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Impact of Coping Styles and Perfectionism on Problematic Substance Use in Medical Students

Pendyala Veda*, Shanmugam Nivetha

Sri Ramachandra Institute of Higher Education and Research, Chennai, India

Abstract

TProblematic substance use in medical students presented significant concerns due to its impacts on personal well-being as well future patient care quality. Hence, to inform interventions, exploring relevant correlates is necessary. Previous literature has explored and found individual associations between coping styles, perfectionism, and substance use. We aimed to contextualise these associations in the Indian medical student context and explore a mediational model that was not previously explored, to understand how these variables function in tandem. We conducted a cross-sectional, correlational study with a sample of 360 undergraduate and postgraduate medical students aged 18-30 years (M= 20.85 years) from Tamil Nadu, India. We recruited participants through convenience and snowball sampling. The participants completed *Almost Perfect Scale-Revised*, *Brief COPE*, *Alcohol Use Disorder Identification Test*, and *Drug Use Disorder Identification Test* to evaluate their perfectionism, coping, problematic alcohol use, and problematic drug use, respectively. The results showed the positive association of Avoidant emotion-focused coping with problematic substance use and that maladaptive perfectionists over other groups tended to use more avoidant emotion-focused coping. Further, Avoidant emotion-focused coping mediated the relationship between perfectionism and problematic substance use such that maladaptive and non-perfectionists relative to Adaptive Perfectionists reported more problematic substance use in the context of greater avoidant emotion-focused coping use. The present study filled important contextual gaps in literature and extended the current literature on substance use. Unequal perfectionist group sizes and self-reporting limited the study. Future research can consider further model replication and longitudinal designs to explore possible causality.
Key words: perfectionism, coping styles, problematic substance use, medical students.

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Novelty and Significance

What is already known about the topic?

- Available data indicate that substance use has increased among medical students.
- Available data have also shown that perfectionism and coping styles influence substance use.
- The literature has also indicated possible links between specific facets of perfectionism and coping styles.

What this paper adds?

- This study evaluates a new model of the mediating effects of coping styles on the relationship between perfectionism and substance use.
- This study shows that emotion-focused avoidant coping styles mediate the relationship between maladaptive and non-perfectionist perfectionism and substance use.

Problematic substance use including substance abuse refers to a pattern of excessive use of substances that result in profound detriment to one's consciousness, mood, and cognition (Griffin, 1990). Substance abuse is a matter of significant global concern as it affects both individuals and societal structures. In 2021, the World Health Organization (WHO) reported that nearly 39.5 million individuals to be affected by harmful use patterns (WHO, 2023). The Indian Ministry of Social Justice and Empowerment (Agrawal, Rao, Mishra, Khandelwal, & Chadda, 2019) reports similar patterns with 12.6% of the population using alcohol, 2.8% cannabis, and 1.08% opioids. Of the alcohol users, 19%

* *Correspondence*: Pendyala Veda, Sri Ramachandra Institute of Higher Education and Research, No.1 Ramachandra Nagar, Porur, Chennai - 600 116, Tamil Nadu, India. Email: pendyalaveda@gmail.com

exhibit dependency patterns. These statistics indicate a concerning pattern within both global and Indian contexts. This prevalence is especially concerning in doctors concerning where its consequences extend beyond personal health to patient care and safety as well. In recent Indian studies, 82% of doctors reported alcohol use, with prevalence rates ranging from 7% to 75% (Kamil *et alii*, 2020). The issue of substance use may both originate during and permeate medical education, as medical students face unique stressors that may predispose them to substance use. The intense academic pressure, long study hours, and emotionally taxing clinical experiences place medical students at heightened risk for mental distress (Niranjjan, Nancy, Gayathri, & Arulvijayavani, 2024). Prevalence studies estimate that 45.87%-20.43% of Indian medical undergraduates engage in substance use (Arora, Kannan, Gowri, Choudhary, Sudarasanan, & Khosla, 2016; Padhy, Das, Sahu, Parida, 2014). These findings emphasize the urgent need to examine factors contributing to substance use within this population, to allow for the development of targeted interventions.

