, A. A., Hussain, M., & Khan, G. M. (2025). Evaluation of health-related quality of life of female students suffering from primary dysmenorrhea: Findings of a cross-sectional study from Pakistan. *Frontiers in Public Health*, *13*. https://doi.org/10.3389/fpubh.2025.1467377

Emiral, G. Ö., Aygar, H., & Atalay, B. (2018). Health literacy scale-European union-Q16: a validity and reliability study in Turkey. *International Research Journal of Medical Sciences*, *6*(1), 1–7. https://www.isca.me/MEDI_SCI/Archive/v6/i1/1.ISCA-IRJMeds-2017-016.php

Fairburn, C. G., & Beglin, S. J. (2008). Eating Disorder Examination Questionnaire. *Cognitive behavior therapy and eating disorders*, *309*(313), 509-528. https://legeforeningen.no/contentassets/47422e2cfa934c35a37fb56b9f09ef61/ede-q_norsk.pdf

Fairburn, C. G., Cooper, Z., & Shafran, R. (2003). Cognitive behaviour therapy for eating disorders: A "transdiagnostic" theory and treatment. *Behaviour Research and Therapy*, *41*(5), 509-528. https://doi.org/10.1016/s0005-7967(02)00088-8

Guo, Y., Liu, Y., Ding, R., Yan, X., Tan, H., Wang, Y., Wang, X., & Wang, L. (2023). A structural equation model linking health literacy, self-efficacy, and quality of life in patients with polycystic ovary syndrome. *BMC Women's Health*, *23*(1). https://doi.org/10.1186/s12905-023-02223-4

Güzeldere, H. K., Efendioğlu, E. H., Mutlu, S., Esen, H. N., Karaca, G. N., & Çağırdar, B. (2024). The relationship between dietary habits and menstruation problems in women: A cross-sectional study. *BMC Women's Health*, *24*(1). https://doi.org/10.1186/s12905-024-03235-4

Hennegan, J., Winkler, I. T., Bobel, C., Keiser, D., Hampton, J., Larsson, G., Chandra-Mouli, V., Plesons, M., & Mahon, T. (2021). Menstrual health: A definition for policy, practice, and research. *Sexual and Reproductive Health Matters*, *29*(1), 31-38. https://doi.org/10.1080/26410397.2021.1911618

Herpertz-Dahlmann, B., & Remschmidt, H. (1993). Depression and psychosocial adjustment in adolescent anorexia nervosa. A controlled 3-year follow-up study. *European Child & Adolescent Psychiatry*, *2*(3), 146-154. https://doi.org/10.1007/bf02125569

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, *6*(1), 1-55. https://doi.org/10.1080/10705519909540118

Kells, M. R., Davis, H. A., Todorov, S., & Wildes, J. E. (2023). Health literacy and eating disorder pathology in women with food insecurity: A preliminary cross-sectional study. *Eating Behaviors*, *49*, 101727. https://doi.org/10.1016/j.eatbeh.2023.101727

Kilfoyle, K. A., Vitko, M., O'Conor, R., & Bailey, S. C. (2016). Health literacy and women's reproductive health: A systematic review. *Journal of Women's Health*, *25*(12), 1237-1255. https://doi.org/10.1089/jwh.2016.5810

Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping*. Springer.

Lincoln, A., Paasche-Orlow, M. K., Cheng, D. M., Lloyd-Travaglini, C., Caruso, C., Saitz, R., & Samet, J. H. (2006). Impact of health literacy on depressive symptoms and mental health-related quality of life among adults with addiction. *Journal of General Internal Medicine*, *21*(8), 818-822. https://doi.org/10.1111/j.1525-1497.2006.00533.x

Iram Naz et al. (2025) | https://doi.org/10.55737/trt/WR25.142

Interplay of Health Literacy, Dietary Behaviors, and Psychological Adjustment in Adult Females Experiencing Menstrual Irregularities

Lohmöller, J.-B. (1989). *Latent Variable Path Modeling with Partial Least Squares*. Physica-Verlag HD. https://doi.org/10.1007/978-3-642-52512-4

Maat, H. P., Essink-Bot, M.-L., Leenaars, K. E., & Fransen, M. P. (2014). A short assessment of health literacy (SAHL) in the Netherlands. *BMC Public Health*, *14*(1). https://doi.org/10.1186/1471-2458-14-990

Magallón-Botaya, R., Méndez-López, F., Oliván-Blázquez, B., Silva-Aycaguer, L. C., Lerma-Irureta, D., & Bartolomé-Moreno, C. (2023). Effectiveness of health literacy interventions on anxious and depressive symptomatology in primary health care: A systematic review and meta-analysis. *Frontiers in Public Health*, *11*. https://doi.org/10.3389/fpubh.2023.1007238

Majeed, J., Sharma, P., Ajmera, P., & Dalal, K. (2022). Menstrual hygiene practices and associated factors among Indian adolescent girls: A meta-analysis. *Reproductive Health*, *19*(1). https://doi.org/10.1186/s12978-022-01453-3

