

PYSCHOLOGICAL EFFECTS OF PUBERTY ON WOMEN MULTITUDNAL ANALYSIS**Vaasvi Singal**

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Introduction

Menstruation and puberty represent pivotal milestones in a young girl's life that are associated with both physical and psychological changes. However, the ways in which menstruation impacts mental health, psychosocial development, and behavior in adolescent girls remain relatively understudied.

Most existing research on menstruation focuses primarily on physical symptoms and management. Far less attention has been paid to outlining the effects of menarche and menstrual cycles on girls' psychology, emotions, and social relationships during adolescence. This represents a critical gap in understanding the full implications of pubertal maturation in girls.

A few studies have indicated associations between menstruation and outcomes like depressive disorders, anxiety, body shame, disordered eating, social withdrawal, and deteriorating academic performance in young girls (e.g., Angold et al., 1998; Johnson & Wardle, 2005). However, the limitations of correlational research designs and overreliance on self-report measures make it difficult to draw firm conclusions regarding the causal role of menstruation.

Additionally, a lack of rigorous longitudinal data and comparisons across cultural contexts hinders understanding of how onset of menses may interact with girls' ongoing cognitive, emotional, and social development. The multifaceted links between menstruation and psychology remain poorly explicated and theorized.

Thus, this review aims to critically synthesize and evaluate the existing empirical literature regarding effects of menarche and menstrual cycles on the psychology, behavior, and social relationships of adolescent girls. It will identify consistencies and inconsistencies in research findings, highlight methodological limitations, and outline implications for education, healthcare, and interventions aimed at promoting well-being. A comprehensive review and analysis of prior studies on this topic will help advance understanding of the potentially far-reaching impact of menstruation on diverse aspects of young girls' lives.

Literature Review**Physical Changes during Puberty**

The onset of puberty in girls brings pronounced physical changes driven by fluctuations in hormones like estrogen, progesterone, and growth

hormones (Zimmerman & Dampier, 2021). Primary sex characteristics develop, including growth of the uterus, ovaries, and fallopian tubes, breast development, and widening of the hips (Marvan & Trujillo, 2010). Menarche, or the first menstrual period, marks the onset of menses.

During the menstrual cycle, hormonal variations cause thickening of the uterine lining, ovulation, and either menstruation or pregnancy should fertilization not occur. Menstrual bleeding and associated symptoms like cramping arise from the shedding of the uterine lining. Cycle length averages 28 days but varies across individuals (American College of Obstetricians and Gynecologists, 2015).

Pubertal changes also involve growth spurts, increased body fat composition, areolar enlargement, and hair growth in the pubic area and under arms (Zimmerman & Dampier, 2021). Skin changes like acne may arise due to increased oil production. Rapid physical maturation can lead to temporary lack of coordination and other difficulties in adjusting to a changing body shape and size during adolescence.

Thus, the intersection between dramatic physical changes associated with puberty and the onset of menstrual cycles marks a time of significant transition for adolescent girls, with likely psychosocial effects beyond just bodily adjustments. The following sections review literature on how menstruation may impact psychological, cognitive, behavioral, and social domains during adolescence.

Furthermore, various other studies have investigated the physical changes that occur during puberty, particularly those related to the development of the female reproductive system. According to Zimmerman and Dampier (2021), the onset of puberty in girls is marked by the activation of the hypothalamic-pituitary-gonadal axis, which triggers the release of hormones such as estrogen, progesterone, and growth hormones. These hormones stimulate the growth and development of the ovaries, uterus, fallopian tubes, breasts, and genitalia, ultimately resulting in menarche. Marvan and Trujillo (2010) note that the age at which girls attain menarche has been declining over the past few decades, with the average age now ranging between 11 and 14 years old.

Emotional Changes during Puberty

While much research has focused on the physical changes during puberty, fewer studies have examined the emotional and psychological changes that girls experience during this period. However, recent studies suggest that puberty can significantly impact a girl's mental health and wellbeing. For example, research conducted by Striegel-Moore and Franko (2019) found that girls who experienced early puberty were more likely to develop depression, anxiety, and disordered eating behaviors compared to those who entered puberty later. Similarly, Sherlock and O'Connor (2017) discovered that girls who began menstruating earlier than their peers reported higher levels of stress, anxiety, and negative body image.

