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Research Article

The Role of Negative Automatic Thoughts and Gender in Predicting Self-Harm among Youth

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Abstract

Background: Deliberate self-harm (DSH) is a maladaptive behavior mostly found in youth. This study examines problem-solving skills (PSS), coping strategies, and cognitive distortion in youth who engage in DSH. *Objectives*: The study investigated the association of coping strategies, problem-solving skills, and personality with self-harm behaviors and the severity of anxiety and depression. *Methods*: This cross-sectional observational study was conducted in a tertiary care hospital in Eastern India. Seventy-five participants of both genders, aged 15-29 years, were selected. Socio-demographic details, PSI, coping strategies, dichotomous thinking (DTI), and personality traits were assessed using appropriate psychological tools. Anxiety and depression were measured with the Hamilton Anxiety Rating (HAM-A) and Hamilton Depression Rating (HAM-D) scales. *Results*: The mean age of the 75 participants was 22.7 years. Gender analysis showed minimal differences in problem-solving and coping strategies. Positive correlations emerged between problem-solving and coping skills (r=0.347, *p*=0.002) and problem-solving and independence (r=0.238, *p*=0.040). Anxiety was associated with self-control (r=0.283, *p*=0.014) and tough-mindedness (r= -0.565, *p*<0.001). *Conclusions*: The study showed how thinking patterns, emotions, and personality traits affect self-harm in young people, highlighting the need for tailored therapies like cognitive behavior therapy and DBT.

Keywords: Baseline assessment, Deliberate self-harm, Personality traits, Problem solving, Youth mental health.

Key Message

Problem-solving and coping skills show a significant positive association in youth engaging in self-harm. Integrating cognitive restructuring and affect regulation strategies with personality-informed interventions may enhance clinical outcomes. These findings highlight the need for personalized, multi-dimensional mental health interventions for young individuals exhibiting self-harm behaviors.

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دور الأفكار التلقائية السلبية والجنس في التنبؤ بإيذاء النفس لدى الشباب

الخلاصة

الخلفية: إيذاء النفس المتعمد (DSH) هو سلوك غير قادر على التكيف يوجد في الغالب عند الشباب. تبحث هذه الدراسة في مهارات حل المشكلات (PSI) واستراتيجيات التأقلم والتشويه المعرفي لدى الشباب الذين يشاركون في DSH. **الأهداف**: بحثت الدراسة في ارتباط مهارات التأقلم وحل المشكلات والشخصية بسلوكيات إيذاء النفس وشدة القلق والاكتئاب. **الطرائق** أجريت هذه الدراسة الرصدية المقطعية في مستشفى للرعاية الثالثية في شرق الهند. تم اختيار خمسة وسبعين مشاركا من كلا الجنسين ، تتراوح أعمارهم بين 15 و 29 عاما. تم تقييم التفاصيل الاجتماعية والديموغرافية ، PSI ، مهارات التأقلم ، التفكير الثنائي التفرع (DTI) ، والسمات الشخصية باستخدام الأدوات النفسية المناسبة. تم قياس القلق والاكتئاب باستخدام مقاييس تصنيف قلق هاميلتون (HAM-A) وتصنيف هاميلتون للاكتئاب (HAM-D). **النتائج**: بلغ متوسط عمر المشاركين البالغ عددهم 75 مشاركا 22.7 عاما. أظهر التحليل الجنساني اختلافات طفيفة في حل المشكلات ومهارات التأقلم. ظهرت ارتباطات إيجابية بين حل المشكلات ومهارات التأقلم (*p*=0.347، *p*=0.002) وحل المشكلات والاستقلالية (*p*=0.238 ، *p* = 0.040). ارتبط القلق بضبط النفس (ص = 0.283 ، *p* =0.014) وضيق العقل (*p*= -0.565 ، *p*> 0.001). **الاستنتاجات**: أظهرت الدراسة كيف تؤثر أنماط التفكير والعواطف والسمات الشخصية على إيذاء النفس لدى الشباب، مما يسلط الضوء على الحاجة إلى علاجات مصممة خصيصا مثل العلاج السلوكي المعرفي و DBT.

