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Impulsivity and Psychosocial Determinants in Patients with Attempted Suicide by Poisoning: A Mixed-Methods Study

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Research Article

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Abstract

Background

Suicide constitutes a pressing worldwide public health crisis. Deliberate self-poisoning consistently ranks among the most frequently utilized methods in suicide attempts that result in emergency department (ED) admissions. Although impulsivity is recognized as a potent risk-enhancing factor for suicidal acts, the interplay between impulsive traits and broader psychosocial stressors in this specific cohort remains insufficiently characterized through integrated quantitative and qualitative inquiry. This investigation was designed to delineate the psychological profiles, impulsivity phenotypes, and associated contributing factors in poisoning-based suicide attempters, while concurrently offering an in-depth exploration of their subjective experiential trajectories throughout the suicidal process.

Methods

A sequential explanatory mixed-methods framework was adopted. The quantitative component comprised a cross-sectional survey administered between January and December 2025, involving 171 patients who presented with deliberate self-poisoning across three tertiary-level EDs. Data collection utilized a demographic questionnaire, the Nurses' Global Assessment of Suicide Risk (NGASR), the Social Support Rating Scale (SSRS), the Generalized Anxiety Disorder-2 (GAD-2), the Patient Health Questionnaire-2 (PHQ-2), and the Barratt Impulsiveness Scale-11 (BIS-11). Binary logistic regression was employed to ascertain independent predictors. For the qualitative strand, purposive sampling guided the selection of 10 participants for semi-structured in-depth interviews, with subsequent transcript analysis performed using phenomenological thematic procedures.

Results

Quantitatively, 73.1% of participants were classified as having moderate suicide risk, whereas 12.9% reported previous attempts. BIS-11 assessments revealed uniformly elevated impulsivity across all three subscales, with total scores surpassing 70 for every participant. Regression analyses identified family per-capita monthly earnings, urban versus rural residency, presence of domestic conflict, and perceived social support availability as robust determinants of both anxiety and depressive symptoms ($P < 0.05$). Qualitatively, three distinct temporal phases emerged from the interview data: profound hopelessness and maladaptive coping preceding the act, an acute impulsive state characterized by "mental blankness" during the attempt, and a subsequent period dominated by fear, remorse, and existential re-evaluation following medical resuscitation.

Conclusions

This cohort exhibits pronounced impulsivity, with their suicidal behaviors frequently manifesting as impulsive reactions to acute stressors. Economic strain, familial discord, and deficient social networks constitute pivotal pathways to psychological morbidity. Incorporating impulsivity screening into ED triage protocols, coupled with phase-sensitive psychosocial interventions, may represent a viable strategy for mitigating future re-attempt risk.

Background

- Suicide remains one of the foremost contributors to avoidable mortality and morbidity globally. It has been estimated that nearly five million individuals seek emergency care annually following non-fatal suicidal behavior [1]. Among the diverse methods employed, intentional ingestion of toxic substances is disproportionately prevalent in resource-limited settings due to its accessibility, and it consistently accounts for a substantial proportion of ED visits related to self-harm [1, 2]. Historically, scholarly attention has gravitated toward diagnosable psychiatric conditions, particularly unipolar depression and generalized anxiety. Nevertheless, accumulating clinical observations indicate that a considerable subset of these patients lack antecedent psychiatric diagnoses; their actions frequently appear precipitous and are executed with minimal forethought [3].
- Impulsivity—conceptualized as a disposition toward rapid, unplanned reactions to internal or external stimuli—is increasingly acknowledged as a critical correlate of suicidal phenomena. Individuals scoring higher on impulsivity metrics tend to exhibit compromised cognitive modulation when confronted with adversities such as interpersonal altercations or financial duress, thereby predisposing them to drastic behavioral responses [4, 5]. Contemporary evidence further underscores that impulsivity not merely predicts the emergence of suicidal ideation but also potentiates the transition from ideation to overt action by distorting risk-benefit appraisal during moments of crisis [6]. The stress-diathesis model offers a useful heuristic for framing how external provocations intersect with intrinsic vulnerabilities [7]; nonetheless, systematic examinations that simultaneously quantify impulsive traits and contextual psychosocial domains—and that integrate experiential accounts—are notably absent from the current literature.
- Most prior investigations have leaned heavily on unidimensional quantitative methodologies, thereby overlooking the fluid, stage-dependent psychological shifts occurring before, during, and after a suicide attempt [8]. Moreover, the ED setting, despite being the primary receptacle for acute post-attempt care, remains underutilized as a site for deploying targeted secondary prevention. A mixed-methods approach offers distinct advantages in this regard: it permits robust statistical modeling of risk associations while also capturing the nuanced subjective narratives that illuminate why and how individuals traverse the path from distress to action [9, 10].
- With this background, the present study was conceived to address three principal inquiries: (i) What is the prevailing impulsivity level among patients presenting with poisoning-related attempts, and how does it relate to concurrent anxiety and depression? (ii) Which sociodemographic and psychosocial variables independently predict the occurrence of such attempts? (iii) How do patients cognitively and emotionally experience the suicidal sequence across its successive phases? The

