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Relationships among Attachment Styles, Personality Characteristics, and Primary Dysmenorrhea

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Primary dysmenorrhea involves menstrual pain without underlying pathology, significantly impacting young women's quality of life. Although biological factors are established, psychological influences like personality traits and attachment styles remain underexplored. This study examines the relationship between personality characteristics, attachment styles, and pain severity among Indian women experiencing primary dysmenorrhea. In a cross-sectional study, 150 female college students (18–25 years) diagnosed with primary dysmenorrhea completed online assessments: VMSS (pain severity), BFI (personality traits), and RAAS (attachment styles). Data were analysed using Spearman's correlation, regression, mediation analysis, and chi-square test. Neuroticism correlated positively (ñ=0.201, p=.014) with and predicted pain severity (â=0.204, p=.012). Attachment styles did not mediate this relationship. Neuroticism significantly relates to higher pain severity in primary dysmenorrhea, though attachment styles, while associated, do not mediate this link. Further studies should investigate emotional regulation and coping strategies as potential mediators or moderators. Psychological assessments should inform interventions targeting personality traits in dysmenorrhea management.

Keywords: Primary dysmenorrhea, Neuroticism, Attachment styles, Pain severity

Primary dysmenorrhea, defined as painful menstrual cramps without an identifiable pelvic pathology, often emerges during adolescence or early adulthood and poses a significant health concern for women worldwide (Durain, 2004; Avasarala & Panchangam, 2008). In India, the prevalence is notably high, reaching 79.67% (Agarwal & Agarwal, 2010). The debilitating pain can lead to absenteeism, reduced academic or occupational performance, and diminished overall quality of life (Joshi et al., 2015; Rakhshaee, 2014). Although elevated prostaglandin production is widely recognized as the primary biological trigger that induces strong uterine contractions, ongoing research indicates that physiological mechanisms alone do not fully account for individual differences in pain severity (Woolf, 2011; Tu et al., 2010). Repeated painful episodes may result in central sensitization, wherein the central nervous system becomes hypersensitive to nociceptive inputs(Iacovides et al 2015); however, not all women experience dysmenorrhea with the same intensity, suggesting that psychosocial variables also play a fundamental role.

Recent literature points to personality traits—especially neuroticism—as a significant factor in shaping stress reactivity and thus modulating inflammatory responses (Gianaros & Wager, 2015; Steptoe & Kivimäki, 2012). High neuroticism, characterized by emotional instability and heightened anxiety, may elevate prostaglandin production via intensified stress pathways, consequently magnifying menstrual pain. Nonetheless, personality does not operate in isolation; the manner in which individuals appraise and cope with pain heavily influences how physiological processes manifest in subjective distress. Herein lies the

importance of attachment theory and, more specifically, the attachment diathesis model of chronic pain (Meredith et al., 2008). According to this model, adult attachment styles—developed through early caregiver relationships—shape both cognitive appraisals of pain and the coping strategies employed. Insecure attachment styles (anxious or avoidant) are linked to maladaptive emotional regulation, greater focus on pain, and diminished resilience, all of which contribute to increased pain sensitivity (Anderson & Hines, 1994; Mikail et al., 1994). Furthermore, high neuroticism is associated with a higher likelihood of developing insecure attachment orientations, thus compounding the risk for more severe or persistent pain experiences (Khosravi & Kasaeiyan, 2020; Cervera-Solís et al., 2022). In this integrated framework, frequent or intense menstrual pain triggers stress responses that are amplified by neuroticism, culminating in elevated prostaglandin levels. These responses are then further shaped by one's attachment style, which governs the cognitive and emotional strategies used to cope with pain sensations.