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INTRODUCTION

Deliberate self-harm (DSH) behavior is also known by various names, such as non-suicidal self-injury (NSSI), self-mutilation, or parasuicide, etc. It is an intentional act of physically injuring oneself without any intention to die [1]. In most cases, DSH behavior was seen along with the person having borderline personality traits with a unique cognitive-emotional interaction or complex patterns in them [2]. Recently, researchers found that most of the DSH behaviors usually begin in a developmental period from the age of 11 years to 17 years [3–5]. It is found in this research that 13.5% of female respondents and 4.3% of males aged 14 to 17 years of age had at least one episode of DSH behaviors [3]. These maladaptive behaviors among college students in India have been found to be up to 46.5% [6]. In light of the increasing

incidence of self-injurious behavior, it is essential to implement interventions that target the fundamental psychological and emotional strategy. The development of problem-solving and coping skills has been recognized as a vital strategy for mitigating self-harm tendencies among adolescents. According to D'Zurilla and Goldfried, a problem is characterized as "a specific situation or set of related situations that necessitate an individual's effective response for functioning in their environment" [5]. So, it is necessary to adopt an effective cognitive-behavioral strategy for developing a better problem-solving skills as in plural [7]. Coping skills are the strategies used by the individuals to cope with emotional distress and other challenges in life [8]. Coping skills are essential to reduce psychological stimuli that may cause self-harm behaviors. Training in problem-solving and coping skills can significantly reduce the rate of self-harm behaviors in youth by providing them with more positive alternatives in handling stress and emotional challenges. Personality traits are highly associated with mental health outcomes, especially in adolescents and young adults. For example, it has been observed that neuroticism is always positively related to vulnerability to anxiety and depression, whereas extraversion and openness are associated positively with coping and better mental health outcomes [9,10]. This study examined the problem-solving abilities, coping strategies, cognitive constructs, and personality characteristics in adolescents engaged in DSH behaviors. Also, this study assessed the severity of depression and anxiety in these youths for a better understanding of their clinical profile.

METHODS

Study design and setting

This was a cross-sectional observational study. The study was conducted at a tertiary care hospital in Eastern India between September 2023 and December 2024.

Participants

Seventy-five participants of both genders who have shown at least one episode of DSH behavior in the last year were selected for the study. The age range of participants was taken from 15 years to 29 years, based upon the definition of youth as per India's National Youth Policy [10]. All the participants involved have a minimum education level of Grade 10. Individuals with diagnosable mental illness and those using any substance in a dependent pattern were excluded from the study.

Data sources and measurement

Data for this study were collected using a set of standardized and widely validated instruments, including the 16 Personality Factor (16PF), the Brief COPE Questionnaire, the Hamilton Anxiety Rating Scale (HAM-A), the Hamilton Depression Rating Scale (HAM-D), the Dichotomous Thinking Inventory (DTI), and the Problem Solving Inventory (PSI). These tools were selected for their reliability and relevance to assessing personality traits, coping mechanisms, cognitive patterns, and emotional states. Correlational analysis was used to explore patterns.

Sample size calculation

The sample size was calculated as follows: $n = N(Z_{1-\alpha/2})^2 / (Z_{1-\alpha/2})^2 + 4Ne^2$, where n is the sample size, $N = 75$ (the population size based on the retrospective data), $Z_{1-\alpha/2} = 1.96$ (the Z-value corresponding to a 95% confidence interval), and $e = 0.05$ (the margin of error). To ensure that the study would retain sufficient power in the event of participant dropout or loss to follow-up, we increased the sample size by 12 participants, accounting for a 19.05% increase to address potential attrition.

Ethical considerations

The study was accorded Ethical Committee Approval vide Ethics Committee (Institutional Ethics Committee, Institute of Medical Sciences and SUM Hospital) Reference No./IEC/IMS-SH/SOA/2023/547 Date: 27th June 2023.

Statistical analysis

The data was analyzed using SPSS version 27. Descriptive statistics summarized demographic and psychological variables, while Pearson's bivariate correlation assessed relationships between problem-solving skills, coping mechanisms, and personality traits. Scatterplots were employed to visualize associations between variables, enhancing the interpretation of key findings. The effect size for group differences was analyzed using Cohen's d for gender and age on problem-solving scores, coping skills, and Dichotomous Thinking Inventory scores. There was no missing data in this study. Subgroup analyses were conducted to explore differences in psychological constructs across gender and age categories. Effect sizes (Cohen's *d*) were calculated to assess the magnitude of group differences in problem-solving skills, coping strategies, and dichotomous thinking.