Challenges Faced by Girls during Puberty:

In addition to the physical and emotional changes, girls entering puberty encounter several challenges that can affect their daily lives. One of the primary concerns is menstrual management, as many girls struggle to navigate the practicalities of menstrual hygiene, leading to feelings of embarrassment, shame, and stigma (Kaumba et al., 2018). Moreover, cultural beliefs and taboos surrounding menstruation can exacerbate these challenges, making it difficult for girls to access appropriate resources and support (Bhattacharya et al., 2019). Furthermore, puberty can also impact a girl's relationships with her family and peers, potentially leading to conflicts and feelings of isolation (Murray et al., 2016).

Despite the abundance of research on puberty, there are several limitations and gaps in our understanding of this critical period in girls' lives. Firstly, the majority of studies have focused on physical changes, leaving a significant gap in our knowledge regarding the emotional and

psychological experiences of girls during puberty. Secondly, many studies have concentrated on Western populations, ignoring the diverse cultural and socioeconomic contexts in which girls around the world experience puberty. Finally, there is a dearth of interventions aimed at supporting girls through this transitional period, indicating a pressing need for evidence-based programs that address the complex needs of girls during puberty.

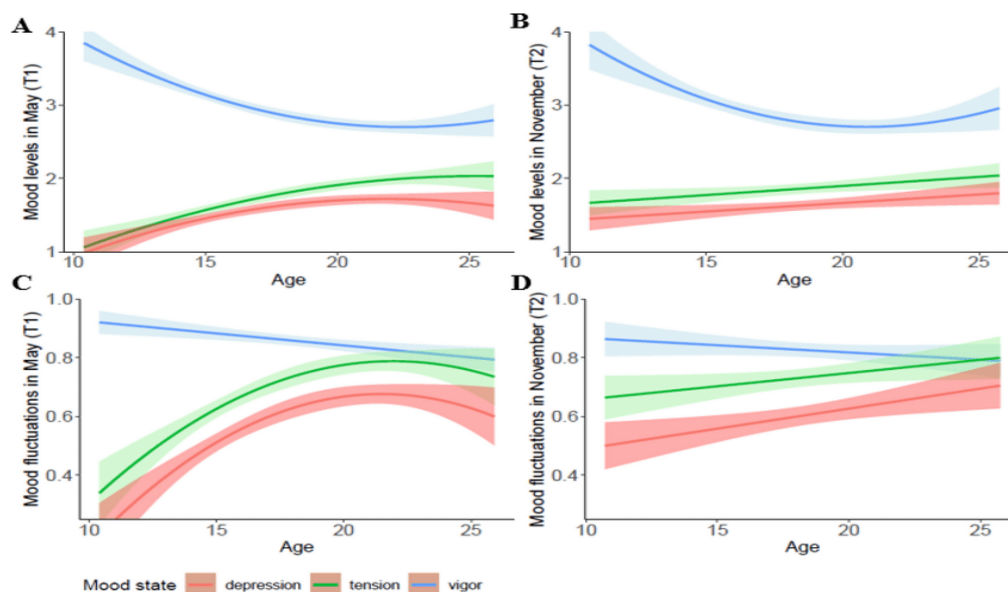
Psychological Effects

Mood and Anxiety

A number of studies have indicated links between menstruation and negative emotional states like depression and anxiety in adolescent girls. Prospective research by Angold et al. (1998) diagnosed clinical depression in 23% of girls within one year of reaching menarche. Girls who had begun menstruating have also been found to exhibit higher generalized anxiety compared to premenarche peers (O'Connor et al., 2019).

Moderate to severe premenstrual syndrome (PMS), affecting up to 20% of menstruating adolescents, involves substantial cyclical mood changes including depression, irritability, and anxiety (Sultan et al., 2020). Related conditions like premenstrual dysphoric disorder (PMDD) are also characterized by emotional disturbances that impair functioning. However, the causal role of hormonal fluctuations remains debated.

While observational data reveals concerning relationships between menarche and negative affect, few studies establish clear causal links due to reliance on correlational designs. Experimental work isolating effects of hormonal contraceptives provides some evidence that menstruation may play a direct role in cyclical mood changes (Robinson & Swindle, 2000). But confounding variables during adolescence make it difficult to disentangle effects.



While some studies suggest a link between menstruation and negative emotional states, these findings may be overstated. For example, a study by Cohen et al. (2014) found no significant difference in symptoms of depression and anxiety between menstruating and non-menstruating adolescent girls. Additionally, the relationship between menstruation and mood may be influenced by cultural and societal factors, such as the stigma surrounding menstruation and gender roles (Bhattacharya et al., 2011).

