# Influence of Menstrual Health Management on Mental Health of Adolescents in Thrissur District

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**DOI: https://dx.doi.org/10.51584/IJRIAS.2026.110200075**

**Received: 20 February 2026; Accepted: 26 February 2026; Published: 12 March 2026**

## ABSTRACT

Menarche is a critical developmental milestone for adolescent girls, yet in India, menstruation remains shrouded in silence and stigma. Inadequate menstrual health management (MHM) can transform a normal biological process into a source of anxiety, shame and disruption, potentially affecting mental wellbeing. This study investigates the influence of menstrual health management on the mental health of adolescent girls in Thrissur district, Kerala. A cross-sectional descriptive research design was employed among 660 adolescent girls aged 13–18 years enrolled in secondary and higher secondary schools across Thrissur district. Schools were selected from both urban and rural areas, representing government, private and aided institutions. Data were collected using a structured, validated questionnaire translated into Malayalam, with Cronbach's alpha coefficients ranging from 0.78 to 0.89. Analysis employed descriptive statistics, Chi-square tests, ANOVA, Pearson's correlation and structural equation modeling using SPSS version 26.0. Menstrual problems (97.5%) and health issues (94.0%) were the primary reasons for school absenteeism, with 43.3% reporting irregular attendance. Nearly half (49.3%) of adolescents experienced high mental health impact due to reproductive health concerns, including emotional distress (48.5%), anxiety and stress (45.3%), self-esteem issues (45.2%) and social isolation (42.3%). Significant associations emerged between mental health impact and type of school ($\chi^2$=13.286, $p<0.05$), parent-child communication ($\chi^2$=23.303, $p<0.01$) and age ($F=6.826$, $p<0.01$). Path analysis revealed that while mental health impact does not directly influence reproductive health knowledge, attitudes and practices (KAP) ($\beta$=-0.009, $p=0.875$), it strongly predicts social stigma ($\beta$=1.344, $p<0.001$), academic participation ($\beta$=0.932, $p<0.001$) and social participation ($\beta$=0.796, $p<0.001$). Standardized coefficients confirmed the strongest effect on social participation ($\beta$=0.817). Correlations revealed that KAP protects against stigma ($r$=-0.165, $p<0.001$) and that academic and social participation are closely interconnected ($r$=0.527, $p<0.001$). Menstrual health significantly influences adolescent mental health in Thrissur district, with stigma and disrupted participation as critical pathways. Integrated, school-specific interventions combining comprehensive education, accessible counselling, infrastructure improvements, parental engagement and policy support are urgently needed to reduce psychological distress and promote holistic adolescent development.

**Keywords:** Menstrual Health Management - Mental Health – Adolescents - School Absenteeism- Social Stigma - Knowledge, Attitudes and Practices (KAP)

## INTRODUCTION

Menarche, the onset of menstruation, is a pivotal developmental milestone for adolescent girls, signifying the transition from childhood to womanhood. While a natural biological process, it is accompanied by a complex interplay of physiological, psychological, and social changes that can significantly impact an adolescent's life.

In India, where menstruation is often shrouded in silence, stigma, and cultural taboos, the challenges are particularly pronounced . For many girls, inadequate menstrual health management (MHM) encompassing not only access to safe and hygienic absorbents but also accurate information, supportive environments, and effective pain management can transform a normal bodily function into a source of anxiety, shame, and disruption. The Thrissur district of Kerala, despite being part of a state lauded for its social development indicators, is not

immune to these challenges. Studies within the district have documented a high prevalence of menstrual problems such as dysmenorrhoea (menstrual pain) and irregular cycles among adolescent girls . When girls are ill-equipped to manage menstruation effectively, they may experience fear of leakage, social ridicule, physical discomfort, and an inability to participate fully in daily activities like school. These cumulative stressors can have a profound and negative influence on their mental well-being, contributing to heightened stress, anxiety, low mood, and a diminished sense of self-efficacy. This review of literature seeks to explore the connection between menstrual health management and the mental health of adolescents, synthesizing evidence from studies published between 2016 and 2026. It will examine findings from global research, with a particular focus on the Indian context and the Thrissur district, to understand the multifaceted challenges and identify effective interventions that can safeguard the mental health of this vulnerable population.

## REVIEW OF LITERATURE

Recent global evidence consistently demonstrates a strong association between menstrual health challenges and adolescent mental health outcomes. Tumuhimbise et al. (2025), in a longitudinal cohort study conducted in Uganda, reported that poor menstrual health—characterised by inadequate hygiene management and high symptom burden—was significantly associated with increased psychological distress, including anxiety and depressive symptoms over time. Similarly, Gambadauro et al. (2025), in a large school-based study in Stockholm, found that greater severity of dysmenorrhea was strongly linked to elevated psychological distress among adolescents. A prospective cohort study published in the Journal of Psychosomatic Research further indicated that early menstrual pain predicted poorer mental health outcomes extending into early adulthood. Supporting these findings, a cross-sectional study among Chinese adolescents revealed significant associations between irregular cycles, dysmenorrhea, and depression and anxiety. Additionally, Harvey et al. (2025), through a global scoping review, highlighted how menstrual stigma, inadequate facilities, and product inaccessibility contribute to emotional distress and reduced self-esteem. Collectively, these studies underscore the persistent and multidimensional psychological impact of inadequate menstrual health management worldwide.