A key factor impacting substance use is coping, the cognitive and behavioural strategies that are employed to manage stress and adversity (Folkman, 1984). Literature has conceptualised coping both dynamically (Hobfoll, 1989; Lazarus & Folkman, 1984) and dispositionally, as being personality-driven and applied normatively across situations (Krohne, 1993). Coping strategies are commonly categorized as problem-focused (PFC), an active, adaptive mechanism involving directly dealing with the stressor and emotion-focused (EFC) coping involving handling the emotional consequences of the stressor (Lazarus & Folkman, 1984). Coping may also be avoidant (AvC) and involve ignoring the problem (Skinner, Edge, Altman, & Sherwood, 2003). The current study categorised coping strategies into three styles: problem-focused coping, active emotion-focused coping, and avoidant emotion-focused coping (akin to avoidant coping) (Schnider, Elhai, & Gray, 2007). Literature found that AvC is consistently associated with higher substance use and related problems (Ivory & Kambouropoulos, 2012; Lucke, Carey, Griffith, Mathes, Lane, & Boals, 2023). These findings were observed in the context of Alcohol misuse in general and clinical populations (Hasking & Oei, 2007; Villanueva Blasco, Villanueva Silvestre, & Vázquez Martínez, 2024), Cannabis use disorder (Blessing, Russell, Stout, Barerra-Barker, & Morissette, 2024), stimulant misuse (Riddell, Jensen, & Carter, 2018), and polysubstance use (Belding, Iguchi, Lamb, Lakin, & Terry, 1996). In contrast, PFC negatively linked to drug addiction potential (Massah, HoseinSabet, Doostian, A'zami, & Farhoudian, 2014), actual drug use (Caricati & Ferrari, 2021) and actual alcohol use (Walker & Stephens, 2014). Evidence on EFC remains mixed, with some studies negatively linking it to alcohol use (Ivory & Kambouropoulos, 2012), while other studies link it positively to negative drug use and addiction potential (Massah et alii, 2014; Staiger, Melville, Hides, Kambouropoulos, & Lubman, 2009). Overall, AvC is a positive correlate and PFC a negative one, while consensus regarding EFC is mixed.

Another variable, perfectionism, a multidimensional personality trait characterized by striving towards high standards (Frost, Marten, Lahart, & Rosenblate, 1990) is also largely linked to substance use (Nelsen, Kayaalp, & Page, 2023). Perfectionism is especially relevant to medical students, wherein perfectionistic traits (Enns, Cox, Sareen, & Freeman, 2008) are valued. Several multidimensional models of perfectionism have been proposed (Frost *et alii*, 1990; Hewitt & Flett, 1991) with dimensions largely underpinned by two types: Adaptive and Maladaptive (Frost, Heimberg, Holt, Mattia, & Neubauer, 1993). Adaptive perfectionists (AP) set high but realistic goals and view success positively, while maladaptive perfectionists (MP) strive towards unrealistic goals,

always feeling dissatisfied with their achievements. A third group of individuals who do not place high standards on themselves, usually experiencing less shame, guilt, and pride than perfectionists, are called Non-perfectionists (NP) (Stoeber, Davis, & Townley, 2013). Flett, Goldstein, Wall, Hewitt, Wekerle, and Azzi (2008) found that while self-oriented perfectionism (adaptive) was negatively associated with binge drinking, perfectionistic concerns (maladaptive) associated positively. These findings have been extended to stimulant, cannabis and opioid use, with APs similarly exhibiting lower propensity to substance misuse (Moate, Gnilka, & Holm, 2021) while MP linked positively with positive attitudes and risk towards using stimulants (Stoeber & Hotham, 2016). However, these findings must be interpreted with caution as perfectionistic self-presentation may affect the reliability of responses (Flett & Hewitt, 2014). The literature overall indicates that AP is protective, while MP is a risk factor for substance misuse.

The theoretical link between perfectionism and coping can be understood using the Conservation of Resources theory (Hobfoll, 1989) that posits that depletion of resources such as time, energy, and self-efficacy leads to psychological strain. MPs tend to set unrealistic standards and inevitably fail to meet them, leading them to lose resources (Harari, Swider, Bujold Steed, & Breidenthal, 2018). This depletion makes it harder to manage future challenges, leading to a loss spiral wherein further resources are lost. The resource deficit leads to reliance on less resource-intensive, maladaptive coping strategies such as avoidance (Ito & Brotheridge, 2003). In contrast, APs set realistic goals and are more self-compassionate with failure, allowing them to better retain their resources and invest in more resource-intensive, but adaptive coping strategies to cope with stress and failure (Ito & Brotheridge, 2003). This leads to a gain spiral wherein they gain resilience and other resources (Molnar, Reker, Culp, Sadava, & DeCourville, 2006). Empirical studies largely support these theoretical predictions. A study by Prud'homme, Dunkley, Bernier, Berg, Ghelerter, and Starrs (2017) found that facets of MP were significant predictors of AvC, while AP facets predicted PFC. This pattern is well-replicated across general populations (Larijani & Besharat, 2010) and medical employees (Crăciun & Dudău, 2014). Chang (2012) found that higher MP predicted higher use of EFC while Larijani and Besharat (2010) found that positive/ AP was linked to positive EFC while negative/ MP was linked to negative EFC, highlighting inconsistencies in how EFC is measured across studies. These variations suggest the need for further research into EFC, especially since it encompasses both positive and negative strategies, which may lead to differing outcomes (Connor-Smith & Flachsbart, 2007; Ivory & Kambouropoulos, 2012) Hence, the overall literature presents a consistent pattern of associations of AP and MP with PFC and AvC, respectively, while findings for EFC are less clear.