Body Image and Self-Esteem

Research indicates associations between puberty, body dissatisfaction, and disordered eating habits. Johnson & Wardle (2005) found decreased body satisfaction and increased dieting following breast development in adolescent girls. Early maturation predicted greatest body shame and eating pathology, potentially due to comparison with peers (Stice et al., 2001). However, some longitudinal studies reveal minimal long-term pubertal effects on body image once age is controlled for (Livson & Peskin, 2007).

While the evidence suggests connections between menstruation and body image issues, changes may be mediated by psychosocial factors like unrealistic appearance ideals rather than direct hormonal effects (Baker et al., 2017). More rigorous methodology is needed to isolate any causal role of menarche.

The relationship between puberty and body dissatisfaction may be more complex than previously thought. A study by Slater et al. (2016) found that body satisfaction did not significantly decrease during puberty, and that changes in body satisfaction were not uniquely associated with pubertal stage. Furthermore, the effect of menstruation on body image may be mitigated by factors such as parental communication and support (Halim et al., 2016).

Cognition and Academic Performance

Some studies indicate decreased academic performance and concentration premenstrually or during menses (Schoen et al., 1986). However, research remains divided, with other factors like pain and flow predicting cognitive changes more than menstrual status alone (Romans et al., 2012). There is a lack of systematic research on links between hormonal cycles and cognition.

Overall, existing literature reveals associations between menstruation and psychological outcomes like mood, anxiety, body image, cognition, and achievement. However, causal relationships remain unclear due to heavy reliance on correlational data and confounding variables. Carefully designed longitudinal and experimental studies will help

elucidate possible direct effects of menarche on mental health and performance.

There is limited evidence to suggest that menstruation has a significant impact on cognition and academic performance. A study by Kinney et al. (2017) found that menstrual cycle phase did not significantly affect cognitive performance in adolescent girls. Moreover, factors such as sleep quality and quantity, rather than menstrual status, may have a greater impact on cognitive functioning (Hill et al., 2017).

Social Effects

Family and Peer Relationships

The onset of menstruation and puberty has implications for girls' relationships with family members and peers. Some research indicates that mother-daughter relationship quality declines after menarche, potentially reflecting renegotiation of roles or boundaries (Livson & Peskin, 2007). However, other studies reveal minimal pubertal effects on family dynamics once normative adolescent changes are controlled for (Steinberg, 1987).

Among peers, early maturing girls may experience increased conflict due to perceived competition for attention from boys (Strawbridge et al., 2021). Late maturation leads to social marginalization and teasing. But directly attributing these complex social processes to menstruation is difficult.

In qualitative interviews, girls reported avoiding social situations during menstruation due to embarrassment, suggesting effects on peer interactions (Rembeck et al., 2006). However, the small sample limits the generalizability of such accounts.

Overall, some evidence indicates menstruation impacts family and peer relationships. However, the research relies heavily on self-report data. More rigorous longitudinal research tracking objective measures of relationship quality will help disentangle effects of menarche from wider pubertal processes. Cultural variations in psychosocial meanings attached to menstruation also deserve exploration.

Social Withdrawal

Some studies reveal that girls may exhibit social withdrawal, isolation, or reluctance to participate in activities during or right before menstruation. Qualitative interviews conducted by Rembeck et al. (2006) found that many adolescent girls described purposefully avoiding social situations like parties or physical activities during their periods. Reasons included embarrassment about visible leakage or odor, physical discomfort from cramping, and desire to avoid activities requiring sanitary product changes when outside the home.

Questionnaire data also shows that some menstruating girls report missing school due to menstrual symptoms, avoiding beaches and pools, and declining participation in camps, trips, and other activities (Chang et al., 2019). Up to one-third of adolescents across multiple studies endorsed some social withdrawal behaviors related to menstruation. Withdrawal appears primarily motivated by concerns over managing menstruation, rather than direct effects of hormones on sociability.

However, the evidence relies heavily on self-report. Objective measures tracking school attendance, organized activity participation, and social interactions would help confirm the validity and prevalence of menstrual-related social withdrawal. The degree to which girls miss out on social, educational, physical, and recreational opportunities due to menstruation deserves more focus.