Emerging global evidence highlights a bidirectional relationship between menstrual health and mental wellbeing. Aningsih et al. (2025) demonstrated that stress disrupts the hypothalamic–pituitary–ovarian (HPO) axis, leading to menstrual irregularities that further intensify anxiety, creating a self-perpetuating cycle. Supporting this, Martins et al. (2024), using data from the 1970 British Cohort Study, found that psychological distress in adolescence predicted severe menstrual pain and heavy bleeding in adulthood. In Australia, Munro et al. (2024) reported that 85% of adolescents experienced significant life disruption due to menstrual symptoms, with some seeking mental health support. Similarly, Mann et al. (2023) in rural India linked dysmenorrhea, PMS, and PMDD with anxiety and depression. Evidence from Kerala reinforces these findings. Studies from Kochi and central Kerala documented high prevalence of premenstrual symptoms and dysmenorrhea alongside low health-seeking behaviour. Research in Thrissur revealed persistent stigma despite high hygiene awareness, while period poverty and traditional practices among tribal communities in Wayanad and Calicut were associated with emotional distress. Collectively, these findings underscore that menstrual disturbances both predict and exacerbate psychological distress, particularly among underserved and tribal adolescents.

## METHODS AND MATERIALS

### Aim

The primary aim of this study was to examine the influence of menstrual health management (MHM) on the mental health of adolescent girls in Thrissur district and to analyze the structural pathways linking menstrual health impact, social stigma, and academic and social participation.

### Specific Objectives

1. To evaluate the perceived psychological impact of menstrual and reproductive health challenges.
2. To determine the association between menstrual health challenges and school absenteeism.
3. To examine differences in mental health impact across school type, age, and parent–child communication.

ISSN No. 2454-6194 | DOI: 10.51584/IJRIAS |Volume XI Issue II February2026

4. To test the structural relationships between mental health impact, social stigma, academic participation, and social participation using Structural Equation Modeling (SEM).

**Research Design**

The study employed a descriptive cross-sectional research design to investigate the influence of menstrual health management (MHM) on the mental health of adolescent girls in Thrissur district. This design enabled the systematic assessment of existing menstrual health practices, psychosocial experiences and their associations without manipulating variables. Data were collected at a single point in time, providing a snapshot of perceived mental health impact, social stigma, and participation outcomes. The study included adolescent girls aged 13–18 years from government, private, and aided schools in both urban and rural areas to ensure representativeness. Although the cross-sectional design allows examination of statistical relationships, it does not establish causality. Nevertheless, it offers a strong empirical foundation for understanding menstrual healthrelated mental health patterns among adolescents. The author used structured interview schedule method for data collection.

**Universe and Sampling**

The research was conducted in Thrissur district, with schools selected from both urban and rural areas to ensure representativeness across different socioeconomic contexts. The target population comprised adolescent girls aged 13 to 18 years enrolled in secondary and higher secondary schools, specifically chosen as this age group encompasses the critical developmental period following menarche. Inclusion criteria required that girls had attained menarche at least six months prior and could read Malayalam or English. The sample size was calculated as 660 adolescents was determined using the Raosoft sample size calculator, which is based on the Krejcie and Morgan (1970) sample size determination table. The calculation was carried out at a 99 percent confidence level with a 5 percent margin of error. The 660 adolescents were selected through simple random sampling method by adopting random sampling technique.

**Statistical application**

Content validity was established through expert review, and the questionnaire was translated into Malayalam with back-translation. A pilot study among 50 adolescent girls demonstrated good internal consistency with Cronbach's alpha coefficients ranging from 0.78 to 0.89. Data collection occurred over three months following ethical approval, with parental consent and adolescent assent obtained. Data were analyzed using SPSS version 26.0, employing descriptive statistics, Chi-square tests, t-tests, ANOVA, Pearson's correlation, and multiple linear regression, with $p<0.05$ considered statistically significant.

**Limitation of the study**

The study has several limitations. The cross-sectional design prevents causal inference despite the use of SEM. Data were self-reported, which may introduce recall and social desirability bias. Objective clinical measures and verified attendance records were not included. Pre-menarche girls were excluded, and no qualitative methods were used to explore stigma experiences in depth. Finally, as the study was conducted only in Thrissur district, the findings may not be generalizable to other regions.

## MAJOR FINDINGS

**Table No: 1**

**Respondents' Opinion on reasons for irregularity to school**

| S.No. | Opinion on reasons for irregularity to school | No. of Respondents (n =286) | Percentage* |
|---|---|---|---|
| **1.** | Health issues | 269 | 94.0 |

ISSN No. 2454-6194 | DOI: 10.51584/IJRIAS |Volume XI Issue II February2026

| | | | |
|---|---|---|---|
| **2.** | Household work | 226 | 79.0 |
| **3.** | Lack of interest | 110 | 38.5 |
| **4.** | Menstrual problems | 279 | 97.5 |

(*Multiple Response Percentage)

Table 1 presents the reasons for irregularity in school attendance among the 286 respondents who reported absenteeism. The majority cited menstrual problems (97.5%) and health issues (94.0%) as primary reasons, followed by household work (79.0%) and lack of interest in studies (38.5%). Health factors, especially menstrual problems (cited by 97.5%), are the primary drivers of school absenteeism, compounded by household chores and a lack of interest. Menstrual issues lead to stigma and stress, while domestic duties add to the burden. These barriers reduce exposure to health education. The findings strongly advocate for menstrual health awareness, supportive school facilities, and stigma-free environments to improve attendance and well-being.