Given its consequences for personal health and the future quality of patient care, it is important to study problematic substance use and its correlates in medical students. Despite the individual empirical relationships between perfectionism, coping styles, and substance use in other populations, these associations have not been explored in the Indian/medical student context. Further, an investigation of a model of these three variables has not been carried out. Pritchard, Wilson, and Yamnitz (2007), for example, examined both perfectionism and coping styles as separate predictors of alcohol use but did not examine how they function in tandem to affect the latter. Recently, Nelsen *et alii* (2023) briefly highlighted the utility of considering how perfectionism impacts mediators for example, one's selection of coping styles and thereafter examine the effects on health outcomes such as substance use. Yet there continues to remain a gap in the literature. Such investigations can provide important avenues for understanding

substance use and developing early interventions within this population, thus fostering healthy and competent healthcare providers. This idea is supported by evidence of the effectiveness of interventions that focus on addressing "personality-specific coping pathways" in preventing both the onset and further progress of substance abuse (Conrod, Castellanos-Ryan, & Strang, 2010).

This study aimed to explore the relationships between perfectionism, coping styles, and problematic substance use in the context of Indian medical students. In doing so, the study aimed to fill a key culture and profession-specific gap in the literature as well as extend the current knowledge on substance use. The study sought first to understand how different groups of perfectionists used specific coping styles and their problematic substance use patterns. Further, the link between coping styles and problematic substance use was also investigated. Secondly, the study also aimed to explore whether the association between perfectionism and problematic substance use, in the mediating context of coping styles.

METHOD

Participants

The required study sample was calculated as 357 using Cochran's formula. The sample was to include full-time, English-fluent, medical students aged 18 to 30 years enrolled in a Medical College recognized by the National Medical Council. The study excluded non-medical students, those diagnosed with or undergoing treatment for substance use disorders (SUDs) or psychiatric disorders, and those with attendance below 25%. Participants were recruited using convenience sampling, wherein questionnaire links were disseminated through social media platforms, and by approaching students in classrooms following permission from administrators. Snowball sampling was also employed, encouraging participants to share the study invitation with their peers and classmates. The sample was predominantly female (60.6%), urban residing (90.87%), and studying in MBBS year 3 (41.1%). The mean age of the sample was 20.85 years. After initial data collection, 413 responses were collected. Of the responses, 53 were excluded from the data set due to a number of reasons: Attendance below 25% (13 responses), Diagnosed with a psychiatric illness (27 responses), both low attendance and psychiatric illness (5 responses), Undergone treatment for a SUD (2 responses), studying at university not recognized by National Medical Council (4 responses), unrecognized gender response (1 response), and blank response (1 response). This resulted in a final data sample of 360 responders.

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual participants included in the study.

Design

The present study employed a cross-sectional, correlational design, collecting data at a single time point using self-report questionnaires to assess participants' levels of perfectionism, coping styles, and substance use patterns. The overall framework focused on examining the associations and mediation between perfectionism, coping, and problematic substance use.

Instrument and Measures

Sociodemographic Questionnaire. A semi-structured sheet collected demographic information such as initials, age/date of birth, gender, institution of education, current year of education, and attendance percentage.

Coping Orientation to Problems Experienced (Brief COPE; Carver, Scheier, & Weintraub, 1989). Coping styles were measured using the brief COPE. This scale consists of 3 subscales, i.e., problem-focused coping (PF), active emotion-focused coping (ACEF), and avoidant emotion-focused coping (AVEF) (Schnider *et alii*, 2007). The Brief COPE consists of 28 items which can each be scored between 1 ("I have not been doing this at all") to 4 ("I have been doing this a lot"). Scores for each subscale were obtained by summing the respective item scores. The scale has good internal consistency (α= 0.73-0.84) (Vanstone & Hicks, 2019).

Almost Perfect Scale-Revised (APS-R; Slaney, Rice, Mobley, Trippi, & Ashby, 2001). Perfectionism was measured using the APS-R. This scale consists of 3 subscales (Standards, order, and discrepancy) and 23 items, that can be scored between 1 (strongly disagree) to 7 (Strongly agree). Perfectionism was used as a categorical variable in this study and hence individuals were classified as APs, MPs, and NPs, based on their subscale scores. Those with Standards scores less than 42 were categorized as NPs, those with both Standards and Discrepancy scores greater than 42 as MPs and those with Standards scores greater than 42 but Discrepancy scores less than 42 as APs (Rice & Ashby, 2007). The APS-R has excellent internal consistency across the subscales, (α= 0.85-0.94) (Slaney *et alii*, 2001).

Alcohol Use Disorders Identification Test (AUDIT; Saunders, Aasland, Babor, de la Fuente, & Grant, 1993) Problematic Alcohol use was assessed using the AUDIT, consisting of 10 items scored on a 4-point scale. The scores indicate risk levels, with higher scores suggesting more problematic drinking in a 1-year period. The AUDIT has strong reliability and validity (α= 0.80-0.94) (de Meneses Gaya, Zuardi, Loureiro, & Crippa, 2009).

