

Association of Perceived Stress with Resilience and Behavioural Responses: A Cross-Sectional Survey

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Abstract:

This study investigated the relationship between perceived stress, psychological resilience, and behavioural responses among participants using a questionnaire-based cross-sectional design. Responses were collected from approximately 345 participants and assessed using the Perceived Stress Scale (PSS) and Brief Resilience Scale (BRS). Statistical analyses included descriptive statistics, correlation, chi-square, ANOVA, and effect-size measures. The findings demonstrated a strong negative association between perceived stress and resilience, indicating that higher stress was associated with lower resilience. Cortisol may represent a potential physiological mediator linking psychological stress with behavioural responses. Overall, the study highlights the importance of resilience in coping with stress.

Key words: Brief Resilience Scale, Perceived Stress Scale, Perceived Stress, Psychological Resilience, Psychological Well-being, Stress Management

1.Introduction

In 1936, when Hans Selye sought to investigate a new hormone with mice stored in cages on the frigid rooftops above his laboratory in Montreal, he began to notice they all suffered a range of symptoms: enlarged adrenal glands, lymph node and thymic atrophy, and gastric ulcer. [5] These findings ultimately led to his discovery of glucocorticoids, the biochemical cornerstone of what we now understand to be stress. [5] Stress plays a major role in the etiologic of mental and physical disorders and was first studied through anecdotal accounts of those who died following a major traumatic event, often from acute cardiovascular disorders. The hypothalamic pituitary adrenal (HPA) axis is a primary stress system that functions as a mechanism linking stressful life events and adverse health outcomes. [2] The brain and body, as well as the stress systems that comprise them, are designed to adaptively respond to internal and external threats. The HPA axis does so by releasing cortisol in response to acute threat and down regulating the cortisol responses, through a negative feedback loop, when no longer under acute threat. [6]

The acute response to stress is a dynamic process that changes over time, starting with stereotypic behaviours and then changing to goal directed behaviours specific to the stressor, followed by activation of the SAM within seconds and finally recruitment of the HPA axis, with peak levels of cortisol occurring between 15 to 20 mins after the stress onset.[6] These early responses provide increased energy resources and initiate longer term and slower genomic

effects the restrain inflammatory and other potentially dangerous responses. The responses to acute stress of cardiac surgery are interesting for several reasons. First, despite the greatly increased levels of cortisol, the pattern of cortisol secretion remains pulsatile. Second, despite initial high levels of ACTH, these rapidly fall to basal levels while the cortisol level remains raised. [6]

In response to chronic stress, a dynamic change in the ratio of AVP to CRH in the hypothalamic PVN occurs as well as an associated decreased sensitivity to the glucocorticoid feedback. [6] Obstructive sleep apnoea is a good example of chronic stress. In sleep apnoea, there is a marked increase in the amount of cortisol released during each secretory pulse, which normalizes after continuous positive airway pressure treatment. In critical illness, the situation is somewhat different with the increased levels of cortisol produced by long term stress being present for the first few days, secondary to increased adrenal sensitivity to ACTH and increased cortisol synthesis. During long term critical illness, a further change in HPA axis regulation occurs with reduced cortisol metabolism becoming an increasingly important factor in maintaining raised levels of plasma cortisol.

Cortisol is a glucocorticoid and is the most important human stress hormone, belonging to the class of steroids hormones. [3] It plays various roles in mobilizing the individual to respond to a stressor, of which the modulation of gluconeogenesis is one of the most prominent ones. This result is an increase in blood glucose level, which increases

the physical capacity of the individual and fulfils several other functions, such as the inhibition of protein synthesis. Being a steroid hormone, cortisol is also able to cross the blood – brain barrier and to modulate processes at the level of the central nervous system. In the brain, cortisol increases several sensory processes, such as the gustatory, tactile, acoustic, and olfactory senses. The promotion of these processes can be useful in resolving dangerous or stressful situations, particularly when an organism is faced with an acute stressor. However, one major issue is that the signal cascade of the HPA axis is relatively slow because it relies on hormones being transported through blood circulation. [6]

Furthermore, cortisol does not directly affect functions like gluconeogenesis, rather it binds to the glucocorticoid (GR) and mineralocorticoid (MR) receptors, which in turn trigger the expression of many genes related to metabolism, immune function and stress reactivity. [6] The effects of cortisol on cognitive functions in humans are seen in response to both acute and chronic elevated secretion. [4] These can be either enhancing or impairing effects depending upon the specific cognitive function, and the timing and quantity of cortisol exposure. [4]