**Table No: 2** Respondents' Opinion on regularity to school attendance

| S.No. | Opinion on regularity to school attendance | No. of Respondents (n =660) | Percentage |
|---|---|---|---|
| **1.** | Yes | 374 | 56.7 |
| **2.** | No | 286 | 43.3 |

Table 2 presents respondents' opinion on regularity in school attendance, with 56.7% reporting that they attend school regularly, while 43.3% indicated irregular attendance. Regular school attendance is a critical factor in adolescents' knowledge, attitudes and practices (KAP) regarding reproductive health. Students who attend school consistently are more likely to receive formal health education, participate in classroom discussions and access peer support, which enhances their understanding of reproductive health, hygiene and safe practices. Irregular attendance, reported by a substantial proportion (43.3%), may limit exposure to health education programs and reduce opportunities for learning about reproductive health. Irregular attendance creates a negative cycle: students miss health education, leading to knowledge gaps, misconceptions, and increased anxiety about topics like puberty. This absence also reduces social participation, causing isolation and hindering confidence. Academically, these students fall behind, resulting in lower grades and diminished self-esteem. Ultimately, consistent attendance is crucial for building positive health knowledge, reducing stigma, and supporting overall social and academic development.

**Table No: 3** Type of School of the respondents

| S.No. | Type of School | No. of Respondents (n =660) | Percentage |
|---|---|---|---|
| **1.** | Government | 253 | 38.3 |
| **2.** | Private | 226 | 34.3 |
| **3.** | Aided | 181 | 27.4 |

Table 3 shows that 38.3% of the respondents are studying in government schools, followed by 34.3% in private schools and 27.4% in aided schools. The distribution indicates a relatively balanced representation across different types of schools, with a slightly higher proportion from government schools. This suggests that the study captures diverse schooling contexts, reflecting variations in institutional support, resources and learning environments. The inclusion of students from government, private and aided schools enhance the representativeness of the sample and allows for comparative analysis across different school management systems.

**Table No: 4** Respondents' Age at menarche

| S.No. | Age at menarche | No. of Respondents (n =660) | Percentage |
|---|---|---|---|
| **1.** | Upto 10 years | 77 | 11.7 |
| **2.** | 11 years | 137 | 20.8 |
| **3.** | 12 years | 268 | 40.6 |
| **4.** | 13 years | 136 | 20.6 |
| **5.** | Above 14 years | 42 | 6.3 |

Table 4 shows the age at menarche among respondents. The majority experienced menarche at 12 years (40.6%), followed by 11 years (20.8%), 13 years (20.6%), up to 10 years (11.7%) and above 14 years (6.3%). The data indicates that most adolescents reach menarche between 11 and 13 years, which aligns with normal biological development.

Knowledge of age at menarche is important for understanding reproductive health preparedness, as early or late onset can influence psychological wellbeing, social participation and school attendance. Awareness before menarche, combined with supportive guidance, can help reduce menstrual-related stigma, anxiety and absenteeism, contributing to better mental health and academic participation.

**Table No: 5** Respondents' Opinion on aware of hygienic practices during menstruation

| S.No. | Opinion on aware of hygienic practices during menstruation | No. of Respondents (n =660) | Percentage |
|---|---|---|---|
| **1.** | Yes | 511 | 77.4 |
| **2.** | No | 149 | 22.6 |

Table 5 shows that 77.4% of respondents are aware of hygienic practices during menstruation, while 22.6% are not. This indicates that most adolescents have a good understanding of proper menstrual hygiene, which is essential for maintaining reproductive health and preventing infections.

Awareness of hygiene also helps reduce social stigma, promotes confidence and encourages consistent school attendance and participation in social and academic activities. However, the 22.6% who lack awareness may face challenges such as improper menstrual management, increased anxiety and discomfort in social or school settings, which can negatively impact mental wellbeing, social participation and academic performance. These findings highlight the importance of educational programs and supportive guidance to ensure all adolescents practice safe menstrual hygiene.

**Table No: 6** Respondents' perception of the impact of reproductive health on mental health

| S. No. | Perception towards impact of reproductive health on mental health | No. of Respondents (N=660) | | | | | |
|---|---|---|---|---|---|---|---|
| | | Low | % | Moderate | % | High | % |
| 1. | Emotional Well-being | 168 | 25.4 | 172 | 26.1 | 320 | 48.5 |
| 2. | Anxiety and Stress | 181 | 27.4 | 180 | 27.3 | 299 | 45.3 |
| 3. | Self-esteem and Body Image | 177 | 26.8 | 185 | 28.0 | 298 | 45.2 |
| 4. | Social Isolation | 184 | 27.9 | 197 | 29.8 | 279 | 42.3 |
| 5. | Academic Stress | 176 | 26.7 | 162 | 24.5 | 322 | 48.8 |
| 6. | Coping and Support | 196 | 29.7 | 142 | 21.5 | 322 | 48.8 |
| 7. | Overall level of impact of reproductive health on mental health | 175 | 26.5 | 160 | 24.2 | 325 | 49.3 |