Such a multifactorial perspective highlights the need to investigate how personality traits and attachment styles interact with established biological mechanisms to influence dysmenorrhea severity. While prior research has established robust links between neuroticism and primary dysmenorrhea (Faramarzi & Salmalian, 2014; Liang et al., 2012) and between insecure attachments and chronic pain (Pearce et al., 2001; Meredith et al., 2008), few studies have examined these constructs concurrently. Moreover, little is known about the specific mediating or moderating role of attachment styles in the relationship between personality and dysmenorrhea severity. By exploring this interplay, the present study aims to illuminate how high neuroticism and insecure attachment styles may converge to exacerbate primary dysmenorrhea, with the ultimate goal of informing more targeted psychological and medical interventions. Establishing these relationships could pave the way for novel therapeutic approaches—such as attachment-focused counselling or stress-reduction strategies—that address both the physiological and psychosocial dimensions of this prevalent and often debilitating condition.

Objectives

1. To examine the relationship between attachment styles, personality traits, and primary dysmenorrhea among women.
2. To determine whether personality traits significantly predict pain severity in women experiencing primary dysmenorrhea.
3. To investigate the mediating role of attachment styles in the relationship between personality traits and the severity of primary dysmenorrhea.

Method

This cross-sectional, correlational study was conducted to investigate the relationship between primary dysmenorrhea, attachment styles, and personality traits among college and university students in India. The study was approved a priori by the Institutional Ethics Committee of Christ University, and all procedures adhered to the ethical standards of the responsible committee on human experimentation and the Declaration of Helsinki (2013 revision). Participants provided informed consent online before participation.

A total of 150 female students aged 18–25 years with primary dysmenorrhea were recruited from universities and colleges using convenience sampling; chosen due to its quick and easy application, and because the student population is easily accessible and relevant, as primary dysmenorrhea significantly impacts the lives of students.

Additionally, painful periods with an onset after the age of 25 lean toward a diagnosis of secondary dysmenorrhea (Proctor & Farquhar, 2006). The sample size was determined based on a G*Power calculation (effect size = 0.25, á error probability = 0.05, power = 0.95) and literature reviews of similar studies (Khalajinia & Refahi, 2008; Faramarzi & Salmalian, 2014; Adib-Rad et al., 2022; Kaviani et al.,2020).

Inclusion criteria were female participants aged between 18 and 25 years from India, with a self-reported history of menstrual pain or cramps during menstruation for at least the past four menstrual cycles, regular menstrual cycles (21–35 days), no abnormalities on ultrasonography or pelvic examination conducted by a doctor, and lower pelvic or abdominal pain associated with the onset of menstrual flow lasting 8–72 hours. Participants had to be able to comprehend and complete the study questionnaires in English and were required to provide informed consent. Exclusion criteria included a diagnosis of secondary dysmenorrhea or any underlying pelvic pathology, use of hormonal contraceptives or medications known to cause menstrual pain, presence of chronic medical conditions such as endometriosis or polycystic ovary syndrome (PCOS), any abnormalities detected on ultrasonography, and inability to understand or communicate in English (Faramarzi & Salmalian,2014; Kaviani et al.,2020; Proctor & Farquhar, 2006).

Data were collected from June 2024 to July 2024. A Google Form was created, which included the consent form, inclusion and exclusion criteria, demographic and menstrual characteristics checklist, and the assessment tools. The link to the Google Form was shared via various college groups on online platforms like WhatsApp, to which the researcher had access. Participation was entirely online; participants were asked to fill out the form, which took approximately 20–25 minutes to complete.

Before participation, participants received comprehensive information about the study's purpose, procedures, potential risks and benefits, confidentiality measures, and their right to withdraw. This information was provided on the first page of the online questionnaire in language understandable to the participants. Informed consent was obtained electronically; the form was designed such that without selecting the 'Agree' option, the participant could not proceed further, and the form would be automatically submitted at that point.

All participant data were treated with strict confidentiality. Data were anonymized and securely stored with encryption and password protection, accessible only to the researcher and their supervisor, in compliance with data protection regulations and institutional guidelines. There were no known adverse effects anticipated from participation in the study. In case of psychological discomfort or distress, participants were provided with resources for counselling or support services, including contact numbers of professionals; the researcher's email was also shared at the end of the questionnaire for participants to reach out if needed. Participation was entirely voluntary, and participants were informed of their right to withdraw without any repercussions.