insights gleaned are intended to inform the development of evidence-based, context-sensitive crisis intervention frameworks tailored to ED practice.

Methods

Study Design and Clinical Setting

- We adopted an explanatory sequential mixed-methods design, wherein the quantitative survey phase was followed by qualitative in-depth interviews designed to enrich and contextualize the statistical findings. The investigation took place from January through December 2025 across the EDs of three tertiary comprehensive hospitals. Ethical clearance was secured from the institutional review boards of all participating sites, and written informed consent was obtained from each participant prior to data collection.

Participant Enrollment and Sample Size Rationale

- Participants were recruited through convenience sampling, yielding a final analytical sample of 171 patients. The target sample size was determined in accordance with established guidelines for multivariate logistic regression modeling [11], which recommend 5 to 10 cases per independent variable. Given that our full model incorporated 16 predictors (spanning demographic indices, social support metrics, risk classification, and impulsivity dimensions), and accounting for a 20% contingency for incomplete responses, we calculated a minimum requirement of 160 cases. The achieved enrollment of 171 thus afforded adequate statistical power.
- Inclusion criteria comprised: (1) a confirmed clinical diagnosis of attempted suicide via toxic ingestion; (2) age 18 years or older; (3) alert mental status with sufficient verbal competency for survey completion; and (4) provision of voluntary, signed informed consent.
- Exclusion criteria encompassed: (1) concurrent severe somatic conditions necessitating emergent resuscitative procedures; (2) documented organic brain syndromes or profound cognitive deficits; and (3) inability to participate attributable to acute emotional agitation or physical distress during the assessment window.

Quantitative Measures

- A battery of validated instruments was administered:
- 1.Demographic Schedule: captured age, gender, educational attainment, marital status, residence locality, and household per-capita monthly income.
- 2.Nurses' Global Assessment of Suicide Risk (NGASR): originally developed by van Veen et al. [12], this 15-item clinician-rated scale evaluates imminent risk (Cronbach's α in this sample = 0.810).

- 3.Barratt Impulsiveness Scale-11 (BIS-11): the Chinese adaptation by Li et al. [13] was utilized, encompassing 30 items distributed across cognitive, motor, and non-planning impulsivity domains. This instrument is widely considered a benchmark for impulsivity assessment in suicidology (α = 0.89–0.90).
- 4.Psychological Distress Screens: anxiety was measured with the 2-item Generalized Anxiety Disorder scale (GAD-2) [14] (α = 0.863), and depression with the 2-item Patient Health Questionnaire (PHQ-2) [15] (α = 0.848). A threshold score of ≥ 3 was adopted to denote clinically meaningful symptomatology.
- 5.Social Support Rating Scale (SSRS): devised by Xiao [16], this tool quantifies objective support, perceived subjective support, and degree of support utilization (α = 0.69).

Qualitative Interviews

- Following the quantitative phase, purposive sampling was deployed to recruit 10 patients for face-to-face semi-structured interviews. The interview protocol was conceptually anchored in the Three-Step Theory (3ST) of suicide [17], with particular emphasis on each participant's emotional and cognitive experiences across the pre-, peri-, and post-attempt periods. The semi-structured interview guide used in this study was developed by the research team specifically for this investigation, drawing upon the 3ST framework and clinical experience in emergency settings. An English-language version of the interview guide is provided as Supplementary File 1. Sessions ranged from 40 to 60 minutes in duration, were audio-recorded in their entirety, and were transcribed verbatim within 24 hours.