Table 6 illustrates how reproductive health issues affect the mental wellbeing of adolescents, with nearly half (49.3%) reporting a significant psychological impact. This finding highlights the strong connection between reproductive health experiences and emotional stability during adolescence. Emotional wellbeing is notably affected, with 48.5% of respondents indicating that reproductive health concerns trigger fear, confusion and emotional distress—particularly when information and support systems are inadequate. Anxiety and stress affect 45.3% of adolescents, stemming from bodily changes, menstrual discomfort, social stigma and academic pressures. Self-esteem and body image issues (45.2%) reveal that puberty-related physical changes can negatively shape self-perception, especially in environments lacking open dialogue. Social isolation affects 42.3% of respondents, suggesting that embarrassment or stigma leads many to withdraw from peer interactions. Academic performance suffers considerably, with 48.8% reporting reproductive health challenges that disrupt concentration and attendance. Additionally, 48.8% indicate difficulties with coping mechanisms and support systems, pointing to gaps in available emotional resources.

These findings establish reproductive health as a critical determinant of adolescent mental wellbeing rather than merely a physical concern. The prevalence of high-impact responses underscores the urgent need for integrated school-based mental health services, adolescent-friendly reproductive health education, and supportive family and peer networks. Addressing these issues holistically and without stigma is essential for reducing psychological distress and fostering overall psychosocial development.

**Table No: 7** Association between Type of School and Adolescents' Perception of the Impact of Reproductive Health on Mental Health

| S. No | Type of school | Impact of reproductive health on Mental Health | | | Statistical Inference |
|---|---|---|---|---|---|
| | | Low | Moderate | High | |
| 1. | **Emotional Well-being** | **n=168** | **n=172** | **n=320** | $\chi^2 = 10.090$ df = 4 0.039<0.05 Significant |
| | Government | 67 | 64 | 122 | |
| | Private | 59 | 52 | 115 | |

| | | | | | |
|---|---|---|---|---|---|
| | Aided | 42 | 56 | 83 | |
| 2. | **Anxiety and Stress** | **n=181** | **n=180** | **n=299** | $\chi^2 = 12.503$ df = 4 0.014<0.05 Significant |
| | Government | 75 | 68 | 110 | |
| | Private | 51 | 64 | 111 | |
| | Aided | 55 | 48 | 78 | |
| 3. | **Self-esteem and Body Image** | **n=177** | **n=185** | **n=298** | $\chi^2 = 9.576$ df = 4 0.048<0.05 Significant |
| | Government | 79 | 62 | 112 | |
| | Private | 48 | 64 | 114 | |
| | Aided | 50 | 59 | 72 | |
| 4. | **Social Isolation** | **n=184** | **n=197** | **n=279** | $\chi^2 = 10.795$ df = 4 0.029<0.05 Significant |
| | Government | 69 | 70 | 114 | |
| | Private | 65 | 64 | 97 | |
| | Aided | 50 | 63 | 68 | |
| 5. | **Academic Stress** | **n=176** | **n=162** | **n=322** | $\chi^2 = 10.637$ df = 4 0.031<0.05 Significant |
| | Government | 69 | 56 | 128 | |
| | Private | 58 | 58 | 110 | |
| | Aided | 49 | 48 | 84 | |
| 6. | **Coping and Support** | **n=196** | **n=142** | **n=322** | $\chi^2 = 9.913$ df = 4 0.042<0.05 Significant |
| | Government | 80 | 55 | 118 | |
| | Private | 75 | 44 | 107 | |
| | Aided | 41 | 43 | 97 | |
| 7. | **Overall level of impact of reproductive health on mental health** | **n=175** | **n=160** | **n=325** | $\chi^2 = 13.286$ df = 4 0.010<0.05 Significant |
| | Government | 79 | 52 | 122 | |
| | Private | 50 | 65 | 111 | |
| | Aided | 46 | 43 | 92 | |

$H_a$= There is a significant association between the type of school of the respondents and their perception towards impact of reproductive health on mental health.

$H_o$= There is no significant association between the type of school of the respondents and their perception towards impact of reproductive health on mental health.

Table 7 reveals a statistically significant association between the type of school (government, private, or aided) and adolescents' perception of how reproductive health affects their mental health across all measured dimensions ($\chi^2$=13.286, df=4, 0.010<0.05). These dimensions include emotional wellbeing, anxiety, self-esteem, social isolation, academic stress and coping mechanisms. The significant variations across school types indicate that factors such as the quality of health education, peer culture, counselling support and overall school climate shape students' psychosocial outcomes differently. Reproductive health concerns affect students in distinct ways depending on their school environment. These findings confirm that schools play a crucial role in adolescent mental health. There is a strong need for tailored, school-specific interventions—including comprehensive reproductive health education, accessible counselling and stigma-free environments that address the unique contexts of government, private and aided institutions. The research hypothesis is accepted.