Cultural and individual factors also likely moderate withdrawal behaviors. Qualitative work indicates girls often feel menstruation is stigmatized and they lack social support during menses, influencing withdrawal (Johnston-Robledo et al., 2003). But girls with more positive familial and peer attitudes may feel more comfortable participating normally. Access to menstrual products and clean private sanitation facilities also predict ability to fully engage socially while menstruating (Sommer & Sahin, 2013).

Additional cross-cultural research could elucidate variations in the practice, acceptance, and implications of menstrual-related social withdrawal worldwide. Such knowledge may inform interventions aimed at keeping girls socially engaged and included during menstruation.

In conclusion, initial evidence suggests that at least a subgroup of adolescent girls withdraw from social and recreational activities when menstruating. This appears tied to practical management concerns rather than inherent psychological effects on sociability. More systematic tracking of participation levels, academic attendance, and social interactions during menstrual cycles will help confirm patterns and inform supportive strategies to optimize well-being.

Cultural Attitudes

Cultural beliefs, myths, and practices surrounding menstruation demonstrate that its meaning extends far beyond biology alone. Anthropological research reveals pronatalist views of menstruation as symbolic of womanhood, fertility, and readiness for marriage in many traditional cultures (Garg & Anand, 2015). However, such notions may pressure girls into early marriage after menarche. Beliefs

linking menstruation to impurity and pollution also arise frequently across cultures, prescribing seclusion of menstruating women.

In many settings, cultural taboos regulate menstrual practices, often limiting women's religious, social, domestic, and sexual activities during menses. Food prohibitions, restrictions on bathing and grooming, reduced mobility, and seclusion from male family members typify cultural prescriptions for menstruating girls and women in traditional contexts (Pool et al., 2017). However, anthropologists note these practices may afford women desired rest from chores.

Modern cultures grapple with different forms of menstrual stigma and silence. School-based ethnographies in Western contexts reveal that girls frequently feel ashamed, try to conceal menstruation, and lack education, reflecting perceived taboo (Lee, 2010). Advertisements depict menstruation as embarrassing, messy, and disruptive, signaling it should remain hidden (Erchull, 2013). Such cultural messages likely shape girls' experiences after menarche.

However, some research indicates suppression of open menstrual talk is decreasing through activist movements. Social media has provided a forum for girls and women to resist stigma, share experiences, and celebrate periods (Gill & Elias, 2018). Menstrual acceptance may allow girls to develop more positive relationships with their bodies and pubertal changes.

Overall, anthropological and sociological literature affirms menstruation as a nexus of complex cultural meanings, attitudes, and practices dictating appropriate menstrual behaviors. These norms influence girls' lived experiences of puberty across global contexts. More research should explore how culture shapes the psychosocial impact of menarche on adolescent girls' well-being.

Biological Theories

Biological explanations for associations between menstruation and psychological changes in adolescent girls center on fluctuations in hormones. Estrogen, progesterone, and other hormones regulating the menstrual cycle do not just affect physical processes, but also influence function and behavior in various systems (Baisley et al., 2012).

One prominent theory posits that declines in estrogen and progesterone premenstrually trigger biochemical changes increasing vulnerability to mood disorders like depression and anxiety in some women (Schmidt et al., 1998). Sensitivity of receptors for GABA, a neurotransmitter implicated in mood regulation, may be modulated by ovarian hormones. Resulting neurochemical imbalances

could directly affect emotion during the late luteal phase for a subgroup of susceptible women.

However, empirical support for direct effects of hormonal declines on mood remains mixed. While some lab studies show negative mood induction from hormone withdrawal in animals, others reveal no effects on humans (Romans et al., 2012). Use of oral contraceptives, which suppress normal hormonal fluctuations, also generates inconsistent effects on mood and behavior.

Beyond menstrual cycles, pubertal increases in estrogen may partly explain increased depression risk in adolescent girls after menarche. Estrogen may interact with the HPA stress axis and other systems regulating mood (Angold et al., 1998). But associations between estrogen and negative affect are complex and depend on individual factors.

Overall, biological models posit that cyclical and pubertal hormonal changes directly impact mood, cognition, behavior, and vulnerability to psychological disorders in girls and women. However, empirical research attempting to isolate hormonal effects remains equivocal. Outcomes likely depend on complex interactions between ovarian hormones and individual factors like genetics, sensitivity, and psychosocial context. More rigorous methodology is needed to test direct causal effects.