Analytical Approaches

- **Quantitative**: All statistical operations were conducted using SPSS version 23.0. Continuous data were summarized as means accompanied by standard deviations (SD), while categorical data were expressed as frequencies and percentages. Binary logistic regression was applied to isolate independent correlates of anxiety and depression, with results presented as odds ratios (OR) alongside 95% confidence intervals (CI). The significance threshold was set at a two-sided P-value of < 0.05.
- **Qualitative**: Transcripts were subjected to thematic analysis facilitated by NVivo 12.0, proceeding through open, axial, and selective coding phases to distill core experiential themes. Inter-rater reliability was ensured by having two independent coders analyze the material, yielding Cohen's kappa coefficients ranging from 0.75 to 0.89.

Results

Sample Characteristics and Bivariate Associations

- The 171 participants had a median age of 43 years (IQR: 25–57), with females constituting 69.0% of the cohort. Rural residence was reported by 57.9%, and 44.4% had completed no more than primary education. Comorbid physical ailments were noted in 73.7%, and 68.4% acknowledged significant family conflict. Risk stratification placed 73.1% in the moderate-risk category, while 12.9% had a history of prior suicidal acts. Table 1 delineates the bivariate relationship between each characteristic and anxiety status.

Table 1
Comparison of anxiety detection rate by demographic and clinical characteristics (N = 171)

Variable	Category	No anxiety n (%)	Anxiety n (%)	χ^2	P
Gender	Male	20 (24.4)	33 (37.1)	3.213	0.073
	Female	62 (75.6)	56 (62.9)		
Age	< 18 years	5 (6.1)	11 (12.4)	3.142	0.370
	18–44 years	40 (48.8)	34 (38.2)		
	45–59 years	19 (23.2)	24 (27.0)		
	≥ 60 years	18 (22.0)	20 (22.5)		
Education	Primary or below	32 (39.0)	44 (49.4)	1.995	0.369
	Junior high school	26 (31.7)	25 (28.1)		
	Senior high or above	24 (29.3)	20 (22.5)		
Marital status	Married	55 (67.1)	54 (60.7)	0.756	0.385
	Others	27 (32.9)	35 (39.3)		
Family per-capita monthly income (RMB)	< 2500	19 (23.2)	51 (57.3)	28.807	< 0.001
	2500–5000	31 (37.8)	30 (33.7)		
	> 5000	32 (39.0)	8 (9.0)		
Residence	Urban	42 (51.2)	30 (33.7)	5.369	0.020
	Rural	40 (48.8)	59 (66.3)		
Payment method	Insurance	20 (24.4)	31 (34.8)	2.223	0.136
	Self-pay	62 (75.6)	58 (65.2)		
Comorbid physical illness	Yes	19 (23.2)	26 (29.2)	0.804	0.370
	No	63 (76.8)	63 (70.8)		
Family conflict	Yes	40 (48.8)	14 (15.7)	21.576	< 0.001
	No	42 (51.2)	75 (84.3)		
Social support level	Low	14 (17.1)	37 (41.6)	15.665	< 0.001

Variable	Category	No anxiety n (%)	Anxiety n (%)	χ^2	P
	Moderate	46 (56.1)	43 (48.3)		
	High	22 (26.8)	9 (10.1)		

Impulsivity Profile and Psychological Distress

BIS-11 subscale scores uniformly exceeded the 10-point benchmark. Notably, 90% of the sample registered total impulsivity scores at or above 80, signifying a markedly elevated impulsive phenotype (Figure 1). The overall detection prevalence for anxiety was 52.0%, while depression was identified in 52.6% (Figure 2).

Multivariate Predictors of Anxiety and Depression

Logistic regression models (detailed in Tables 2 and 3) confirmed that household income level, residential setting, familial conflict, and the extent of social support independently contributed to both anxiety and depression outcomes.