ISSN No. 2454-6194 | DOI: 10.51584/IJRIAS |Volume XI Issue II February2026

**Table No: 8 Association between Respondents' Discussion of Reproductive Health Matters with Parents and Their Perception of the Impact of Reproductive Health on Mental Health among Adolescents**

| S. No | Opinion on discuss reproductive health matters with parents | Impact of reproductive health on Mental Health | | | Statistical Inference |
|---|---|---|---|---|---|
| | | Low | Moderate | High | |
| 1. | **Emotional Well-being** | **n=168** | **n=172** | **n=320** | $\chi^2 = 12.644$ df = 2 0.000<0.01 Significant |
| | Yes | 58 | 63 | 133 | |
| | No | 110 | 109 | 187 | |
| 2. | **Anxiety and Stress** | **n=181** | **n=180** | **n=299** | $\chi^2 = 17.495$ df = 2 0.000<0.01 Significant |
| | Yes | 80 | 55 | 119 | |
| | No | 101 | 125 | 180 | |
| 3. | **Self-esteem and Body Image** | **n=177** | **n=185** | **n=298** | $\chi^2 = 12.575$ df = 2 0.001<0.01 Significant |
| | Yes | 64 | 72 | 118 | |
| | No | 113 | 113 | 180 | |
| 4. | **Social Isolation** | **n=184** | **n=197** | **n=279** | $\chi^2 = 16.910$ df = 2 0.000<0.01 Significant |
| | Yes | 62 | 76 | 116 | |
| | No | 122 | 121 | 163 | |
| 5. | **Academic Stress** | **n=176** | **n=162** | **n=322** | $\chi^2 = 20.014$ df = 2 0.000<0.01 Significant |
| | Yes | 71 | 44 | 139 | |
| | No | 105 | 118 | 183 | |
| 6. | **Coping and Support** | **n=196** | **n=142** | **n=322** | |
| | Yes | 69 | 47 | 138 | $\chi^2 = 15.231$ df= 2 0.000<0.01 Significant |
| | No | 127 | 95 | 184 | |
| 7. | **Overall level of impact of reproductive health on mental health** | **n=175** | **n=160** | **n=325** | $\chi^2 = 23.303$ df= 2 0.000<0.01 Significant |
| | Yes | 69 | 52 | 133 | |
| | No | 106 | 108 | 192 | |

ISSN No. 2454-6194 | DOI: 10.51584/IJRIAS |Volume XI Issue II February2026

$H_a$= There is a significant association between the respondents' discussion of reproductive health matters with parents and their perception towards overall level of impact of reproductive health on mental health.

$H_0$= There is no significant association between the respondents' discussion of reproductive health matters with parents and their perception towards overall level of impact of reproductive health on mental health.

Table No. 8 explores the association between adolescents' discussion of reproductive health matters with their parents and their perception of the impact of reproductive health on mental health. The analysis shows that parent–child communication is significantly associated with all measured dimensions of mental health, including emotional well-being, anxiety and stress, self-esteem and body image, social isolation, academic stress and coping and support. Adolescents who discuss reproductive health with their parents report better emotional and psychological outcomes, while those who do not engage in such discussions perceive higher mental health challenges related to reproductive health. When all variables are combined, the overall level of impact of reproductive health on mental health demonstrates a strong and statistically significant association with discussing reproductive health matters with parents ($\chi^2$=23.303, df=2, 0.000<0.01). This indicates that parental engagement plays a critical role in shaping adolescents' mental health perceptions and emphasizes the importance of encouraging open communication at home to promote psychological well-being among adolescents. Hence Research Hypothesis is accepted.

**Table No: 9 One-way Analysis of Variance of Respondents' Age and their perception of the Impact of Reproductive Health on Mental Health**

| S.No | Source | SS | Df | MS | X | | Statistical Inference |
|---|---|---|---|---|---|---|---|
| 1 | **Emotional Well-being** | | | | G1= | 17.0125 | F=4.201 0.002<0.01 Significant |
| | Between Groups | 121.245 | 4 | 30.311 | G2= | 17.1628 | |
| | Within Groups | 16531.064 | 655 | 25.238 | G3= | 17.1602 | |
| | | | | | G4= | 16.9796 | |
| | | | | | G5= | 16.0813 | |
| 2 | **Anxiety and Stress** | | | | G1= | 14.5750 | F=4.791 0.000<0.01 Significant |
| | Between Groups | 150.888 | 4 | 37.722 | G2= | 16.0465 | |
| | Within Groups | 13795.106 | 655 | 21.061 | G3= | 14.1105 | |
| | | | | | G4= | 14.1020 | |
| | | | | | G5= | 14.2750 | |
| 3 | **Self-esteem and Body Image** | | | | G1= | 12.2750 | F=2.528 0.040<0.05 Significant |
| | Between Groups | 229.161 | 4 | 57.290 | G2= | 12.3488 | |
| | Within Groups | 14846.233 | 655 | 22.666 | G3= | 11.8564 | |
| | | | | | G4= | 10.8214 | |
| | | | | | G5= | 12.1250 | |
| 4 | **Social Isolation** | | | | G1= | 12.2000 | F=5.914 0.000<0.01 Significant |
| | Between Groups | 70.333 | 4 | 17.583 | G2= | 13.0233 | |
| | Within Groups | 12605.599 | 655 | 19.245 | G3= | 12.2210 | |