While some studies support the notion that hormonal fluctuations during the menstrual cycle and puberty contribute to psychological changes in adolescent girls, other research challenges this view. For instance, a study by Kinney et al. (2017) found no significant correlation between menstrual cycle phase and cognitive performance in adolescent girls. Additionally, factors such as sleep quality and quantity may have a more substantial impact on cognitive functioning than menstrual status (Hill et al., 2017).

Furthermore, a longitudinal study by Mendelsohn et al. (2018) discovered that the relationship between estradiol levels and depressive symptoms varied across different developmental periods in girls. Specifically, they found that high estradiol levels were associated with lower depressive symptoms during early puberty but not later in adolescence. These findings suggest that the connection between hormones and mood may be more complex than previously thought and dependent on individual circumstances.

Research examining the relationship between menstruation and psychological outcomes in adolescent girls faces several methodological challenges. Firstly, studying natural hormonal fluctuations is difficult since participants' menstrual cycles and hormone levels can vary widely. Secondly, separating the specific effects of

hormones from other influential factors, such as social and environmental conditions, is problematic. Finally, many studies rely on self-report measures of mood and cognition, which may be subject to bias and limitations.

Psychosocial Theories

While biological models focus on hormonal mechanisms, psychosocial perspectives emphasize the broader personal and cultural meanings attached to menstruation. The onset of menses represents more than just a biological event, but rather a transition imbued with complex social, emotional, and cognitive significance.

Menarche signals entry into womanhood and developing sexuality (Ruble & Brooks-Gunn, 1982). Younger adolescent girls in particular may struggle with identity shifts related to their new status as menstruating women. Such maturation can disrupt girls' social roles and relationships, for example leading to increased mother-daughter conflict if boundaries are renegotiated (Steinberg, 1987). Navigating social expectations around dating, interest from boys, and sexual activity also complicates the pubertal transition.

Feelings of shame or embarrassment about menstruation arise frequently due to associated cultural taboos and silencing of menstrual talk, potentially contributing to withdrawal and secrecy (Uskul, 2004). Girls may receive mixed messages about whether menstruation is a positive or negative event from parents, peers, schools, and media. Where menstrual stigma prevails, girls may be more liable to frame menses negatively.

Coping resources and perceived control over one's body and cycles also mediate responses to menarche. Girls with more knowledge of pubertal changes, access to social support, and positive bodily attitudes adjust more easily (Rierdan et al., 1989). Those lacking coping resources are more vulnerable to distress when beginning to menstruate.

Overall, the meaning a girl assigns to menstruation based on cultural norms and individual experiences shapes her pubertal transition more than hormonal processes alone. For example, negative attitudes about womanhood, fertility, or maturity could promote poor self-image, social discomfort, or attempts to conceal periods. Positive meanings focused on growth and health can foster acceptance. Viewing menstruation as debilitating may increase tendency to withdraw from activities during cycles. The psychosocial context transforms menstruation from a purely biological event into one with profound personal and social significance. Additional sociocultural factors like education, economic resources, and ethnicity likely intersect

with individual differences to further moderate menstruation's impact. More research should integrate biological, social, cultural, and psychological perspectives into multidimensional models explaining variability in girls' pubertal experiences across global contexts.

Methodological Limitations of Reviewed Studies

While the reviewed research reveals tentative connections between menstruation and various psychological outcomes, conclusions are constrained by several recurring methodological limitations.

First, the heavy reliance on correlational designs prevents establishment of definitive causal relationships. The consistent associations found between menarche and increased depression, anxiety, body shame, etc. do not confirm that hormonal fluctuations directly cause these changes. Relatedly, most studies fail to adequately account for confounding variables and normative developmental processes during adolescence that may explain observed effects. For example, increased social pressures around dating and sexuality that coincide with pubertal maturation may contribute to heightened anxiety and lowered self-esteem in ways independent of menstrual cycles (Graber, 2013). Changes attributed directly to menstruation may reflect wider biosocial transitions.

The literature is also characterized by overreliance on self-report measures like questionnaires and interviews. Such data provides useful phenomenological insights but can be subject to various response biases. Integration of more objective behavioral observations, physiological data, and reports from peers and family could strengthen validity and elucidate complex links between menstrual cycles and functioning.

Additionally, the field lacks rigorous longitudinal tracking of changes over time within individuals. Cross-sectional designs comparing pre- vs post-menarche groups are vulnerable to cohort effects between samples. Following girls longitudinally through their pubertal transitions would better elucidate menstruation's effects. This requires commitment to sustained, multi-year funding for research.