Table 2 Logistic regression analysis of anxiety in patients with attempted suicide by poisoning

Variable	β	SE	Wald χ^2	P	OR	OR (95% CI)
Constant	0.721	0.587	1.505	0.220	0.532	—
Family per-capita monthly income (RMB)						
< 2500 (ref)	—	—	—	—	1.000	—
2500–5000	-0.631	0.416	2.297	0.130	0.532	0.236–1.203
> 5000	-2.069	0.514	16.214	< 0.001	0.126	0.046–0.346
Residence (urban vs. rural)	-0.842	0.386	4.748	0.029	0.431	0.202–0.919
Family conflict (yes vs. no)	1.407	0.430	10.683	0.001	4.083	1.756–9.490
Social support level						
Low (ref)	—	—	—	—	1.000	—
Moderate	-0.638	0.449	2.019	0.155	0.528	0.219–1.274
High	-1.324	0.595	4.947	0.026	0.266	0.083–0.855

Table 3 Logistic regression analysis of depression in patients with attempted suicide by poisoning

Variable	β	SE	Wald χ^2	P	OR	OR (95% CI)
Constant	-1.293	0.754	2.941	0.086	0.275	—
Age						
< 18 years (ref)	—	—	—	—	1.000	—
18–44 years	0.851	0.699	1.484	0.223	2.343	0.596–9.219
45–59 years	0.950	0.726	1.714	0.190	2.586	0.624–10.721
≥ 60 years	-1.066	0.769	1.923	0.166	0.344	0.076–1.554
Family per-capita monthly income (RMB)						
< 2500 (ref)	—	—	—	—	1.000	—
2500–5000	-1.493	0.469	10.153	0.001	0.225	0.090–0.563
> 5000	-2.251	0.548	16.853	< 0.001	0.105	0.036–0.308
Residence (urban vs. rural)	-0.767	0.411	3.482	0.062	0.464	0.207–1.039
Family conflict (yes vs. no)	1.702	0.476	12.770	< 0.001	5.485	2.157–13.952
Social support level						
Low (ref)	—	—	—	—	1.000	—
Moderate	2.080	0.510	16.656	< 0.001	8.006	2.948–21.740
High	1.329	0.625	4.523	0.033	3.776	1.110–12.849

For anxiety, higher income (> 5000 RMB) conferred a protective effect (OR = 0.126), whereas rural residence (OR = 0.431) and familial discord (OR = 4.083) emerged as exacerbating factors. For depression, family conflict (OR = 5.485) and moderate social support (OR = 8.006) featured prominently.

Qualitative Findings: A Three-Phase Experiential Continuum

Thematic analysis of the 10 interview transcripts yielded a coherent temporal framework (Figure 3):

- Pre-attempt (Despair Phase): Participants consistently recounted enduring interpersonal difficulties, most notably chronic domestic strife, coupled with a pervasive sense of entrapment and an absence of perceived assistance.
- Peri-attempt (Impulse Phase): The majority described their immediate mental state at the moment of ingestion as "mind-blanking," wherein the act was precipitated by a sudden surge of emotion rather than reflective deliberation.
- Post-attempt (Re-evaluation Phase): Strikingly, 90% of those interviewed voiced regret following stabilisation, alongside pronounced fear and a heightened awareness of life's value—sentiments that often persisted well into the recovery period.

Discussion

- Our mixed-methods investigation offers a layered understanding of the psychosocial and dispositional architecture underpinning poisoning-related suicide attempts. The data underscore that these patients are not merely passive recipients of psychiatric morbidity but are instead situated at the nexus of trait impulsivity and deteriorating environmental conditions.

Impulsivity as a Proximal Driver

- The near-uniform elevation in BIS-11 scores—with nine out of ten patients reaching the threshold for high impulsivity—corroborates and extends prior findings [5, 6]. This disposition appears to operate as a behavioral catalyst, effectively overriding inhibitory control precisely when it is most needed, particularly amid escalating familial disputes. Our qualitative data further illuminate this mechanism through the "cognitive tunnel" phenomenon described by participants, wherein attention narrows exclusively to the immediate source of distress, obscuring consideration of long-term consequences [18]. Viewed through the lens of the Three-Step Theory [17], impulsivity likely constitutes the critical factor that accelerates the final translation of profound dysphoria into a potentially lethal act.