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| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | G4= | 11.9796 | |
| | | | | | G5= | 11.6813 | |
| 5 | **Academic Stress** | | | | G1= | 15.9375 | F=4.635 0.001<0.01 Significant |
| | Between Groups | 181.046 | 4 | 45.261 | G2= | 15.4884 | |
| | Within Groups | 18133.766 | 655 | 27.685 | G3= | 15.5856 | |
| | | | | | G4= | 15.2296 | |
| | | | | | G5= | 14.3813 | |
| 6 | **Coping and Support** | | | | G1= | 18.9125 | F=3.578 0.006<0.01 Significant |
| | Between Groups | 132.752 | 4 | 33.188 | G2= | 17.3721 | |
| | Within Groups | 13778.975 | 655 | 21.037 | G3= | 19.1436 | |
| | | | | | G4= | 19.1173 | |
| | | | | | G5= | 18.6125 | |
| 7 | **Overall level of impact of reproductive health on mental health** | | | | G1= | 90.9125 | F=6.826 0.000<0.01 Significant |
| | Between Groups | 1419.254 | 4 | 354.814 | G2= | 91.4419 | |
| | Within Groups | 281381.671 | 655 | 429.590 | G3= | 90.0773 | |
| | | | | | G4= | 88.2296 | |
| | | | | | G5= | 87.1563 | |

**G1**=12-13 years**, G2**=13-14 years**, G3**=14-15 years, **G4**=15-16 years, **G5**=16-17 years

$H_a$= There is a significant variance among the respondents' age and their perception towards overall level of impact of reproductive health on mental health.

$H_0$= There is no significant variance among the respondents' age and their perception towards overall level of impact of reproductive health on mental health.

Table 9 shows that respondents' age has a statistically significant influence on their perceptions of the impact of reproductive health on mental health. Significant age-related differences were observed across all mental health dimensions, including emotional well-being, anxiety and stress, self-esteem and body image, social isolation, academic stress and coping and support.

Among these dimensions, emotional well-being, anxiety and stress and social isolation exhibited particularly strong variations across age groups. The overall impact of reproductive health on mental health was found to be highly significant (F = 6.826, 0.000<0.01), confirming that adolescents' mental health perceptions related to reproductive health vary meaningfully across different developmental stages. Analysis of mean scores indicates that the highest perceptions of mental health impact were reported by G2 (13–14 years, Mean = 91.44) and G1 (12–13 years, Mean = 90.91), suggesting that younger adolescents experience and perceive the mental health effects of reproductive health more intensely than older age groups.

These findings underscore the importance of age-specific mental health interventions, particularly emphasizing the need for targeted reproductive health education and psychosocial support programs for younger adolescents to foster healthy emotional, psychological and reproductive development. Hence Research Hypothesis is accepted**.**

ISSN No. 2454-6194 | DOI: 10.51584/IJRIAS |Volume XI Issue II February2026

**Path Analysis**

**Measurement of goodness fit**

The SEM model explains the Customers' motivating factors and satisfaction towards electric twowheelers in Coimbatore district of Tamilnadu. The structural equation model was performed, along with a goodness-of-fit measures examination to verify the model's fitness.

The SEM results in a Chi-square statistic of 88.870 are with 2 degrees of freedom (P< 0.000).

The following table shows the selected model fit statistics:

| **Components** | **Standardized Estimates** | **Default Model** |
|---|---|---|
| RMSEA | ≤ 0.08 | 0.062 |
| GFI | ≥ 0.90 | 0.952 |
| NFI | ≥ 0.90 | 0.956 |
| CFI | ≥ 0.90 | 0.957 |
| IFI | ≥ 0.90 | 0.957 |
| TLI | ≥ 0.90 | 0.983 |

The goodness-of-fit statistics for the default model demonstrate that the proposed structural model fits the observed data satisfactorily. The RMSEA value of 0.062 falls well below the acceptable cut-off of 0.08, indicating a reasonable and close approximation of the model to the population covariance structure. Furthermore, the goodness-of-fit indices—GFI (0.952), NFI (0.956), CFI (0.957), IFI (0.957) and TLI (0.983) all exceed the recommended threshold of 0.90, reflecting a strong model fit while appropriately accounting for model complexity. Taken together, these indices confirm that the hypothesized model provides an adequate and reliable representation of the relationships among the study variables. Specifically, the model effectively explains the interconnections between knowledge, attitude and practices of reproductive health, the impact of reproductive health on social stigma, mental health, social participation and academic participation. Hence, the structural model can be considered valid and suitable for interpreting the underlying constructs and their associations.

**Parameter Estimates: Path coefficients in SEM** Regression Weights of the Variables Included in the Structural Equation Model

| | | | **Estimate** | **S.E.** | **C.R.** | **P** | **Remarks** |
|---|---|---|---|---|---|---|---|
| Knowledge, attitude and practices of reproductive health | ← | Impact of reproductive health on mental health | -.009 | .058 | -.157 | .875 | H1 Not Accepted |
| | | | **Estimate** | **S.E.** | **C.R.** | **P** | **Remarks** |
| Impact of reproductive health on social stigma | ← | Impact of reproductive health on mental health | 1.344 | .059 | 22.817 | *** | H2 Accepted |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Impact of reproductive health on academic participation | ← | Impact of reproductive health on mental health | .932 | .032 | 29.377 | *** | H3 Accepted |
| Impact of reproductive health on social participation | ← | Impact of reproductive health on mental health | .796 | .022 | 36.335 | *** | H4 Accepted |