RESULTS

The demographic analysis, as shown in Table 1, provided insightful findings about the respondents' age, gender, and socioeconomic status. The mean age and standard deviation (SD) have all been captured therein. With 75 participants, the gender distribution was almost even, with 36 males and 39 females.

Table 2 presents the reasons given by the study population for engaging in self-harming behavior.

Table 1: Demographic characteristics of Respondents

Variable	Result
Age	22.7±3.092
Occupation	
Employed	2(2.7)
Unemployed	59(72)
Student	19(25.3)
Sex	
Male	36(48)
Female	39(52)
Marital Status	
Single	66(88)
Married	9(12)
Education	
Grade 6-10	25(33.3)
Above grade 10	50(66.7)

Values were expressed as frequency, percentage, and mean±SD.

Table 2: The reasons given by the study population for engaging in self-harming behavior

Function	Result
I hurt myself to feel something	46(61)
I hurt myself because my friends do so	26(35)
I hurt myself as a self-punishment	42(56)
I hurt myself to deal with frustration	56(75)
I hurt myself to cope with uncomfortable feeling	60(80)
I hurt myself so that others will pay attention to me	54(72)
I hurt myself so as not to do it in another way	44(57)
I hurt myself because it feels good	34(45)
I hurt myself to deal with anger	48(64)
I hurt myself to get control over myself	45(60)
I hurt myself to surprise or hurt someone	31(42)
I hurt myself to avoid killing myself	45(60)
I hurt myself because I cannot stop the urge	54(72)
I hurt myself to change my emotional mood into something physical	54(72)
I hurt myself because of my low self esteem	46(61)
I hurt myself because I like the way it looks	38(51)
I hurt myself as a way to practice ending my life	39(52)
I hurt myself as a way to attempt suicide	39(52)

Values were expressed as frequency and percentage.

The answers reveal a rather alarming outcome whereby most participants gave reasons such as

wanting to kill themselves, end their lives, and attempt suicide, respectively, as motives for self-harm. Figure 1 below presents a positive linear relationship of total HAM-A and total HAM-D scores with regression equation $y=1.62+0.96xy=1.62 + 0.96xy=1.62+0.96x$ and $R2R^2R2$ value = 0.687, representing that about 68.7% of the variations in HAM-A are due to HAM-D scores.
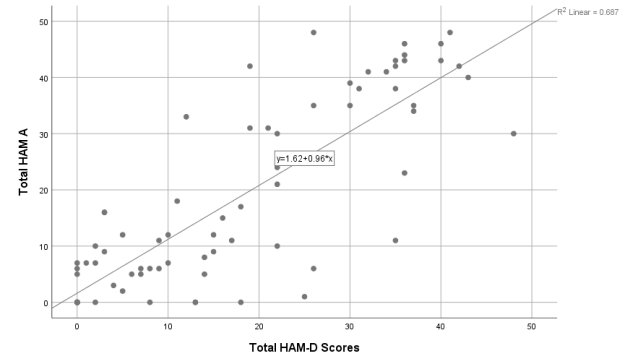
Figure 1: Scatterplot showing the relationship between Total HAM-D and Total HAM-A scores

The scatter plot shows that higher levels of depression (HAM-D) are associated with higher levels of anxiety (HAM-A). Results from the analysis of problem-solving skills, coping skills, and dichotomous thinking among the respondents are shown in Table 3. Age was categorized into three groups (15-20, 21-25, and 26-29), with score ranges provided for problem-solving and coping skills, as well as the Dichotomous Thinking Inventory (DTI). For the coping skills measure, higher scores reflected more adaptive coping strategies. However, for the PSI and DTI, higher scores indicated greater difficulties in problem-solving and more rigid thinking patterns, respectively.