Drug Use Disorders Identification Test (DUDIT; Berman, Bergman, Palmstierna, & Schlyter, 2005) Problematic Drug use was measured using the DUDIT, consisting of 11 items. The items are scored on a 5-point scale, with higher scores indicating problematic drug use in a 1-year period. The DUDIT has strong reliability (α= 0.74-0.97; Berman *et alii*, 2005) and convergent validity with other drug abuse measures such as the *Drug Abuse Screening Test* (DAST-10; Voluse *et alii*, 2012).

Procedure

Following the institutional ethics committee approval, participants were recruited using the aforementioned procedures. The recruited participants were directed to the questionnaire on Google Forms wherein they were initially provided with an information sheet detailing the study's purpose, risks, benefits, confidentiality, and their right to withdraw at any time. After reading the information, participants provided informed consent. Next, they completed all the mentioned measures. Following completion, participants were thanked for their participation and their right to withdraw their participation was reiterated. No compensation was provided for participation.

Data Analysis

The cross-sectional data was subjected to introductory descriptive analysis (means, standard deviations, frequencies, and percentages). A Pearson's correlation analysis was conducted to examine the relationships between continuous variables (coping styles and substance use), and an ANOVA for the categorical variable, to examine differences in coping styles and substance use across perfectionism groups (APs, MPs, NPs). Hayes' PROCESS with bootstrapping (5000 resampling) (Hayes, 2013) was used to run a parallel mediation to simultaneously test coping styles for their mediation of the relationships

between perfectionism and alcohol (model 1) and drug use (model 2). Model 4 was selected to carry out the parallel mediation. Perfectionistic categories were dummy coded into two variables, X1 (MPs vs APs) and X2 (NPs vs APs), using indicator coding. The overall statistical analysis was carried out using IBM SPSS© 24.

RESULTS

Means, Standard Deviations, frequencies, and percentages are presented in Table 1. Correlation results, in Table 2, indicated a positive correlation between PF and ACEF (r= .772, p <.001). AVEF was positively correlated with alcohol use (r= .361, p <.001) and drug use (r= .240, p <.001).

Table 1. Descriptive statistics of sociodemographic details and tools' scores.

			M-*n*	*SD*-%
Demographics Variables	Age[a]		20.85	2.97
	Gender[b]	Male	140	38.9%
		Female	218	60.6%
		Others	2	0.6%
	Area Residence[b]	Urban	327	90.8%
		Rural	13	3.6%
		Sub-Urban	20	5.6%
	Year Education[b]	Mbbs Year 1	68	18.9%
		Mbbs Year 2	60	16.4%
		Mbbs Year 3	149	41.1%
		Mbbs Year 4	17	4.7%
		Mbbs Year 5	11	3.1%
		Pg Year 1	20	5.6%
		Pg Year 2	19	5.3%
		Pg Year 3	14	3.9%
		Other (Post Interns)	2	0.6%
Perfectionism[b]		Adaptive perfectionism	14	3.9%
		Maladaptive perfectionism	94	26%
		Non-perfectionist	252	69.8%
Problem Focused Coping[a]			17.90	4.895
Active Emotion Focused Coping[a]			21.29	5.877
Avoidant Emotion Focused Coping[a]			18.12	5.2176
AUDIT[a]			1.855	4.6139
DUDIT[a]			.4806	2.379

Notes: [a]= data show *M* and *SD*; [b]= data show *n* and percentage; AUDIT= Alcohol use disorder identification test; DUDIT= Drug Use Disorder Identification Test; Mbbs= Bachelor in Medicine, Bachelor in Surgery (undergraduate level); Pg= Postgraduation.

Table 2. Correlations between variables.

Variable	1	2	3	4
1. Problem Focused Coping	-			
2. Active Emotion Focused Coping	.772*	-		
3. Avoidant Emotion Focused Coping	.292*	.396*	-	
4. AUDIT	-0.008	0.041	.361*	-
5. DUDIT	-0.064	-0.078	.240*	.410*

Notes: AUDIT= Alcohol Use Disorder Identification Test; DUDIT= Drug Use Disorder Identification Test; *= p <.05; **= p <.01

The ANOVA results (Table 3) indicated significant group differences in PF (F= 3.50, p= 0.041), AVEF (F= 7.97, p= .001), and alcohol use (F= 3.69, p= .031). The Games-Howell post hoc (Table 4) test for the ANOVA indicated significant differences between NPs and MPs in PF use with a mean difference of -1.66 (p= .023). Further, significant differences were found between APs and NPs in AVEF use with a mean difference of -2.05 (p= .043). Similarly, APs vs MPs and NPs vs APs significantly differed in AVEF use with mean difference of -3.74 (p <.001) and -1.70 (p= .035) respectively Finally, significant differences between APs and NPs were found with a mean difference -1.25 (p= .038).