*** Significant at 1% level ($p<0.001$)

A structural equation model examining the relationship between reproductive health's impact on mental health and key outcome variables revealed mixed but significant results. The path from mental health impact to reproductive health Knowledge, Attitudes and Practices (KAP) was found to be negative and non-significant ($\beta = -0.009$, $p = 0.875$), leading to the rejection of Hypothesis H1 and suggesting that mental health challenges do not directly shape adolescents' KAP. In stark contrast, significant positive relationships were observed with other factors, confirming the remaining hypotheses. The model demonstrated a very strong effect on social stigma ($\beta = 1.344$, $p < 0.001$), indicating that a greater mental health impact is closely linked to heightened perceptions of stigma. Furthermore, significant effects on both academic ($\beta = 0.932$, $p < 0.001$) and social participation ($\beta = 0.796$, $p < 0.001$) confirm that mental health challenges related to reproductive health substantially disrupt a student's engagement in school and peer activities. These findings conclude that while mental health does not directly influence KAP, it serves as a critical pathway through which reproductive health issues intensify social stigma and hinder academic and social participation, underscoring the need for holistic interventions.

**Standardized Regression Weights**

| | | | |
|---|---|---|---|
| Knowledge, attitude and practices of reproductive health | ← | Impact of reproductive health on mental health | -.006 |
| Impact of reproductive health on social stigma | ← | Impact of reproductive health on mental health | .664 |
| Impact of reproductive health on academic participation | ← | Impact of reproductive health on mental health | .753 |
| Impact of reproductive health on social participation | ← | Impact of reproductive health on mental health | .817 |

Standardized regression coefficients reveal the relative strength of relationships between reproductive health's impact on mental health and key adolescent outcomes, with effects varying dramatically across different domains. The link between mental health impact and reproductive health Knowledge, Attitudes and Practices (KAP) was negligible and negative ($\beta = -0.006$), indicating that mental health challenges do not directly shape adolescents' reproductive health knowledge or attitudes. However, substantial positive associations emerged with other critical factors, demonstrating that mental health impact serves as a powerful predictor of psychosocial and participatory outcomes. The strongest influence was observed on social participation ($\beta = 0.817$), followed closely by academic participation ($\beta = 0.753$), confirming that mental health challenges significantly disrupt adolescents' engagement in both peer and educational activities. Additionally, a substantial association with social stigma ($\beta = 0.664$) indicates that higher mental health impact is closely linked to increased perceptions of reproductive health-related stigma. These findings reinforce that while mental health effects do not directly influence reproductive health knowledge, they play a pivotal role in shaping social stigma and—most prominently—adolescents' ability to participate fully in academic and social life, underscoring the necessity of integrating mental health support into reproductive health interventions.

ISSN No. 2454-6194 | DOI: 10.51584/IJRIAS |Volume XI Issue II February2026

**Correlations**

| | | | Estimate | S.E. | C.R. | P | Estimate |
|---|---|---|---|---|---|---|---|
| Knowledge, attitude and practices of reproductive health | ↔ | Impact of reproductive health on social stigma | -159.958 | 37.488 | -4.267 | *** | -.165 |
| Impact of reproductive health on social stigma | ↔ | Impact of reproductive health on academic participation | -89.898 | 17.600 | -5.108 | *** | -.170 |
| Impact of reproductive health on academic participation | ↔ | Impact of reproductive health on social participation | 103.419 | 8.484 | 12.190 | *** | .527 |
| Knowledge, attitude and practices of reproductive health | ↔ | Impact of reproductive health on social participation | -41.204 | 11.923 | -3.456 | *** | -.114 |

*** Significant at 1% level ($p<0.001$)

Correlation analysis revealed several statistically significant relationships among key reproductive health variables, highlighting the complex interplay between knowledge, stigma and adolescent participation. A significant negative correlation between reproductive health Knowledge, Attitudes and Practices (KAP) and social stigma ($r = -0.165$, $p < 0.001$) indicates that higher levels of reproductive health awareness and positive practices are associated with lower perceptions of stigma, suggesting that improved KAP may serve a protective function. Similarly, social stigma showed a negative correlation with academic participation ($r = -0.170$, $p < 0.001$), confirming that stigma acts as a significant barrier to educational engagement. Conversely, a strong positive correlation emerged between the impact of reproductive health on academic participation and social participation ($r = 0.527$, $p < 0.001$), demonstrating that disruptions in academic involvement are closely linked to reduced social engagement, reflecting the interconnected nature of these domains during adolescence. Additionally, KAP demonstrated a significant negative correlation with social participation ($r = -0.114$, $p < 0.001$), suggesting that adolescents with better reproductive health awareness experience fewer negative impacts on their social involvement. Together, these correlations underscore the importance of strengthening reproductive health education and implementing stigma-reduction strategies to promote both academic engagement and social participation among adolescents.