Sampling also remains limited, with too few studies recruited from diverse populations. Understanding how cultural meanings and psychosocial contexts shape girls' experiences requires inclusion of participants from different ethnic, socioeconomic, and national backgrounds. Comparative designs could illuminate cross-cultural commonalities and differences.

Finally, more intervention studies are needed to test effects of manipulating variables like attitudes, coping skills, and knowledge about menstruation and puberty. Random assignment to psychoeducational programs prior to menarche may help establish causal connections. Overall, existing literature relies heavily on observational methods with intrinsic limitations. Innovation in research designs, measures, sampling, and interventions is required to advance knowledge.

Synthesis and Evaluation of Literature Patterns in Research Findings

Synthesis of the literature reveals several broad patterns regarding associations between menstruation and psychological states in adolescent girls. First, an increase in internalizing symptoms like depression, anxiety, and body dissatisfaction consistently emerges around the time of menarche across numerous studies (e.g., Angold et al. 1998; Graber et al., 1997). Although the correlations do not prove causation, the reproducibility of this trend is concerning and merits further investigation.

Secondly, the preponderance of evidence links menstrual cycles, especially the late luteal phase, with cyclical negative affect and mood disturbances. While findings are mixed, multiple clinical and epidemiological studies observe associations between the premenstrual week and increased depressive symptoms, anxiety, irritability, and other emotional changes (Romans et al., 2012).

However, research also indicates substantial individual variability in the degree of mood and body image disruption experienced throughout the menstrual cycle. Findings differ on whether hormonal fluctuations impact mood independently or only in susceptible subgroups, reflecting a need for more nuanced study of moderators (Schmidt et al., 1998).

In the social domain, studies fairly consistently report that girls feel increased self-consciousness about their bodies and attempt to conceal menstruation after puberty begins, signaling the pervasiveness of menstrual stigma (Schooler et al., 2005). Research also documents associations between menarche and shifts in girls' relationships with mothers, peers, and boys as social roles change.

However, aside from qualitative self-reports, objective evidence regarding menstrual effects on social activities and relationships remains limited. And findings often conflict on whether family dynamics are significantly altered (Steinberg, 1987).

Overall synthesis points to menstruation as an important correlate, but not definitively a causal

factor, in psychological and social changes during female adolescence. However, the recurrent associations reported warrant research isolating effects of menarche from other pubertal processes.

Consistencies and Inconsistencies

While studies broadly link menstruation to increased negative affect, closer examination reveals some inconsistencies. Although many report premenstrual mood changes, a subset find minimal or no cyclical variation in moods across menstrual cycle phases (Romans et al., 2012). Similarly, some studies reveal negligible effects of menarche on body image once age is controlled for, conflicting with research tying puberty to body dissatisfaction (Baker et al., 2017). Differences could reflect methodological variations and inadequate consideration of moderators.

Evidence also conflicts on whether menstruation directly impacts academic performance and cognition. Small declines in some studies contrast with research showing no menstrual cycle effects on cognition (Romans et al., 2012). More work is needed to systematically assess links between menstrual cycles and functioning across cognitive domains.

Longitudinal analyses that track girls across their menarchal transition, such as Angold et al. (1998), provide uniquely strong evidence regarding pre- vs post-menarche differences. Studies comparing naturally cycling women to those on hormonal contraceptives also afford some control when testing for hormonal effects on mood (Robinson & Swindle, 2000).

However, most studies rely on uncontrolled observational designs with intrinsic limitations. Large retrospective surveys maximize sample size but provide weaker evidence than controlled experiments. Studies narrowly sampling white, Western populations limit generalizability.

Assessment of Evidence

Given methodological constraints, evidence appears strongest for associations between menstruation and increased internalizing symptoms in adolescence. The correlations are consistently replicated. Prospective and experimental approaches provide converging support that menstrual cycles influence mood in at least a subgroup of women.

However, clear causal evidence directly linking menarche to social withdrawal, body shame, disordered eating and other outcomes is lacking. Changes may reflect normative psychosocial development during puberty. More rigorously designed research is needed to isolate effects of menstruation on behavior and relationships from wider processes.

Overall, existing literature provides preliminary evidence that menstruation correlates with psychological changes in adolescent girls. But confirmation of direct causal relationships remains somewhat speculative due to intrinsic limitations of predominant methodologies.