Table 3. One-Way ANOVA Results for Perfectionism Groups

Variable	*F*	*df1*	*df2*	*p*
Problem Focused Coping	3.50	2	33.8	.041*
Active Emotion Focused Coping	1.84	2	33.3	.175
Avoidant Emotion Focused Coping	7.97	2	40.7	.001**
AUDIT	3.69	2	57.5	.031*
DUDIT	1.16	2	34.0	.327

Notes: AUDIT= Alcohol Use Disorder Identification Test; *df1*= degrees of freedom group 1; *df2*= degrees of freedom group 2; DUDIT= Drug Use Disorder Identification Test; *= p <.05; **= p <.01.

Table 4. Games-Howell Post Hoc Comparisons for Significant ANOVA Results[a].

Variable	Group Comparison	*M* Difference	*p*
Problem-Focused Coping	0 vs. 2	0.472	.942
	0 vs. 1	-1.19	.714
	2 vs. 1	-1.66	.023*
Avoidant Emotion Focused Coping	0 vs. 2	-2.05	.043*
	0 vs. 1	-3.74	.001**
	2 vs. 1	-1.70	.035*
AUDIT Total	0 vs. 2	-1.25	.038*
	0 vs. 1	-1.30	.119
	2 vs. 1	-0.058	.995

Notes: [a]= Games-Howell Post Hoc test was used; *= p <.05; **= p <.01; 0= Adaptive perfectionism; 1= Maladaptive perfectionism; 2= Non-perfectionism.

The path effects in the mediation model are presented in Figures 1 and 2 for each respective model. Neither model showed significant total or direct effects of perfectionism on alcohol or drug use as presented in Tables 5 and 6. For model 1, AVEF significantly mediated the relationship between perfectionism and alcohol use. MP relative to AP was positively associated to AVEF (a3= 3.743, p= .011), and AVEF was positively related to alcohol use (b3= 0.363, p <.001). The indirect effect through AVEF (a3b3= 1.360) was significant [b= 1.36, 95%*CI* (0.61, 2.35)] as the interval did not contain zero]. Conversely, NP relative to AP was positively but non-significantly associated with AVEF (a'3= 2.0476, p= .146), and AVEF was positively associated with alcohol use (b3= 0.363, p <.001). The indirect effect through avoidant coping (a'3b3= 0.7440) was significant [b= 0.74, 95%*CI* [0.20, 1.41]).

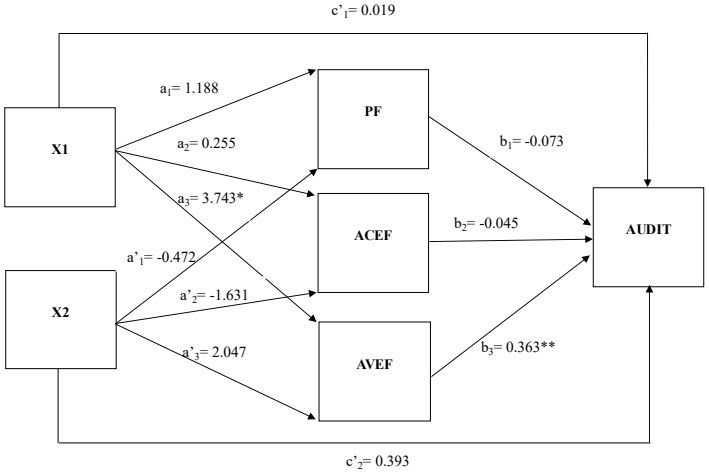

Figure 1. Pathway Effects for Mediation Model 1. [*Notes*: *= p <.05; **= p < .001; X1= Maladaptive vs Adaptive perfectionists; X2= Non-perfectionists vs Adaptive perfectionists; PF= Problem focused coping; ACEF= Active Emotion Focused Coping; AVEF= Avoidant Emotion Focused Coping; AUDIT= Alcohol Use Disorder Identification Test.]

Table 5. Total, Direct, and Indirect Effects of Perfectionism on AUDIT Scores.

Effect Type	Predictor	Effect	SE	LLCI	ULCI	*p*
Total Effect	X1	1.3040	1.3236	-1.2990	3.9070	.3252
	X2	1.2460	1.2687	-1.2489	3.7410	.3267
Direct Effect	X1(c'_1)	0.0194	1.2474	-2.4339	2.4728	.9876
	X2(c'_2)	0.3933	1.1874	-1.9420	2.7286	.7407
Path: Perfectionism → Problem-Focused Coping → AUDIT						
Indirect Effects	X1(a_1b_1)	-0.0872	0.1622	-0.4915	0.1632	-
	X2(a'_1b_1)	0.0346	0.1386	-0.2462	0.3462	-
Path: Perfectionism → Active Emotion-Focused Coping → AUDIT						
Indirect Effects	X1(a_2b_2)	0.0116	0.1398	-0.2922	0.3170	-
	X2(a'_2b_2)	0.0741	0.1528	-0.1748	0.4578	-
Path: Perfectionism → Avoidant Emotion-Focused Coping → AUDIT						
Indirect Effects	X1(a_3b_3)	1.3601	0.4550	0.6050**	2.3518**	-
	X2(a'_3b_3)	0.7440	0.3167	0.1981**	1.4148**	-

Notes: X1= Maladaptive Perfectionists vs. Adaptive Perfectionists; X2= Non-Perfectionists vs. Adaptive Perfectionists. LLCI= Lower Limit Confidence Interval; ULCI= Upper Limit Confidence Interval. Bootstrap resampling = 5000; **= Significant indirect effects (95% CI excluding zero).