Table 3: Baseline analysis of problem-solving inventory (PSI), coping skills (CS), and dichotomous thinking inventory (DTI) by age and gender

Variable	n	PSI		CS		DTI		*p*-value*
		0–96 (Low)	97–192 (High)	0–56 (Low)	57–112 (High)	0–45 (Low)	46–90 (High)	
Age group (year)								
15–20	16	5(31.3)	11(68.8)	8 (50.0)	8 (50.0)	2(12.5)	14(87.5)	
21–25	43	17 (39.5)	26(60.5)	16(37.2)	27(62.8)	9(20.9)	34(79.1)	0.35
26–29	16	5 (31.3)	11(68.8)	8 (50.0)	8 (50.0)	1 (6.3)	15(93.8)	
Gender								
Male	36	12 (44.4)	24(50.0)	14(43.8)	22(51.8)	5(41.7)	31(49.2)	0.52
Female	39	15 (55.6)	24(50.0)	18(56.3)	21(48.8)	7(58.3)	32(50.8)	

Values are presented as frequency and percentage. PSI = Problem-Solving Inventory; DTI = Dichotomous Thinking Inventory; CS= Coping Skills. Score ranges: PSI (0–96 = Low, 97–192 = High); Coping Skills (0–56 = Low, 57–112 = High); DTI (0–45 = Low, 46–90 = High). *Chi-square tests comparing the distribution of scores across age groups and gender categories.

Thus, lower scores in PSI and DTI reflected more positive functioning in these areas. Most participants across the three levels of age groups showed lower problem-solving abilities. However, with coping strategies, participants in the 21-25 age range reported better coping strategies compared to the other two age groups. All age groups showed higher scores of dichotomous thinking, indicating the presence of more dichotomous thinking among the respondents. With gender difference, coping skills were fairly balanced between males and females.

However, a slightly higher number of females showed more rigid, black-and-white thinking compared to males. In all, the differences between age and gender groups were not statistically significant. To better understand the magnitude of group differences, Cohen's *d* effect sizes were calculated for gender and age comparisons (Table 4). Cohen's *d* values ranging from 0.01 to 0.19 indicate very small or negligible effects, while values between 0.20 and 0.49 suggest small effects.

Table 4: Effect Sizes (Cohen's d) for group differences

Variable	Gender (Male *vs*. Female)	Age (15-20 *vs*. 21-25)	Age (15-20 *vs*. 26-29)	Age (15-20 *vs*. 26-29)
Problem solving skill	-0.139	0.134	0.229	0.359
Coping skills	-0.150	-0.158	0.041	-0.172
Dichotomous Inventory	-0.139	-0.069	0.377	0.312

The calculated effect sizes for PSI, coping skills, and DTI indicate minimal differences between groups, suggesting that variations in problem-solving ability, coping strategies, and dichotomous thinking tendencies are relatively weak or negligible. The effect sizes for gender comparisons are small (d = 0.14–0.15), indicating minimal differences between males and females in PSI, coping skills, and DTI. The correlation analysis between the five global personality factors and problem-solving and coping skills revealed some significant relationships. A positive correlation between problem-solving skills and coping skills was found. Furthermore, problem-solving abilities correlated significantly positively with independence. With respect to anxiety, it was observed to have significant correlations with self-control, tough-mindedness, and extraversion. Coping skills, however, showed no significant correlations with the global personality factors (Table 5).

Table 5: Correlations between personality traits, problem-solving, and coping skills (n=75)

PSI Total Scores	r	1	0.347	0.058	-0.205	-0.072	0.238	-0.030
	p		0.002	0.624	0.078	0.542	0.040	0.799
Brief cope Total scores	r	0.347	1.0	-0.202	0.053	0.152	0.005	0.124
	p	0.002		0.082	0.654	0.194	0.968	0.288
Anxiety	r	0.058	-0.202	1.0	0.283	-0.565	0.335	-0.265
	p	0.624	0.082		0.014	0.00	0.003	0.022
Self-Control	r	-0.205	0.053	0.283*	1.0	-0.04	0.084	-0.19
	p	0.078	0.654	0.014		0.732	0.473	0.103
Tough-Mindedness	r	-0.072	0.152	-0.565	-0.040	1.0	-0.459	0.226
	p	0.542	0.194	0.00	0.732		0.00	0.051
Independence	r	0.238*	0.005	0.335	0.084	-0.459	1.0	-0.067
	p	0.040	0.968	0.003	0.473	0.00		0.565
Extraversion	r	-0.030	0.124	-0.265	-0.190	0.226	-0.067	1.0
	p	0.799	0.288	0.022	0.103	0.051	0.565	