Discussion

Summary of Evidence for Psychological and Social Effects

This literature review reveals tentative connections between menstruation and various dimensions of adolescent girls' psychology and social functioning. However, limitations of existing evidence temper conclusions regarding direct causal relationships.

In the psychological domain, onset of menstruation consistently associates with increased internalizing problems like depression, anxiety, and body dissatisfaction across studies (Angold et al., 1998; Graber et al., 1997). Fluctuations across menstrual cycle phase also correlate with mood changes premenstrually in multiple clinical and epidemiological studies (Romans et al., 2012). However, findings differ on whether hormonal effects occur independently or only in susceptible subgroups, and experimental isolation of hormonal causes remains rare.

In the social realm, qualitative reports indicate girls frequently feel ashamed and attempt to conceal menstruation from peers after puberty begins, signaling persistent stigma (Schooler et al., 2005). Quantitative and qualitative data also reveal associations between menarche and shifts in girls' relationships with family members and peers as social roles undergo transition (Livson & Peskin, 2007). However, aside from self-reports, rigorous evidence directly linking menses to social withdrawal, activities, or relationship quality remains scarce.

Overall, recurring correlations between menstruation, mood, body image concerns, and facets of social functioning emerge in adolescence. But methodological constraints preclude definitive identification of menstruation as the causal factor underlying observed changes. Confounding variables, normative developmental processes, and cultural meanings of menarche likely interact to generate associations reported.

Longitudinal tracking of changes, controlled experiments, cross-cultural designs, and objective behavioral measures could help isolate influences directly attributable to menstruation. At present, the literature provides preliminary evidence that menstruation associates with, but may not independently cause, psychological and social changes experienced after menarche.

Situate Findings in Context of Theories

The increased negative affect, body shame, and social pressures observed around menarche align with both biological and psychosocial explanatory frameworks.

From a biological lens, the hormonal fluctuations of puberty and menstruation could directly impact mood and body image through mechanisms like withdrawal effects on neurotransmitters as estrogen drops premenstrually (Schmidt et al., 1998). Rising hormone levels at puberty may also interact with stress response systems underpinning emotional regulation (Angold et al., 1998).

However, empirical tests attempting to isolate hormonal causes of psychological changes generate mixed results. Outcomes likely depend on complex interactions between ovarian hormones and individual factors like genetics, sensitivity, and wider context. Biological theories remain speculative absent confirmation in rigorously controlled experiments.

Likewise, observed correlations between menarche and relationship shifts fit with biosocial perspectives that highlight renegotiation of roles and boundaries given girls' new reproductively mature status. But changes could also stem from normative social development in adolescence.

From a psychosocial lens, increased distress around menarche aligns with the profound personal and cultural meanings associated with beginning menstruation. The complex symbolism of menarche may underlie increased vulnerability to body shame, anxiety over womanhood, and menstrual stigma (Uskul, 2004).

Psychosocial resources like coping skills and menstrual education shape appraisal of menarche as a positive or distressing event, mediating its impact on self-image and behavior (Rierdan et al., 1989). The meaning constructed around menstrual transitions likely interacts with biological processes to generate observed effects.

Overall, neither biological nor psychosocial frameworks wholly account for menstruation's mental health and social correlates. An integrative model incorporating hormonal, developmental, cultural, and individual factors will likely prove most explanatory. Moving forward, researchers should consider multidimensional perspectives acknowledging menstruation as simultaneously a biological and social event intertwined with pubertal maturation.

Limitations and Future Research Directions

Several limitations constrain conclusions that can be drawn from this literature. Firstly, inadequate control of confounding variables pervades, preventing isolation of menstruation as the causal

factor underlying observed changes in affect, cognition, or social functioning. Future research should aim to control normative developmental processes through tight age-matching, longitudinal tracking, and multivariate models.

Secondly, lack of experimental designs limits causal inference. Studies could experimentally induce hormonal states via exogenous hormones in randomized trials to better test direct effects on mood and other outcomes. Alternatively, longitudinal tracking of changes from pre- to post-menarche with each girl serving as her own control provides naturalistic quasi-experiments of menstrual effects.

Thirdly, reliance on self-report measures should be supplemented with methods like clinician interviews, reports from peers and family, behavioral observations, and collection of objective performance data. Multi-modal measurement will provide converging evidence regarding functional domains affected by menstrual cycles.

Fourthly, more comparative work is needed to understand variations across cultural contexts. Broadly sampling participants internationally and from diverse ethnic groups is required to elucidate commonalities and differences in how menstruation impacts girls worldwide. Mixed-methods approaches can incorporate cultural meanings and practices surrounding menarche.