Similarly for model 2, AVEF significantly mediated the relationship between perfectionism and drug use. MP relative to AP was positively associated to AVEF (a3= 3.743, *p*= .011), and AVEF was positively related to drug use (b3= 0.145, *p* <.001). The indirect effect through AVEF (a3b3= 0.543) was significant [b= 0.54, 95%*CI* (0.11, 1.08]). Conversely, NP relative to AP was positively but non-significantly associated with AVEF (a'3= 2.0476, *p*= .146), and AVEF was positively associated with drug use (b3= 0.145, *p* <.001). The indirect effect through avoidant coping (a'3b3= 0.297) was significant [b= 0.29, 95%*CI* (0.06, 0.67)].

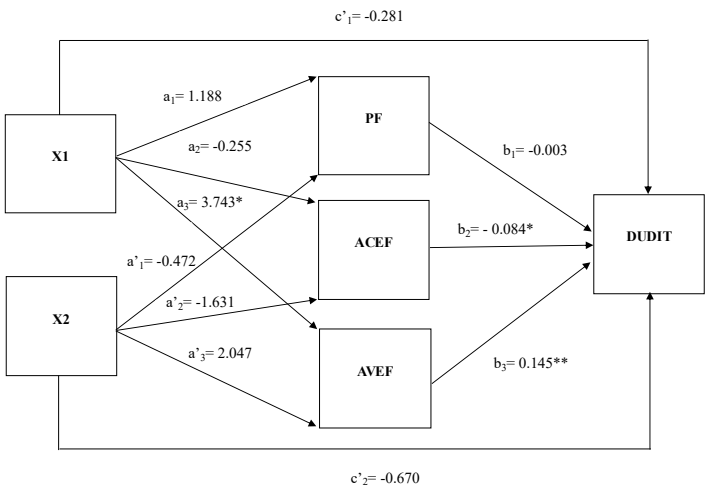

Figure 2. Pathway Effects for Mediation Model 2. *[Notes*: *= p <.05; **= p < .001; X1= Maladaptive vs Adaptive perfectionists; X2= Non-perfectionists vs Adaptive perfectionists; PF= Problem focused coping; ACEF= Active Emotion Focused Coping; AVEF= Avoidant Emotion Focused Coping; AUDIT= Alcohol Use Disorder Identification Test.]

Table 6. Total, Direct, and Indirect Effects of Perfectionism on DUDIT Scores.

Effect Type	Predictor	Effect	SE	LLCI	ULCI	*p*
Total Effect	X1	0.2796	0.6804	-1.0584	1.6177	.6813
	X2	-0.2341	0.6521	-1.5166	1.0484	.7198
Direct Effect	X1(c'_1)	-0.2817	0.6607	-1.5812	1.0177	.6701
	X2(c'_2)	-0.6707	0.6289	-1.9075	0.5662	.2870
Path: Perfectionism → Problem-Focused Coping → DUDIT						
Indirect Effects	X1(a_1b_1)	-0.0036	0.0891	-0.1927	0.1942	-
	X2(a'_1b_1)	0.0014	0.0696	-0.1447	0.1539	-
Path: Perfectionism → Active Emotion-Focused Coping → DUDIT						
Indirect Effects	X1(a_2b_2)	0.0216	0.1922	-0.3838	0.4263	-
	X2(a'_2b_2)	0.1379	0.1940	-0.2165	0.5790	-
Path: Perfectionism → Avoidant Emotion-Focused Coping → DUDIT						
Indirect Effects	X1(a_3b_3)	0.5434	0.2367	0.1757**	1.0825**	-
	X2(a'_3b_3)	0.2972	0.1595	0.0553**	0.6688**	-

Notes: X1= Maladaptive Perfectionists vs. Adaptive Perfectionists; X2= Non-Perfectionists vs. Adaptive Perfectionists. LLCI= Lower Limit Confidence Interval; ULCI= Upper Limit Confidence Interval. Bootstrap resampling = 5000; **= Significant indirect effects (95% CI excluding zero).

DISCUSSION

The present study explored how different perfectionistic types and coping styles relate to problematic substance use among medical students. There has been a dearth of literature on how perfectionism and coping styles impact substance use in the Indian/ medical student context as well as on a combined model of the three variables. Hence, the current study aimed to fill this gap in the literature by first exploring how perfectionism types and coping styles are associated to one another and problematic substance use in the Indian medical student population and second, exploring the variables' interactions in a mediational model wherein coping styles may mediate the link between perfectionism and problematic substance use.

