

Haematological Alterations Associated with Panic Disorder among Sri Lankan University Students: A Case-Control Study

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Additional File 02: Panic Assessment Questionnaire (PAQ) - Reliability Assessment, Validation, Scoring and Clinical Panic Measures

Reliability Assessment and Validation of the PAQ

Reliability Assessment

Internal consistency was determined using Cronbach's alpha coefficient. Test-retest reliability was assessed using the Intraclass Correlation Coefficient (ICC), calculated via a two-way mixed-effects model, which is considered appropriate for evaluating the reliability of repeated measurements (Tsang et al., 2017).

Validity Assessment

The face validity of the questionnaires was evaluated by two independent experts who rated each item on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). The degree of agreement between raters was analyzed using Cohen's Kappa Index to assess inter-rater reliability and ensure the items were perceived as appropriate and relevant (Taherdoost, 2016).

Construct validity was examined through both convergent and discriminant validity assessments, established via factorial validity using Principal Component Analysis (PCA), following the guidelines of Taherdoost (2016).

Criterion validity was evaluated through multiple approaches. Predictive validity was assessed using discriminant analysis, with eigenvalues and canonical correlations used to determine the strength of each discriminant function. The Wilks' Lambda values were also used to verify the significance of the discriminant functions, where lower values indicate better discrimination between groups (Taherdoost, 2016).

Additionally, concurrent and postdictive criterion validities were assessed by comparing the newly developed questionnaires against previously validated instruments measuring similar constructs, to ensure alignment with established standards and to further confirm the validity and reliability of the tools.

Reliability Assessment

- **Internal Consistency**

The internal consistency was measured to ensure that the questionnaire can be used confidently to assess the panic status and severity in the target population. The study questionnaire produced an overall Cronbach's Alpha score of 0.934, indicative of excellent reliability.

- **Test-Retest Reliability**

The questionnaire produced satisfactory ICC results (average measures – 0.934, single measures – 0.235) suggesting that the questionnaire produces stable and consistent results over time.

Validity Assessment

- **Face Validity**

The scores of the raters produced a Cohen's Kappa Index value of 0.613 with a significance value of 0.001, indicating substantial agreement between their scores.

- **Construct Convergent and Discriminant Validity**

Principal Component Analysis (PCA) identified six factors that explained 76.98% of the total variance (Table 01). Since every item of the questionnaire loaded above 0.5, no question items were omitted from the panic assessment questionnaire used in the main study.

Table 01. Factor loadings for each item of the PAQ

Component	1	2	3	4	5	6
Total	4.573	3.519	2.466	2.436	1.980	1.961
% of Variance	20.786	15.994	11.208	11.074	9.001	8.913
Cumulative %	20.786	36.780	47.988	59.062	68.062	76.975
PA	.810					
PS1 (Sym)	.567					
PS2		.638				
PS3	.814					
PS4	.628		.549			
PS5	.732					
BC1			.729			
BC2						.840
BC3	.617					
BC4		.726				
BC5				.851		
BC6	.574			.540		
BC7						.698
BC8				.797		
BC9	.732					
BC10			.518			
Fear		.709				
EB1		.837				
EB2		.808				
EB3			.730			
EB4					.737	
EB5					.942	

- **Criterion Predictive Validity**

The discriminant analysis resulted in one function which accounted for 100% of variance. The eigenvalue, 19.82 and the canonical correlation, 0.98 assessed the strength of the discriminant function (Table 02). This is indicative of a strong canonical correlation. A Lambda value of 0.048, a chi square value of 81.967 and p value of 0.00, indicates the statistical significance of the discrimination (Table 03).

Table 02. Eigenvalue of the test function

Function	Eigenvalue	% of Variance	Cumulative %	Canonical Correlation
1	19.818	100.0	100.0	.976

Table 03. Wilks' Lambda of the test function

Test of Function(s)	Wilks' Lambda	Chi-square	df	Sig.
1	.048	81.967	22	.000

- **Criterion Concurrent and Postdictive Validity**

The PDSS questionnaire (Shear et al., 1997) was used as a comparative tool for the panic assessment questionnaire used in the study. Correlations were obtained using Spearman's Rho the data set violated normal distribution. All aspects showed correlation coefficients over 0.750 with significance values of 0.000, indicative of a strong correlation.

Scoring of the PAQ

The PAQ comprised both binary (Yes/No) and Likert-scale items, which were scored systematically to derive a total panic score for each participant.