Tools

Multidimensional Verbal Scoring System (VMSS) used to assess pain severity in participants with primary dysmenorrhea, the MVSS evaluates the degree of pain and its impact on daily activities, categorizing dysmenorrhea into four grades (0–3). Higher grades indicate more severe pain and greater disruption of activities. The MVSS has been extensively used in literature to assess pain in dysmenorrhea patients.

(Özcan et al., 2023; Nazir & Sadhu, 2024; Rathod & Gohil, 2022)

Big Five Inventory (BFI) A 44-item questionnaire developed by John and Srivastava (1999) to assess personality dimensions: openness, conscientiousness, extraversion, agreeableness, and neuroticism. Participants rated items on a 5-point Likert scale ranging from "disagree strongly" to "agree strongly." High scores indicate higher levels of the corresponding personality trait. The BFI is a robust tool for measuring various aspects of personality across different cultures, including Asian countries, with reliability coefficients above 0.70. (Hee, 2014; Benet-Martínez & John, 1998; Wibowo et al., 2017). The Cronbach's á for this scale in the sample was 0.800, indicating good internal consistency.

Revised Adult Attachment Scale (RAAS) – Close Relationships Version. Developed by Collins (1996) the RAAS consists of 18 items assessing three dimensions of attachment: Close, Depend, and Anxiety. Participants responded on a 5-point Likert scale. Scores were calculated by averaging the items for each dimension. The RAAS has demonstrated satisfactory reliability in Indian setting, with Cronbach's alpha coefficients of 0.69 for Close, 0.75 for Depend, and 0.72 for Anxiety (Collins & Read,1990; Ripardo et al., 2019; Ahmad & Hassan, 2014). The Cronbach's á for this scale in the sample was 0.895, indicating excellent internal consistency.

Data analysis was conducted using the JAMOVI software. Spearman's rank correlation coefficients were used to examine relationships among RAAS, BFI, and VMSS scores, as the data were non-parametric. Mediation analysis assessed the mediating role of attachment styles between personality traits and primary dysmenorrhea. Regression analysis determined how personality traits affected primary dysmenorrhea. Chi-square tests were used to examine differences in demographic and menstrual characteristics across different levels of pain severity.

Results

The correlations between attachment styles, personality traits, and pain severity measured by the Multidimensional Verbal Scoring System (VMSS) are presented in Table 1.

Table 1. Correlations between Attachment Styles, Personality, and Pain severity

Variables	VMSS	Attachment Anxiety	Attachment Avoidance
Attachment Anxiety	ρ = 0.174*	—	—
Attachment Avoidance	ρ = 0.220**	—	—
Extraversion	ρ = -0.087	ρ = -0.141	ρ = -0.198*
Agreeableness	ρ = -0.094	ρ = -0.344***	ρ = -0.281***
Conscientiousness	ρ = 0.138	ρ = -0.097	ρ = -0.020
Neuroticism	ρ= 0.201*	ρ = 0.526***	ρ = 0.373***
Openness to Experience	ρ = -0.003	ρ = 0.109	ρ = 0.132

Note: ρ = Spearman correlation coefficient. VMSS = Pain severity measured by the Multidimensional Verbal Scoring System. *P<.05. ** P<.01. *** P<.001

Using Spearman's rank-order correlation, we found significant positive correlations between pain severity and both attachment anxiety (ρ = 0.174, *p* = .034) and attachment avoidance (ρ = 0.220, *p* = .007). This indicates that women with higher levels of attachment-related anxiety and avoidance tend to experience more severe menstrual pain.

Neuroticism was positively correlated with pain severity (ρ = 0.201, *p* = .014), suggesting that participants with higher neuroticism scores (mean neuroticism score =27.7) reported greater pain severity. Additionally, neuroticism was strongly correlated with attachment anxiety (ρ = 0.526, *p* < .001) and attachment avoidance (ρ = 0.373, *p* < .001).

Extraversion and agreeableness showed negative correlations with attachment avoidance and anxiety, respectively. However, these traits did not significantly correlate with pain severity.