In exploring the link between coping styles and substance use, AVEF, but not PF and ACEF was found to be positively correlated to problematic alcohol and drug use, suggesting that the greater use of AVEF linked to greater substance use. These results are in line with existing literature. For example, a study investigating the association between coping and illicit drug (e.g., cocaine, ketamine, cannabinoids, etc) use among Italian university students, found that the usage of avoidant coping was associated to increased likelihood of partaking in drug use (Caricati & Ferrari, 2021). A similar pattern was also found among the more culturally relevant population of Pakistani university students, wherein cannabis users employed more avoidant coping than non-users (Ahsan, Kiani, Hanif, & Andleeb, 2021). Similar significant positive correlations have been found between avoidant coping and alcohol consumption (Villanueva Blasco, Villanueva Silvestre, & Vázquez Martínez, 2024). Similar to the present study's findings, this study also found no significant correlations for active coping. Additionally, Lucke *et alii* (2023) also did not find a significant association between PF and alcohol consumption in university students suggesting that neither of these styles are particularly linked with substance use. Overall, the present findings in the context of Indian medical students were in line with studies based on other populations and indicate that AVEF over the other types is an important factor in medical students' problematic use of substances.

Perfectionism types were compared in their use of coping styles to explore the link between these variables. The results indicated that MPs engage in significantly less PF coping and more AVEF than NPs. The self-worth theory (Covington, 1992) suggests that individuals who tie their achievements to their self-perception are driven by a fear of failure. MPs, who are extremely self-critical when failing to meet unrealistic standards, often link their achievement to their self-worth (Stoeber *et alii*, 2013) and thus may face

this fear of failure. This fear may be further amplified due to the immense academic pressure and high-stakes evaluations that medical students face (Toufiq *et alii*, 2024). Hence, as engaging in PF coping involves actively engaging with a stressor/problem and thus the possibility of being exposed to failure, MPs may avoid using these strategies and rather, rely on strategies that allow them to avoid the problem entirely. NPs, on the other hand tend to be less self-critical and concerned with goal achievement (Stoeber *et alii*, 2013) and hence may not face the same fear of failure. This contention is supported by findings wherein pure socially prescribed perfectionism, a form of MP, was linked to lower PF coping use than NP (Jowett, Hill, Forsdyke, & Gledhill, 2018). However, contrasting the present findings, a study found that MPs and NPs were comparable in their use of avoidant coping (Noble, Ashby, & Gnilka, 2014). This contrast may be attributable to the present focus on the medical student population wherein the high-pressure environment may amplify the fear of failure and hence MPs' tendency to avoid the problem as opposed the general university student sample utilized by Noble *et alii* (2014). The present results also indicated that MPs and NPs both rely on AVEF more than APs. This pattern replicates literature findings so far. For example, a study on university students found significantly lower use of avoidant coping by adaptive perfectionists relative to both MPs and NPs (Noble *et alii*, 2014). Overall, the present results suggest a clear pattern wherein MPs demonstrate the highest reliance on AVEF, followed by NPs, with APs utilizing them the least (MP>NP>AP) indicating the nuanced role of perfectionism type in coping within the Indian medical student context.

Exploring the link between perfectionism and substance use, NPs were found to engage in significantly greater alcohol use than APs. This finding is generally well replicated (Moate *et alii*, 2021; Nelsen *et alii*, 2023) suggesting that our findings for Indian medical students are in line with findings based on other populations. In general, APs, in comparison to NPs, tend to have greater standards and a drive to achieve and may hence view drinking as an impediment to achieving their goals (Moate *et alii*, 2021). They are also more likely to have a positive experience and satisfaction in working towards their goals (Richardson, Hoene, & Rigatti, 2020). Especially in medical education, where performance, knowledge retention, and clinical competence are crucial, AP medical students may further perceive alcohol consumption as a risk to their productivity and success. These factors may cause APs to feel less drawn to use alcohol than NP. The results also, interestingly found no differences between the groups on drug use. This may be due to generally low levels of drug use in the present sample as well as unequal group sizes that may have affected the detection of a difference. Future studies can focus on the recruitment of more balanced samples as well as more sensitive measures of drug use to enhance variability and allow for detection of differences.