Malik, M., Hashmi, A., Hussain, A., Waleed Ali Khan, Jahangir, N., Malik, A., & Noreen Naz Ansari. (2023). Experiences, awareness, perceptions and attitudes of women and girls towards menstrual hygiene management and safe menstrual products in Pakistan. *Frontiers in Public Health*, *11*. https://doi.org/10.3389/fpubh.2023.1242169

Maurya, P., Meher, T., & Muhammad, T. (2022). Relationship between depressive symptoms and self-reported menstrual irregularities during adolescence: Evidence from UDAYA, 2016. *BMC Public Health*, *22*(1). https://doi.org/10.1186/s12889-022-13196-8

Meczekalski, B., Katulski, K., Czyzyk, A., Podfigurna-Stopa, A., & Maciejewska-Jeske, M. (2014). Functional Hypothalamic Amenorrhea and Its Influence on Women's Health. *Journal of Endocrinological Investigation*, *37*(11), 1049–1056. https://doi.org/10.1007/s40618-014-0169-3

Meherali, S., Matthews, B., Myhre, D., Nisa, S., Idrees, S., Faraz, A., Ullah, K., Shah, R., & Lassi, Z. (2024). Empowering mothers: Advancing maternal health literacy and numeracy through the introduction of Maternal and Child Health Calendar. *Women's Health*, *20*. https://doi.org/10.1177/17455057241291725

Mond, J., Hay, P., Rodgers, B., Owen, C., & Beumont, P. (2004). Validity of the eating disorder examination questionnaire (EDE-Q) in screening for eating disorders in community samples. *Behaviour Research and Therapy*, *42*(5), 551-567. https://doi.org/10.1016/s0005-7967(03)00161-x

Mughal, F., Kumar, A., Maheshwari, J. D., Bijarani, A. N., Kazmi, T., & Nangrejo, R. (2021). Prevalence and age-related association of abnormal endocrine changes among women with menstrual disorder. *Journal of Pharmaceutical Research International*, 341-349. https://doi.org/10.9734/jpri/2021/v33i44b32685

Nagata, J. M., Garber, A. K., Tabler, J., Murray, S. B., Vittinghoff, E., & Bibbins-Domingo, K. (2019). Disordered eating behaviors and cardiometabolic risk among young adults with overweight or obesity. *International Journal of Eating Disorders*, *51*(8), 931-941. https://doi.org/10.1002/eat.22927

Napolitano, F., Bencivenga, F., Pompili, E., & Angelillo, I. F. (2019). Assessment of knowledge, attitudes, and behaviors toward eating disorders among adolescents in Italy. *International Journal of Environmental Research and Public Health*, *16*(8), 1448. https://doi.org/10.3390/ijerph16081448

National Institute of Child Health and Human Development. (2022). Menstrual cycle: Overview. NICHD. https://www.nichd.nih.gov/health/topics/menstruation

Iram Naz et al. (2025) | https://doi.org/10.55737/trt/WR25.142

Interplay of Health Literacy, Dietary Behaviors, and Psychological Adjustment in Adult Females Experiencing Menstrual Irregularities

Naz, I., Bano, Z., & Anjum, R. (2022). Construct and criterion validity of adjustment scale for adults using the correlation and Receiver-Operating Characteristics Analysis. *Rawal Medical Journal*, *47*(1), 89-89. https://www.rmj.org.pk/fulltext/27-1582280908.pdf

Naz, I., Bano, Z., & Leghari, N. U. (2018). Construction of scales on depression, anxiety and conduct disturbance of adjustment for adults: developing a reliable measure. *Isra Med J*, *10*(5), 310-314.

Proff, A. A., Fatima, S., & Limón, M. L. (2023). Becoming women: Period. Perceptions of barriers and facilitators to menstrual hygiene management programs for Pakistani girls. *Frontiers in Public Health*, *11*. https://doi.org/10.3389/fpubh.2023.1083688

Rafique, N., & Al-Sheikh, M. H. (2018). Prevalence of menstrual problems and their association with psychological stress in young female students studying health sciences. *Saudi Medical Journal*, *39*(1), 67-73. https://doi.org/10.15537/smj.2018.1.21438

Roop, J. K. (2018). Hormone imbalance—a cause for concern in women. Res J Life Sci Bioinform Pharm Chem, 4, 237-51.

Safaralinezhad, A., Lamyian, M., Ahmadi, F., & Montazeri, A. (2025). Mental health literacy of reproductive age women: A qualitative study. *BMC Public Health*, *25*(1). https://doi.org/10.1186/s12889-025-21488-y

Sarwar, U., & Rauf, U. (2021). Social support, quality of life and mental health problems among females with and without menstruation problems: A comparative study. *Khyber Medical University Journal*, *14*(4), 206-210. https://doi.org/10.35845/kmuj.2021.21373

Sembulingam, K., & Sembulingam, P. (2016). Essentials of medical physiology (7th ed.). Jaypee Brothers Medical Publishers.