The Weight of Adverse Psychosocial Conditions

- The regression analyses consistently identified family conflict as a dominant predictor, with odds ratios exceeding 4 for anxiety and 5 for depression. This finding lends empirical support to the stress-diathesis formulation [7], reinforcing the notion that persistent interpersonal stressors exert a cumulative toll on psychological homeostasis. Social support, conversely, demonstrated a nuanced pattern: while high support was protective against anxiety, the moderate support category paradoxically associated with elevated depression odds. This may reflect a "support paradox" in chronic stress contexts, where the quality rather than mere quantity of support determines its adaptive value—a theme that warrants closer inspection in future research. Rural patients, who comprised the majority, appeared especially vulnerable, likely due to sparse community mental

health infrastructure and normative expectations around stoicism, which impede help-seeking [9, 19].

Temporal Dynamics and Therapeutic Opportunities

- The recovery phase emerged as a particularly underappreciated window for intervention. The widespread expression of regret and existential reappraisal—spontaneously reported by nearly all interviewees—challenges the deterministic assumption that near-lethal attempters harbor chronic, intractable suicidal intent. Rather, the cognitive landscape appears momentarily malleable following physiological stabilisation. As highlighted by Chen and O'Connor [8, 20], this juncture affords clinicians a finite period during which psychoeducation, cognitive reframing, and family involvement can exert maximum impact. The integration of quantitative risk profiles with qualitative narrative insights, as executed in this study, vividly illustrates the added value of methodological pluralism in suicide research [21].

Conclusions

- The current investigation yields three principal insights that carry practical implications. First, impulsivity is not merely a peripheral correlate but a central engine of suicidal behavior in this population; the majority of acts are reactive rather than premeditated. This necessitates a departure from prevention paradigms predicated exclusively on chronic depression and reinforces the imperative for routine impulsivity screening within ED triage algorithms. Second, the convergence of material deprivation, relational rupture, and inadequate social scaffolding creates a pathogenic milieu that can overwhelm individual coping capacities—particularly for residents of rural communities. Mitigating this risk will require multi-sectoral efforts that address both individual and systemic determinants. Third, the post-attempt period, marked by cognitive openness and remorse, offers a time-limited but potent opportunity for deploying brief, targeted psychosocial interventions. We propose a shift from a purely medical "treat-and-release" model toward an active, continuity-oriented care pathway that bridges the hospital, family, and community support ecosystems.

Limitations

- Several constraints should be acknowledged. The cross-sectional nature of the quantitative component precludes causal attribution. The recruitment of participants from only three tertiary institutions may limit the generalizability of our findings to lower-level facilities or different geographic regions. Although the qualitative strand achieved saturation, the modest sample size warrants caution in interpretation. Longitudinal studies encompassing more diverse settings are needed to validate and extend our observations.

Abbreviations

BIS-11
Barratt Impulsiveness Scale-11
CI
Confidence interval
ED
Emergency department
GAD-2
Generalized Anxiety Disorder-2
NGASR
Nurses' Global Assessment of Suicide Risk
OR
Odds ratio
PHQ-2
Patient Health Questionnaire-2
SD
Standard deviation
SSRS
Social Support Rating Scale
3ST
Three-Step Theory

Declarations

Ethics approval and consent to participate:

This study adhered to the ethical principles of the Declaration of Helsinki. Approval was obtained from the Institutional Review Board of Deyang People‘s Hospital (the lead ethics committee for this multi-site study), with approval number 2023-01-128-H01, and the ethics committees of all other participating hospitals also provided formal approval for the study protocol. Written informed consent was obtained from all participants prior to any data collection. Participants were informed of their right to withdraw at any time without affecting their medical care.

Consent for publication:

Not applicable, as this manuscript does not include identifiable personal data, images, or videos from any participant.

Competing interests:

The authors confirm that they have no financial or personal conflicts of interest that could have influenced this work.

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Author Contribution

H.R.W. conceptualized and designed the study, conducted data acquisition, performed formal analysis and interpretation, prepared the original draft, and critically revised the manuscript for key intellectual content. The author reviewed and approved the final version.