DISCUSSION

The results of this study give important insights into the cognitive, emotional, and personality-related factors associated with deliberate self-harm among young adults. The mean age of the participants was 22.7 years, which falls within the global findings that the early years of young adulthood are particularly vulnerable to mental health challenges like anxiety, depression, and self-harm [11,12]. This vulnerability is compounded by socio-demographic factors, as observed in this study, where most respondents were unmarried and relatively educated. These characteristics are critical in shaping stress-coping mechanisms and emotional responses, with higher education levels potentially contributing to greater awareness of mental health issues and willingness to seek help [13]. As depicted in Table 2, self-harm motivations among the participants are seen to be very prevalent and therefore complicated in terms of emotional dysregulation and cognitive distortion. Many respondents reported having coped with frustration and unpleasant feelings by using self-harm. That high percentage of these respondents expressed suicidal intent in their acts calls for a serious intervention at an early stage. This supports prior findings that link self-injurious behavior to emotional dysregulation and hopelessness, common precursors to suicidal thinking [14,15]. This points out that these interventions need to be tailored specifically, such as through cognitive-behavioral therapy and dialectical behavior therapy, which teach coping strategies outside the realm of undesirable acts. Furthermore, the NSSI questionnaire included items assessing past self-harm and substance use; however, none of the participants reported a history of self-harm beyond the current episode, nor did they indicate substance use. This suggests that the self-harmed behaviors observed in this study may be more situationally driven rather than rooted in persistent self-injurious tendencies or substance-related influences. Gender differences in depression and severity call for specific interventions. While 38.5 percent of females suffered from severe depression, the proportion was slightly lower among males at 27.8 percent. These results confirm established literature findings explaining the gap in terms of hormonal changes and greater psychosocial stressors that females are subjected to [16]. These results call for a gender-sensitive approach: focusing on emotional regulation among females and an early detection strategy among males, who are likely to underreport their symptoms for fear of stigma. Correlation analysis between the anxiety HAM-A score and the depression HAM-D score revealed a good positive relationship, indicating significant comorbidity in these two conditions. Such comorbidity implies that treatments used for one condition would beneficially impact the other too. High scores on the Dichotomous Thinking Inventory, used to measure dichotomous thinking, further indicate that distorted cognitions are significantly connected with emotional dysregulation. In these regards, cognitive restructuring techniques can be especially useful in dampening such thought patterns and reducing self-harm behaviors [11,15,17]. The

findings on problem-solving and coping skills provide an essential view on adaptive versus maladaptive responses to stress. Problem-solving and coping skills are at their best in the age groups 21-25 compared to younger and older, and thus developmental factors seem to promote these skills. Conversely, the absence of statistically significant gender differences in coping and problem-solving skills implies that both males and females are equally faced in their adaptive strategies. As can be observed from Table 4, the effect sizes for gender and age differences were generally small, indicating that variations in problem-solving skills, coping strategies, and dichotomous thinking were not significantly influenced by these demographic factors. This finding is consistent with previous research suggesting that cognitive constructions related to self-harm are shaped by a range of psychosocial influences rather than demographic characteristics alone [18,19]. Personality traits, as analyzed against problem-solving and coping skills, provide further insights into individual variations in responses to stress. Significant correlations between problem-solving skills and independence suggest that fostering self-reliance may enhance problem-solving abilities. However, a negative correlation between anxiety and traits such as tough-mindedness and extraversion does point to the importance of emotional resilience and social engagement in reducing anxiety. In this regard, the necessity for personalized interventions, considering the personality profile in the mental health program design, has been further supported by the present findings. This overlap of cognitive, emotional, and personality-related factors is an important aspect observed in this study and signifies that self-harm behavior has multiple facets. It can be effectively treated by incorporating interventions targeting distortions in cognitive patterns, emotional dysregulation, and personality. Several studies have delved into the personality, emotional, and thought characteristics of DSH. Earlier studies have asserted that negative emotional issues and negative thought processes account for the activities of self-harm [20]. Individuals at high risk for dichotomous thinking and negative thoughts drift toward self-harming behavior [21]. The existing studies also determined that there are co-existing symptoms of depression and anxiety in self-harm populations, demonstrating that there must be holistic treatment of mental well-being [22,23]. How personality traits, cognitive distortions, and reasons for self-harm interact is still being explored. While some research has explored how personality profiles and coping styles [24] interact, there are fewer studies that link personality traits to reasons for self-harm in young adults. Further, most current research is centered on Western populations, while this study presents new evidence from an Eastern Indian, alternative cultural context. Our study, including gender-based analysis and exploring the interactions between thoughts and feelings, is aimed at building on current research and highlights the need for targeted interventions. This research reports new findings that coping and problem-solving skills have a small but significant effect on lowering self-harming behavior. Previous research has acknowledged the benefit of adaptive coping [27], but our research acknowledges how such skills develop as individuals mature and how their success is more related to personality than gender. This is supported by later studies in favor of interventions for specific personality-based therapy combined with affective and cognitive management skills.