Linear Regression Analysis

Table 2. Linear Regression Analysis

Predictor	Beta	SE	t	p	R^2	F	p
Extraversion	-0.0344	0.0258	-0.419	0.676	0.00119	0.176	0.676
Agreeableness	-0.038	0.0248	-0.463	0.644	0.00145	0.214	0.644
Neuroticism	0.204	0.0228	2.54	0.012	0.0417	6.44	0.012
conscientious	0.191	0.0261	1.37	0.319	0.0365	2.61	0.319
Openness	0.101	0.0235	1.24	0.217	0.0103	1.54	0.217

Dependent variable is VMSS

In this linear regression analysis with the dependent variable VMSS (pain severity), Neuroticism is the only significant predictor. With a Beta coefficient of 0.204, a t-value of 2.54, and a p-value of 0.012, it shows a positive and statistically significant relationship with pain severity. This indicates that higher levels of Neuroticism are associated with greater pain severity, and the model explains about 4.17% of the variance in pain severity (R^2 = 0.0417). The overall F-value for this predictor is 6.44, further confirming its significance.

The other predictors—Extraversion (Beta = -0.0344, p = 0.676), Agreeableness (Beta = -0.038, p = 0.644), Conscientiousness (Beta = 0.191, p = 0.319), and Openness (Beta = 0.101, p = 0.217)—do not show significant associations with pain severity, as their p-values are all well above the conventional threshold for significance (p < 0.05). The explained variance (R^2) for these predictors is minimal, ranging from 0.00119 to 0.0365, indicating that they contribute little to the model's overall explanatory power regarding pain severity.

Mediation Effect of Attachment Styles

The indirect effects of neuroticism on pain severity through attachment anxiety and avoidance were not statistically significant (*p* = .192 for both). The direct effects were also not significant after accounting for the mediators. However, the total effect remained significant (Estimate = 0.0580, *p* = .011), indicating that neuroticism affects pain severity independently of attachment styles.

Table 3. Mediation Analysis of Attachment Anxiety and Attachment Avoidance between Personality and VMSS

Mediator	Effect	Estimate	SE	Z	p	% Mediation
Attachment Anxiety	Indirect	0.0198	0.0152	1.31	0.192	34.2
	Direct	0.0381	0.0271	1.41	0.159	65.8
	Total	0.058	0.0227	2.56*	0.011	100
Attachment Avoidance	Indirect	0.0123	0.0094	1.31	0.192	21.2
	Direct	0.0457	0.0243	1.88	0.06	78.8
	Total	0.058	0.02268	2.56*	0.011	100

Note: SE = Standard Error. *P<.05. ** P<.01. *** P<.001

Relationship Between Pain Severity and Demographic Characteristics

The relationship between pain severity and demographic characteristics was analysed using the Chi-square test. A significant association was found between family history and pain severity (p = .002). Among participants with a family history of dysmenorrhea (n = 78), 74% (n = 58) reported moderate to severe pain. In contrast, among those without a family history (n = 72), only 47% (n = 34) reported moderate to severe pain. No significant associations were observed between pain severity and residence, socioeconomic status, or age at menarche.

Discussion

This study examined the relationships among attachment styles, personality traits, and pain severity in women experiencing primary dysmenorrhea, exploring specifically whether attachment styles mediate the association between personality traits and pain severity. The analysis yielded several important findings: higher levels of neuroticism were significantly associated with increased menstrual pain severity, and neuroticism correlated positively with attachment anxiety and avoidance. However, attachment styles did not statistically mediate the relationship between neuroticism and pain severity. Furthermore, a significant association was identified between a family history of dysmenorrhea and greater pain severity, suggesting genetic predispositions influencing menstrual pain.