The individual paths estimates in the mediation extended the findings from the preliminary analyses. As found in the ANOVA, being classified as a MP over an AP was associated with the use of AVEF. This finding is consistent with the COR theory which posits that MPs' often unrealistic expectations, in the pursuit of which they expend a lot of their resources and yet inevitably fail to meet (Stoeber & Rambow, 2006) corresponds to depletion of personal resources such as self-efficacy in a loss spiral of constantly depleting resources. This is associated with the use of avoidant, resource-conserving styles (Ito & Brotheridge, 2003). On the other hand, APs manage their expectations in a more balanced way (Stoeber & Rambow, 2006), which corresponds to the experience of failures without resource depletion. This is associated with the greater use of adaptive, resource-intensive coping (Ito & Brotheridge, 2003). Also, in line with the findings of

the correlational analysis, AVEF was associated with greater use of both alcohol and drugs. This result is in line with a mediational study on college students indicating that maladaptive coping styles such as AVEF are associated with higher alcohol consumption and heavy episodic drinking (Metzger *et alii*, 2017). Accumulating stress due to avoiding the problem (Villanueva Blasco *et alii*, 2024), further compounded by the stress of long study hours, lack of sleep, and emotional distress from patient care (Shadakshari *et alii*, 2021) may be associated with medical students' greater use of substances as a release. Additionally, ACEF was negatively associated to drug use. This finding is in line with the current literature, (Caricati & Ferrari, 2021; Pence, Thielman, Whetten, Ostermann, Kumar, & Mugavero, 2008). A recent Indian study (Singh, Datta, Gupta, Batra, Gupta, & Garaya, 2023) found that positive reframing, a component of ACEF was a significant, negative, and independent predictor of overall problematic substance use. Since adaptive coping styles like ACEF are often linked to reduction in psychological distress, and an improvement in personal well-being and effectiveness (Zeider & Saklofske, 1995) they may reduce the need to use substances as an outlet, explaining the present findings. Thus, medical students who use ACEF may experience greater emotional resilience, reducing their need to rely on substances to relieve stress.

The mediation analysis found that AVEF mediated the relationship between perfectionism types and problematic substance (alcohol and drugs) use such that MPs and NPs relative to APs report more problematic substance use in the context of greater AVEF use. Although no study to date has assessed this mediational model some previous studies have found avoidant forms of coping to significantly mediate the relationship of perfectionism with other negative outcomes such as test anxiety (Weiner & Carton, 2012), distress (Dunkley *et alii*, 2000), and depression (Abdollahi, Hosseinian, & Asmundson, 2018). This finding suggests that avoidant forms of coping, including AVEF, may be an important variable for consideration in future research on maladaptive outcomes including substance use and their possible mechanisms. In exploring this mediation model, the present study fills an important gap in the literature, expanding findings from the context of test anxiety and depression, to the context of substance use which is a significant concern in the Indian medical student population.

The present study has some limitations. First, the groups of perfectionists, i.e., APs, MPs, and NPs, were unequal in size. Such disparities can lead to imbalanced statistical power, where larger groups exert greater influence on model estimates, and smaller groups yield fewer stable estimates due to reduced variability (Rusticus & Lovato, 2014). Although bootstrapping was employed to mitigate these issues (Shrout & Bolger, 2002), the results concerning the smallest group AP (n= 14), should be interpreted with caution, as small samples are more sensitive to outliers and data variability (Rusticus & Lovato, 2014). Future research can aim for more balanced group distributions to improve statistical precision and generalizability. Second, the variables were measured using self-report measures making the responses prone to response bias, social desirability effects, and acquiescence biases (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Further, MP tends to be positively associated to fear of scrutiny (Levinson *et alii*, 2015) which may have prompted MP participants to respond in a socially desirable manner. It is also relevant to consider the role played by cultural expectations and views towards substance use behaviours which may also have impacted the participants' self-report. In the Indian context, substance use is often looked down upon, with a study conducted in Tamil Nadu suggesting that 70% of drug users reported feeling ashamed about using drugs, with 67% feeling that they need to hide their usage (Latkin *et alii*, 2010). Finally, the

study only included participants from Tamil Nadu, and hence the present results must be interpreted with caution across populations.

The current study explored the relationships of perfectionism and coping styles with problematic substance use in Indian medical students. Although previous studies tested individual relationships between the variables, the present study aimed to contextualize these findings in the Indian medical student context filling an important gap in literature with regards to culture and profession. Further, the present study also tested a previously unexplored mediational model of these variables to explore how they may function in tandem, extending the knowledge on these variables in the context of substance use. The current study found the positive association of AVEF with problematic substance use, that MPs over other groups tend to engage in greater AVEF, and the mediating role of AVEF in the association between perfectionism types and problematic substance use. These present findings suggest that counselling for medical students must also involve a careful consideration of their personality factors including perfectionistic tendencies as well as their coping styles. Emphasizing self-awareness of one's perfectionistic dispositions i.e., whether they are adaptive or maladaptive, their commonly used coping styles as well as psychoeducation on replacing maladaptive patterns with more adaptive ones may possess great preventative value against substance use in medical populations if incorporated through the counselling process.

Further replication of this model across cultures and populations is required of future studies. This replication can especially focus on identifying and controlling for other factors that affect this relationship such as self-efficacy or impulsivity. Future research can also undertake longitudinal designs to assess and assert causality between these variables. Overall, the current findings not only contextualize previous findings but also extend the current literature on substance use which is a matter of concern in the medical student population due to its impact on their personal well-being but also on the broader quality of future patient care in the society. Hence, the present findings not only open more avenues for future research and knowledge expansion but also provide avenues for interventions and wellness checks.

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