Theoretical implications

This study's findings can be interpreted through a number of theoretical frameworks that explain the cognitive, emotional, and personality-related factors associated with DSH. One such framework is the Interpersonal Theory of Suicide, developed by Joiner (2005) [27]. According to this theory, thwarted belonging and perceived burdensomeness are the feelings that make individuals self-harm as a way of transitioning to suicidal ideation. The motivations for self-harm identified in this study, such as self-punishment (56%) and seeking attention (72%), fit these constructs. It can be seen that their actions may be a response to a need to communicate distress or alleviate interpersonal rejection, as put forward by the theory. Thus, the necessity to address relational and social dimensions in intervention strategies arises. Linehan's biosocial model, which is the basis of dialectical behavior therapy, provides another approach, explaining self-harm as a maladaptive response to emotional dysregulation and cognitive distortions. The high prevalence of dichotomous thinking among the respondents supports this model, in that many participants are challenged by managing intense emotions within invalidating environments. Therefore, DBT interventions may be particularly effective for this population, focusing on enhancing emotional regulation and promoting cognitive flexibility. Comorbid anxiety and depression symptoms would explain the tight connection between HAM-A and HAM-D scores as represented by $R^2 = 0.687$. In Beck's Cognitive Theory of Depression, the existence of such symptoms has been demonstrated; there is evidence showing negative automatic thoughts and cognitive distortion responsible for sustaining the states of emotional distress. These conclusions strengthen the intervention known as cognitive restructuring in altering a dysfunctional pattern of thoughts possibly accountable for anxiety as well as depression among these individuals. The Five-Factor Model of Personality offers understanding into the relationship between personality characteristics and adaptive behaviors. Because there was a positive association between problem-solving ability and independence, it may be possible that more independent individuals experience greater growth in problem-solving ability because of increased confidence in their own abilities to solve problems [9,27]. On the other hand, the negative correlation between anxiety and tough-mindedness and extraversion suggests that emotional

resilience and social engagement protect against anxiety [28]. These results highlight the importance of interventions that are targeted to the individual personality profile so that strategies can be designed to address particular vulnerabilities and strengths. Applying these theoretical frameworks will serve to contextualize the study's findings within broader psychological models, thus enhancing the understanding of self-harm behaviors and factors associated with them.

Study limitations

Our findings should be interpreted with caution due to the following: Since self-harm is a sensitive issue, some participants may have responded in ways they felt were more acceptable. The study's cross-sectional design captures a snapshot in time and can't determine cause-and-effect relationships. While it shows links between cognitive patterns, personality traits, and self-harm, we can't say for sure which causes what. Another key limitation is the mismatch between how participants described their self-harm and the standard definition of deliberate self-harm as a non-suicidal act.

Conclusion

This study sheds light on the relationship between cognitive distortions, emotional dysregulation, personality traits, and self-harming behaviors among young adults. It highlights how factors like dichotomous thinking, depression, anxiety, and certain personality traits contribute to self-harm, with gender and age showing nuanced influences. The findings reinforce the need for targeted, multi-dimensional interventions, especially those grounded in cognitive-behavioral and dialectical behavior therapy approaches. Future studies should explore these dynamics longitudinally and pay special attention to individuals whose self-harm motivations reflect suicidal intent. Distinguishing between these subgroups could provide better understanding into the unique psychological profiles and treatment needs of each, ultimately helping to shape more precise and effective mental health interventions.

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