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Data Availability

The datasets generated and/or analyzed during the current study are available from the corresponding author on reasonable request.

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Figures

Figure 1. BIS-11 subscale scores and distribution of total impulsivity scores in participants.

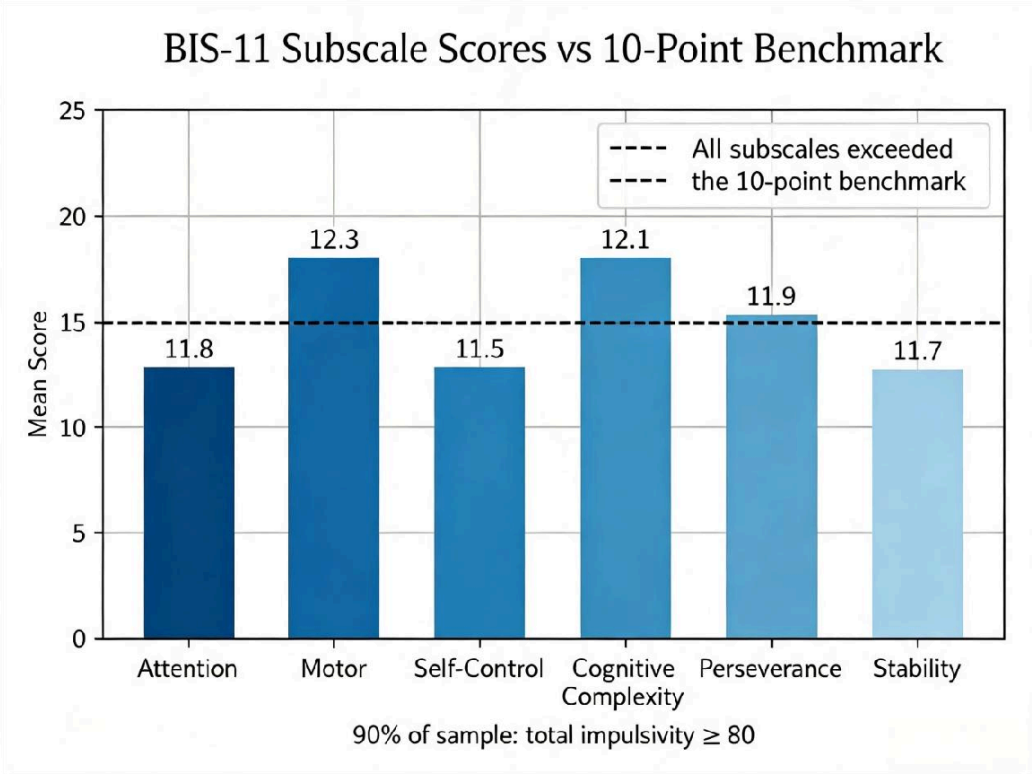


Figure 1. BIS-11 subscale scores uniformly exceeded the 10-point benchmark. Notably, 90% of the sample registered total impulsivity scores at or above 80, signifying a markedly elevated impulsive phenotype.

Figure 1

See image above for figure legend

Figure 2. Prevalence of anxiety and depression among the sample.