The panic severity was assessed based on the number of symptoms (open checklist, with 1 point awarded for each symptom ticked by the participant), interference with daily life (binary), fear associated with future attacks (binary), frequency of attacks, triggers and time to reach peak severity. The frequency of attacks, triggers and time to reach peak severity were structured items and had predefined score allocations based on intensity or frequency. A panic severity score was then calculated by summing the individual item scores, with higher totals indicating greater severity.

The behavioural changes associated with panic attacks were assessed using 10 direct and positively framed Likert-scale questions that reflected avoidance behaviours and restriction in daily life activities. Each item was scored using a 5-point frequency scale as follows: 0 – Never, 1 – Rarely, 2 – Occasionally, 3 – Often, and 4 – Always or Almost Always. A behavioural change score was then calculated by summing the individual item scores, with higher totals indicating greater behavioural impairment.

The extreme behaviours expressed as coping mechanisms for panic attacks were assessed using 5 direct questions (binary) and an extreme behaviours score was calculated by summing the individual item scores. Higher totals indicated greater expression of extreme behaviours.

A total panic score was derived by summing the individual sub-scores for panic severity, behavioural changes, and extreme coping behaviours.

Variation of Clinical Panic Measures between Study Groups

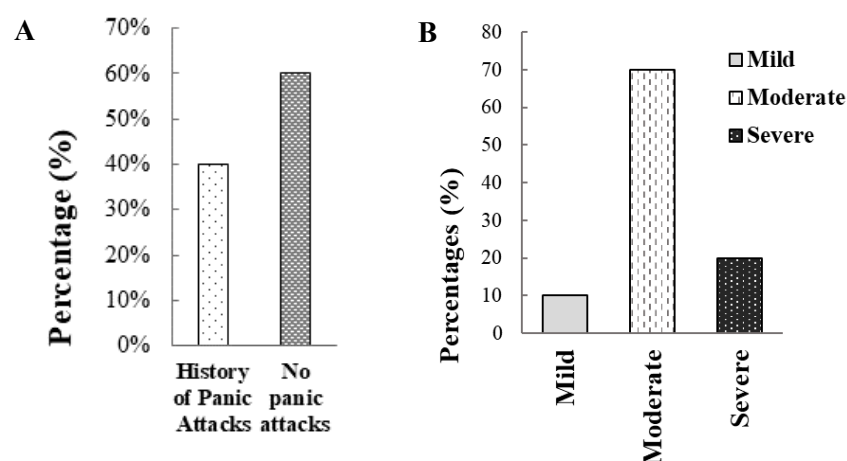
The PD group reported substantially more symptoms per panic attack (8.77 ± 4.63) compared to HCs (2.17 ± 2.31) (t -test; $*p=0.000$) (Supplement 02-Figure 02A). The PD group also scored significantly higher in panic severity (PD 15.43 ± 5.54 , HC 4.70 ± 5.01) (t -test; $*p=0.000$) (Supplement 02-Figure 02B) and behavioral avoidance (PD 21.17 ± 7.61 , HC 11.20 ± 9.14) (Mann-Whitney U test; $*p=0.000$) (Supplement 02-Figure 02C). This heightened severity may contribute to the disabling social and occupational impairments associated with PD (Giesecke, 1987; Hoehn-Saric et al., 1991).

The PD group showed significantly higher extreme behaviour scores (PD 1.67 ± 1.75 , HC 0.40 ± 0.86) (t -test; $*p=0.001$) (Supplement 02-Figure 02D), indicating greater vulnerability to suicide, substance use, alcohol abuse, and self-harm as coping mechanisms (t -tests; $*p<0.01$) (Supplement 02-Figure 02E). Although no significant differences were found in past suicidal ideation, self-harm, or substance use, patients were likely to consider self-harm and substance use, reflecting a cognitive vulnerability to such coping strategies.

The PD group also had significantly higher total panic scores (39.27 ± 12.35) compared to HCs (16.53 ± 13.32) (Mann-Whitney U test; $*p=0.000$) (Supplement 02-Figure 02F), aligning with the diagnostic distinction between context-specific subclinical panic attacks and clinical PD, thus, underscoring the chronic, debilitating nature of PD, marked by elevated panic symptomatology, distress, and impairment beyond isolated panic episodes in healthy individuals.