Finally, sustained, long-term funding is necessary to support rigorous multi-year longitudinal tracking of girls through puberty to definitively characterize effects. Researchers should maintain commitment to projects following early-adolescent girls over the course of their maturation into adulthood. This resource-intensive but vital work will provide unique insights.

Addressing these limitations through strengthened research designs, measurement pluralism, representative sampling, and provision of adequate time and funding will significantly advance understanding of menstruation's impact. Although a challenging undertaking, implementing more rigorous methodology remains imperative for clarifying effects on psychological and social functioning in adolescence.

Implications for Education, Healthcare, and Interventions

Although research remains ongoing, preliminary findings suggest several implications for promoting the well-being of adolescent girls.

Educationally, schools should implement comprehensive puberty and menstruation education for both girls and boys starting in late elementary school (Sommer et al., 2016). Accurate information about menstrual health and hygiene given prior to

menarche reduces stigma and equips girls to navigate changes. Education may also help boys develop empathy and support for menstruating peers.

For girls experiencing distress around menstruation, clinicians should assess and address underlying factors like knowledge gaps, shame, and lack of coping skills (Kumar & Srivastava, 2011). Cognitive reframing of menstruation as healthy rather than debilitating may alleviate associated mood issues. Screening for and treating premenstrual disorders is also recommended.

Provision of psychosocial support and open, non-stigmatizing communication around pubertal changes in both family and school contexts enables healthy adaptation (McPherson & Korfine, 2004). Girls should feel empowered to ask questions and voice concerns.

Structurally, schools must guarantee access to safe, clean private restrooms, menstrual products, and sanitary disposal. Ensuring girls can manage menstruation at school promotes social inclusion and educational attainment (Hennegan & Montgomery, 2016). Discreet access to products and pain relief may also reduce classroom disruptions.

Policy makers should fund programs educating girls on menstrual health and providing free menstrual supplies, as pioneered in some countries (Black et al., 2019). Eliminating menstrual inequities enables participation.

Finally, doctors, families, and schools should avoid reverting to traditionally negative views of menstruation as debilitating or indicative of weakness. Instead, they should reinforce framing periods as a normal biological process compatible with full capacities and activities.

Overall, a supportive environment facilitating positive experiences, knowledge, and practices around menstruation will optimize adolescent girls' psychosocial growth and resilience.

Conclusion

This review aimed to synthesize literature on the effects of menstruation on psychological and social functioning in adolescent girls. Several tentative conclusions can be drawn, while also highlighting the need for more rigorous research on this important topic.

Firstly, the research indicates consistent correlations between onset of menstruation and increased vulnerability to internalizing problems like depression and anxiety in the time period surrounding menarche. Links between menstrual cycles and mood changes like irritability and sadness also emerge around the premenstrual phase, suggesting acute effects on emotional states.

However, the evidence falls short of confirming definitive causal relationships due to reliance on observational methods and inability to control confounding variables. Changes attributed to menstruation may reflect wider biosocial processes during puberty. More stringent designs are imperative to isolate direct effects of menstrual cycles on mood and affect.

Secondly, qualitative research fairly consistently reveals feelings of embarrassment and stigma regarding menstruation among adolescent girls across cultures. Young teens frequently report attempting to conceal periods from peers and family, signaling perseverance of negative cultural taboos. However, quantitative data directly linking menstruation to social withdrawal or impairments remains limited at present.

Thirdly, this review indicates scholars must move beyond a narrow focus on just physical symptoms to recognize that menstruation intersects with psychological, cognitive, social, cultural, and emotional dimensions of life. An interdisciplinary, biopsychosocial perspective is needed to fully capture the diverse impacts of menarche on development and well-being.

Overall, despite intrinsic constraints on causal inference, existing literature provides preliminary evidence that the onset of menses and menstrual cycles correlate with changes across many domains of functioning in adolescence. However, high quality longitudinal and experimental research is critically needed to definitively characterize effects attributable to menstruation. This complex phenomenon warrants further rigorous empirical attention.

Advanced understanding of how menstruation impacts young girls will inform educational, clinical, and policy efforts to optimize health outcomes. Destigmatizing periods and providing psychosocial support around this normative transition remains imperative. Ultimately, alleviating distress and promoting resilience will allow girls to flourish into womanhood.

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