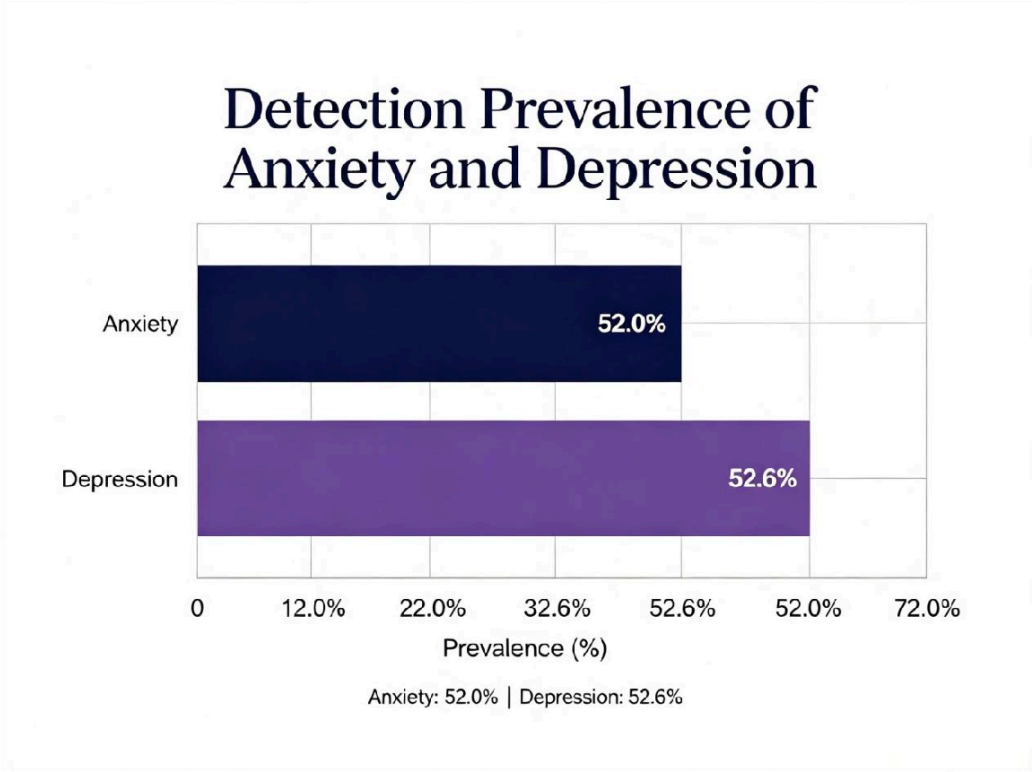


Figure 2. Overall detection prevalence of anxiety (52.0%) and depression (52.6%) in participants.Multivariate Predictors of Anxiety and Depression.

Figure 2

See image above for figure legend

Figure 3. A three-phase experiential continuum based on qualitative interview analysis

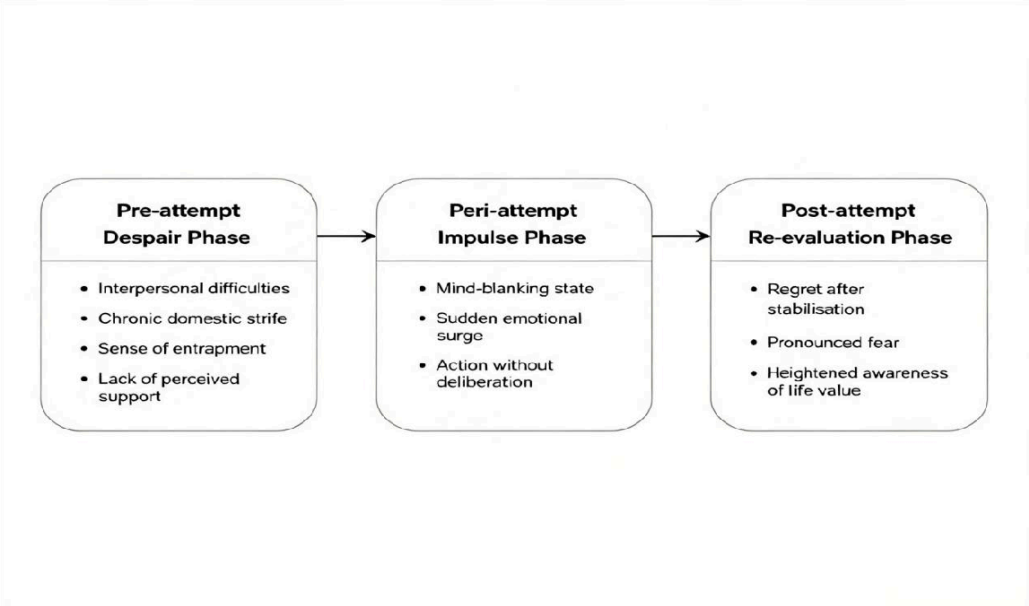


Figure 3. Three sequential experiential phases among participants: Pre-attempt (Despair Phase), Peri-attempt (Impulse Phase), and Post-attempt (Re-evaluation Phase).

Figure 3

See image above for figure legend

Supplementary Files

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- SupplementaryFile1.docx