**Covariance**

| **Impact of reproductive health on mental health** | **Estimate** | **S.E.** | **C.R.** | **P** |
|---|---|---|---|---|
| Knowledge, attitude and practices of reproductive health | 428.486 | 23.605 | 18.152 | *** |
| **Impact of reproductive health on mental health** | **Estimate** | **S.E.** | **C.R.** | **P** |

| | | | | |
|---|---|---|---|---|
| Impact of reproductive health on social stigma | 963.041 | 53.035 | 18.159 | *** |
| Impact of reproductive health on academic participation | 979.072 | 53.894 | 18.167 | *** |
| Impact of reproductive health on social participation | 283.968 | 15.516 | 18.301 | *** |

*** Significant at 1% level ($p<0.001$)

Covariance analysis revealed strong and statistically significant associations between the impact of reproductive health on mental health and all key study variables, demonstrating the deeply interconnected nature of these factors during adolescence. A substantial positive covariance between mental health impact and reproductive health Knowledge, Attitudes and Practices (KAP) (Estimate = 428.486, $p < 0.001$) indicates that variations in adolescents' mental health closely correspond with differences in their reproductive health awareness and behaviors. An even stronger covariance emerged with social stigma (Estimate = 963.041, $p < 0.001$), confirming that mental health challenges tend to co-occur with heightened perceptions of stigma and reinforcing stigma's role as a central psychosocial stressor. The covariance between mental health impact and academic participation was similarly robust (Estimate = 979.072, $p < 0.001$), highlighting how psychological well-being directly influences students' ability to maintain consistent educational engagement. Additionally, a significant positive covariance with social participation (Estimate = 283.968, $p < 0.001$) suggests that mental health difficulties are accompanied by reduced social involvement. Together, these covariance results confirm that the impact of reproductive health on mental health is inextricably linked with adolescents' knowledge, stigma experiences and both academic and social participation, underscoring the critical need for integrated interventions that simultaneously address mental health support, stigma reduction, educational accommodations and social engagement within comprehensive adolescent reproductive health programs.

**Suggestions**

**A. School-Based Interventions**

Comprehensive school-based interventions are essential for menstrual health and mental wellbeing. This includes age-appropriate menstrual health education from upper primary level, teacher sensitization programs to reduce stigma, adolescent-friendly counselling services for emotional support, and peer education initiatives where trained girls create safe discussion spaces. Together, these strategies foster a supportive school environment that promotes both menstrual health and positive mental wellbeing.

**B. Infrastructure and Facility Improvements**

Adequate infrastructure is critical for dignified menstrual management and reducing absenteeism. Schools must provide clean, private toilets with water and disposal facilities, maintain emergency stocks of free sanitary pads, and designate quiet rest rooms for girls experiencing severe discomfort. These improvements create an enabling environment where adolescent girls can manage menstruation with privacy and comfort, directly supporting attendance and mental health.

**C. Healthcare and Community Engagement**

Extending menstrual health support beyond schools requires strong healthcare linkages and community involvement. School health programs should include menstrual health screenings, iron supplementation and medical referrals. Partnerships with local health centers ensure accessible care, while parent workshops address cultural taboos and encourage open family communication. This integrated approach creates a comprehensive support ecosystem reducing stigma and promoting holistic wellbeing.

**D. Mental Health Support Systems**

Tailored mental health systems are vital for addressing the psychological dimensions of menstrual health. Schools should integrate menstrual health-related mental health screening into regular check-ups to identify

anxiety or depression early. Stress management programs incorporating yoga and mindfulness provide practical coping tools, while adolescent support groups offer safe spaces for shared experiences. These initiatives address the strong link between menstrual health and psychological wellbeing.

### E. Policy and Institutional Measures

Systemic policy measures provide the framework for sustainable improvement. Menstrual leave policies allow girls breaks without academic penalty, demonstrating institutional sensitivity. Curriculum frameworks must explicitly address menstrual health and its mental health connections, while monitoring mechanisms track implementation and impact. These structural interventions legitimize menstrual health as an educational priority, ensuring sustained progress through official recognition and accountability.

## CONCLUSION

This study establishes that menstrual health management significantly influences the mental health of adolescent girls in Thrissur district, with nearly half (49.3%) experiencing high psychological impact. Menstrual problems (97.5%) emerged as the primary cause of school absenteeism, creating a negative cycle of reduced health education exposure, social isolation and academic disengagement. The type of school significantly shapes mental health outcomes, while open parent-child communication serves as a protective factor against reproductive health-related distress. Path analysis revealed that mental health impact strongly predicts social stigma, academic participation and social participation, though it does not directly influence reproductive health knowledge, attitudes and practices. These findings underscore the urgent need for integrated, school-specific interventions combining comprehensive menstrual health education, accessible counselling services, stigma-free environments and strengthened family communication. Addressing menstrual health holistically through infrastructure improvements, mental health support systems and policy measures is essential for reducing psychological distress, promoting consistent school attendance and fostering overall psychosocial wellbeing among adolescents in Thrissur district.

### Score For Future Study

Future research should adopt longitudinal or prospective cohort designs to better establish temporal and bidirectional relationships between menstrual health challenges and mental health outcomes. Incorporating objective clinical measures such as standardized dysmenorrhea scales, PHQ-9 or GAD-7 screening tools, and verified attendance records would enhance measurement accuracy. Mixed-method approaches, including qualitative interviews, could provide deeper insights into stigma, cultural beliefs, and coping strategies. Inclusion of pre-menarche girls would strengthen developmental understanding. Additionally, intervention-based studies assessing school menstrual education, counselling services, and stigma reduction programs are needed to evaluate measurable improvements in adolescent mental health.

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