Supplement 02 - Figure 01

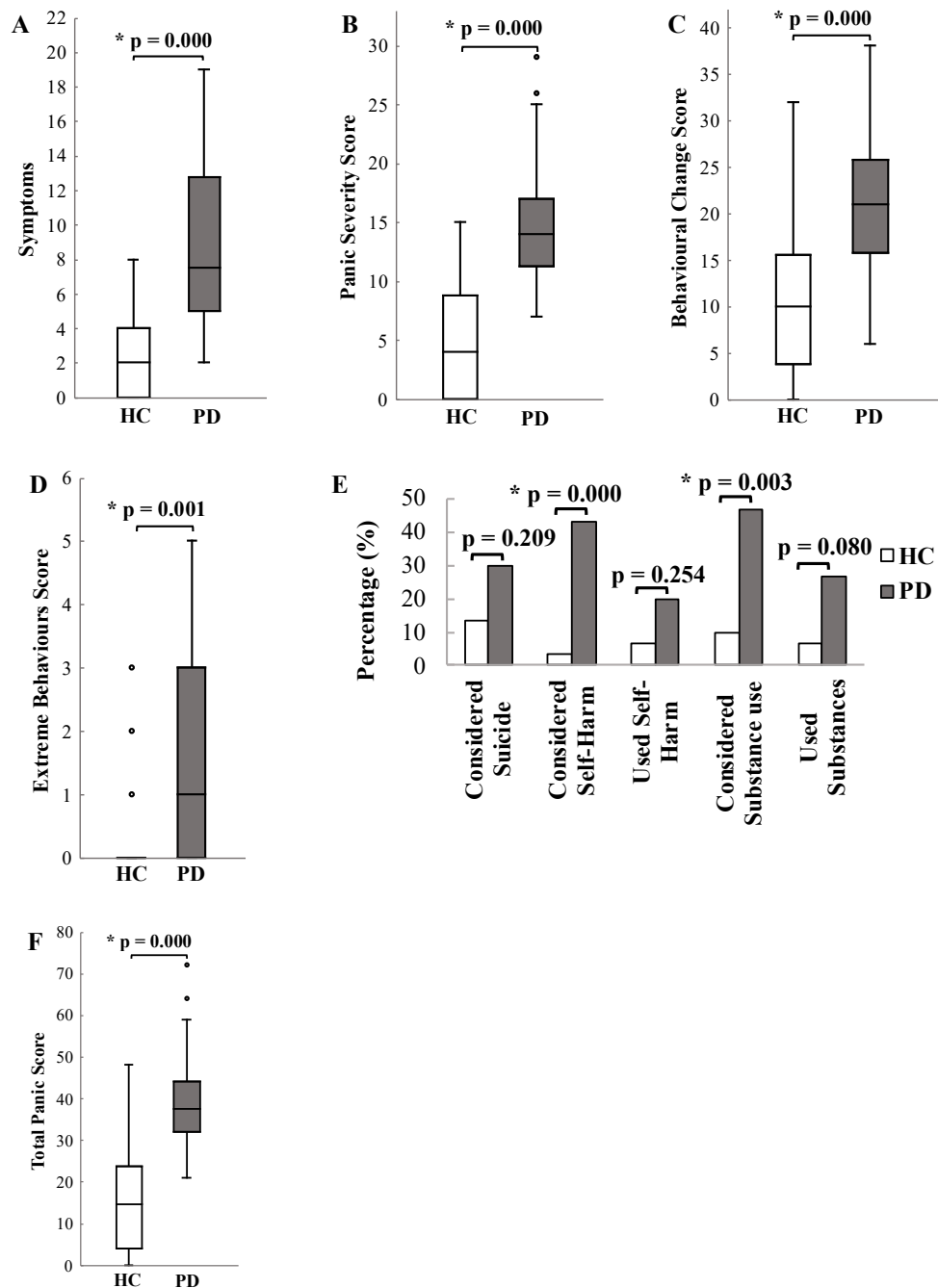
Clinical History of the Study Groups.



Note: (A) History of Panic Attacks in the HC Group, (B) Panic Disorder Severity within the PD Group

Supplement 02 - Figure 02.

Comparison of Clinical Panic Measures between Study Groups.



Note: (A) Number of symptoms (t -test; $*p < 0.001$), (B) Panic severity scores (t -test; $*p < 0.001$), (C) Behavioural change scores (Mann-Whitney U test; $*p < 0.001$), (D) Extreme behaviours scores (t -test; $*p < 0.01$), (E) Types of extreme behaviours (t -test; $*p < 0.01$), (F) Total panic scores (Mann-Whitney U test; $*p < 0.001$).

Abbreviations: HC-Healthy Control, PD-Panic Disorder