Shah, S. F., Punjani, N. S., Rizvi, S. N., Sheikh, S. S., & Jan, R. (2023). Knowledge, Attitudes, and Practices Regarding Menstrual Hygiene among Girls in Ghizer, Gilgit, Pakistan. *International Journal of Environmental Research and Public Health*, *20*(14), 6424. https://doi.org/10.3390/ijerph20146424

Sharma, P., Kaur, M., Kumar, S., & Khetarpal, P. (2021). A cross-sectional study on prevalence of menstrual problems, lifestyle, mental health, and PCOS awareness among rural and urban population of Punjab, India. *Journal of Psychosomatic Obstetrics & Gynecology*, *43*(3), 349-358. https://doi.org/10.1080/0167482x.2021.1965983

Singh, R., Sharma, R., & Rajani, H. (2015). Impact of stress on menstrual cycle: A comparison between medical and non medical students. *Saudi Journal for Health Sciences*, *4*(2), 115. https://doi.org/10.4103/2278-0521.157886

Solmi, M., Radua, J., Stubbs, B., Ricca, V., Moretti, D., Busatta, D., ... & Castellini, G. (2021). Risk factors for eating disorders: an umbrella review of published meta-analyses. *Brazilian Journal of Psychiatry*, *43*(3), 314-323. https://doi.org/10.1590/1516-4446-2020-1099

Sørensen, K., Van den Broucke, S., Fullam, J., Doyle, G., Pelikan, J., Slonska, Z., & Brand, H. (2012). Health literacy and public health: A systematic review and integration of definitions and models. *BMC Public Health*, *12*(1). https://doi.org/10.1186/1471-2458-12-80

Soylu, T. (2022). Sexual quality of life and marital adjustment in women with menstrual irregularıty. International Journal of Caring Sciences, 15(1), 435-443.

Ssesanga, T., Thomas, K. A., Nelson, K. A., Oenen, E., Kansiime, C., Lagony, S., Enomut, J. R., Mayanja, Y., & Weiss, H. A. (2024). Understanding menstrual factors associated with poor mental health among

Iram Naz et al. (2025) | https://doi.org/10.55737/trt/WR25.142

Interplay of Health Literacy, Dietary Behaviors, and Psychological Adjustment in Adult Females Experiencing Menstrual Irregularities

female secondary school students in Uganda: A cross-sectional analysis. *Child and Adolescent Psychiatry and Mental Health*, *18*(1). https://doi.org/10.1186/s13034-024-00829-6

Stice, E., Gau, J. M., Rohde, P., & Shaw, H. (2017). Risk factors that predict future onset of each DSM–5 eating disorder: Predictive specificity in high-risk adolescent females. *Journal of Abnormal Psychology*, *126*(1), 38-51. https://doi.org/10.1037/abn0000219

STRIEGEL-MOORE, R. H., SEELEY, J. R., & LEWINSOHN, P. M. (2003). Psychosocial adjustment in young adulthood of women who experienced an eating disorder during adolescence. *Journal of the American Academy of Child & Adolescent Psychiatry*, *42*(5), 587-593. https://doi.org/10.1097/01.chi.0000046838.90931.44

Thiyagarajan, D. K., Basit, H., & Jeanmonod, R. (2024). *Physiology, menstrual cycle*. National Library of Medicine; StatPearls Publishing. https://www.ncbi.nlm.nih.gov/books/NBK500020/

Toffol, E., Koponen, P., Luoto, R., & Partonen, T. (2014). Pubertal timing, menstrual irregularity, and mental health: Results of a population-based study. *Archives of Women's Mental Health*, *17*(2), 127-135. https://doi.org/10.1007/s00737-013-0399-y

Tran, N. H., Dang, N. B., Nguyen, K. T., Bui, T. M., & Phan, Q. N. (2025). Gendered dimensions of menstrual health: Lifestyle, biology, and coping strategies among female medical students. *Sexes*, *6*(3), 35. https://doi.org/10.3390/sexes6030035

Treasure, J., Stein, D., & Maguire, S. (2020). Has the time come for a new classification system for eating disorders? *European Eating Disorders Review, 28*(1), 1–3.

Tufail, A., Mustafa, R., Munaver, S. A., & Nawaz, B. (2022). Frequency of psychological stress among women with new onset menstrual disorders amid corona pandemic lockdown. *Pakistan Journal of Medical Sciences*, *38*(5), 1159-1164. https://doi.org/10.12669/pjms.38.5.4606

Yu, M., Han, K., & Nam, G. E. (2017). The association between mental health problems and menstrual cycle irregularity among adolescent Korean girls. *Journal of Affective Disorders*, *210*, 43-48. https://doi.org/10.1016/j.jad.2016.11.036

Zhong, S., Wang, S., Ding, K., Tan, W., & Zhou, L. (2024). Low mental health literacy is associated with depression and anxiety among adults: A population-based survey of 16,715 adults in China. *BMC Public Health*, *24*(1). https://doi.org/10.1186/s12889-024-20020-y