Consistent with prior literature, neuroticism emerged as a robust predictor of pain severity, indicating that higher neuroticism enhances pain sensitivity and perception. The trait's association with emotional instability and predisposition towards negative affective states such as anxiety and depression may explain this relationship. Supporting this, Boothby et al. (2004) and Goubert et al. (2004) noted that individuals with elevated neuroticism frequently exhibit pain catastrophizing behaviours, intensifying their subjective experience of pain. Genetic research also underscores this connection, with Vassend et al. (2013) identifying overlapping genetic influences between neuroticism and heightened pain sensitivity. Furthermore, a meta-analysis by Timmers et al. (2018) recognized neuroticism as a risk factor for chronic pain conditions due to its role in amplifying emotional reactions and negative interpretations of pain signals.

The finding that neuroticism correlates positively with both attachment anxiety and avoidance aligns with existing studies highlighting that neuroticism contributes to

attachment insecurities. Donges et al. (2015) reported similar patterns, emphasizing that individuals higher in neuroticism frequently demonstrate insecure attachment patterns characterized by emotional instability and heightened interpersonal distress. Neuroticism's association with emotion dysregulation might further exacerbate anxious and avoidant attachment behaviors, as suggested by Wijngaards-de Meij et al. (2007). This interconnection is critical, as insecure attachment itself influences emotional and stress regulation, thereby intensifying psychological vulnerability to chronic pain states.

Interestingly, extraversion and agreeableness showed protective associations against insecure attachment. Extraverted individuals typically demonstrate sociability and openness in relationships, reducing tendencies toward attachment avoidance. This aligns with Ben-Ari and Lavee (2005), who found extraversion conducive to secure attachment through enhanced interpersonal engagement. Similarly, agreeableness, characterized by empathy and cooperation, negatively correlated with both attachment anxiety and avoidance, reinforcing previous findings by Carver (1997) that individuals high in agreeableness are better equipped emotionally and socially to form secure attachment bonds, thereby mitigating attachment-related distress.

Contrary to expectations, attachment anxiety and avoidance did not statistically mediate the relationship between neuroticism and dysmenorrhea pain severity. This absence of mediation might reflect a more complex interplay of psychological variables influencing pain experiences. McWilliams and Holmberg (2010) observed that attachment anxiety primarily affects pain catastrophizing rather than directly mediating personality-pain relationships. Additionally, Pfeifer et al. (2018) noted inconsistent direct pathways between attachment insecurities and pain outcomes, suggesting indirect influences via coping strategies or emotional regulation mechanisms. Thus, it seems plausible that while attachment insecurities co-exist with high neuroticism, they influence pain perception indirectly through emotional processing or coping behaviours rather than serving as direct mediators.

Finally, the significant correlation between a family history of dysmenorrhea and increased pain severity aligns with genetic studies highlighting familial predispositions to menstrual pain intensity. Supporting this, Sharlini et al. (2015) and Ju et al. (2014) emphasized genetic underpinnings contributing to severe dysmenorrhea. Furthermore, genetic correlations between neuroticism and pain catastrophization have also been documented (Burri et al., 2018), underscoring a multifactorial genetic and psychological framework underlying primary dysmenorrhea. In summary, these findings reinforce the central role of neuroticism in shaping pain experiences, highlight the complex interactions between personality, attachment, and pain perception, and emphasize genetic factors in dysmenorrhea severity, underscoring the need for integrative biopsychosocial approaches in treatment.

Conclusion

The current study highlights the psychological dimensions influencing pain perception in primary dysmenorrhea, emphasizing neuroticism as a significant predictor of pain severity. Although attachment anxiety and avoidance correlated positively with pain severity, they did not mediate the relationship between neuroticism and pain. This suggests the importance of exploring other psychological factors, such as emotional regulation and coping strategies. Practically, these findings recommend integrating personality

assessments, especially for neuroticism, into clinical evaluations. Targeted interventions like cognitive-behavioral therapy (CBT) and stress-reduction techniques addressing emotional vulnerabilities associated with neuroticism could be particularly effective. Limitations include the study's cross-sectional design, reliance on self-report measures, and limited demographic scope, restricting generalizability. Future research should adopt longitudinal designs, broader demographic samples, and objective measures to deepen understanding and enhance intervention strategies for women with primary dysmenorrhea.

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