Human behaviour encompasses the cognitive, emotional, social, and behavioural responses through which individuals perceive and interact with their environment. [1] Stress is an important factor that can modify these responses by influencing psychological processes as well as physiological systems involved in adaptation. [5] Research indicates that stress can affect social cognition and behaviour, including emotional responses, interpersonal interactions, decision-making, and responses to social situations. [1] The effects of stress are not uniform across individuals and may depend on the intensity and duration of the stressor, individual characteristics, and the surrounding circumstances. [5]

2. Materials and Methodology

2.1 Study Design

The present study was designed as a quantitative, questionnaire-based cross-sectional study to assess the relationship between perceived stress and behavioural and psychological responses among human participants. Data were collected at a single point in time using a structured questionnaire consisting of standardized stress related and resilience related items. The questionnaire primarily assessed perceived stress, perceived control, emotional responses, coping ability, and resilience to stressful events. Approximately 347 responses were collected, and all valid responses were included in the statistical analysis. The collected data were subsequently analyzed using descriptive

and inferential statistical methods, including mean scores, standard deviation, Pearson's correlation coefficient, Spearman's rank correlation coefficient, and chi-square analysis, to examine the relationship between stress and resilience-related responses.

2.2 Study Participants

The study included 347 participants who voluntarily responded to the structured questionnaire. Participants were recruited through an online survey and provided responses regarding their perceived stress and resilience-related experiences. The collected responses were used to assess variations in stress and resilience across demographic groups and to examine the association between stress levels and resilience. Responses were compiled and organized for subsequent statistical analysis.

2.3 Study Period

The study was conducted during the period of August 2026 to September 2026. During this period, data were collected through a structured questionnaire designed to assess perceived stress, resilience, coping responses, and behavioural changes associated with stress. A total of 347 valid responses were obtained and subsequently used for statistical analysis.

2.4 Questionnaire Structure, Development and Domains

A structured questionnaire was developed to assess the relationship between perceived stress, resilience, and behavioural responses among the participants. The questionnaire was prepared in Google Forms and distributed electronically through online platforms to facilitate convenient and wider participation. The questionnaire consisted of two sections with a total of 16 questions. Section A comprised the Perceived Stress Scale (PSS) consisting of 10 questions, which assessed the extent to which participants perceived their situations as stressful, unpredictable, and uncontrollable. [14] Appropriate reverse scoring was applied to PSS response, and the responses were summed to obtain an overall perceived stress score. Based on the obtained scores, participants were categorized according to their level of perceived stress. Section B comprised the Brief Resilience Scale (BRS) consisting of 6 questions, which assessed the participants ability to recover or bounce back from stressful situations and adversity. [15] Together, the two sections provided an assessment of both the level of perceived stress and the individual's resilience in dealing with stressful situations.

Appropriate reverse scoring was applied to the relevant BRS response, followed by calculation of the overall resilience score and classification of participants according to their

resilience level. A total of 347 responses were collected through the online questionnaire. The resulting stress and resilience scores were subsequently used for further analysis, including assessment of the relationship between stress and resilience, calculation of effect size, Cramér's V, Pearson's contingency coefficient, ANOVA, and graphical representation of the stress and resilience categories.

2.5 Response Scale

The questionnaire used a standardized response format for both the PSS and BRS to allow participants to indicate the frequency or extent of their experiences. Responses were converted into numerical scores according to the respective scoring procedures of each scale. Reverse scored response were appropriately recoded before calculating the final scores. The numerical responses obtained from the questionnaire provided quantitative measures of perceived stress and resilience for subsequent statistical analysis.

2.6 Data collection procedure

Data were collected through an online questionnaire created using Google Forms. The questionnaire was distributed electronically through online platforms, allowing participants to access and complete the form remotely. Participation was voluntary, and respondents were provided with the relevant information regarding the purpose of the study before completing the questionnaire. A total of 347 responses were collected and considered for further analysis. The responses were subsequently organized and exported for scoring, categorization, and statistical analysis.

2.7 Variables assessed

The primary variables assessed in the study were perceived stress and psychological resilience. Perceived stress was evaluated using the PSS score, while resilience was assessed using the BRS score. In addition, stress and resilience categories were considered to examine the association between the two variables. The study also examined the relationship between stress and resilience through statistical measures and graphical representations to determine whether variations in perceived stress were associated with differences in resilience levels.

2.8 Scoring and Data Analysis

The responses obtained from the PSS and BRS were converted into numerical scores according to the respective scoring procedures of the standardized scales. The appropriate responses were reverse scored before calculating the overall scores. The total PSS score was used to determine the participant's perceived stress category, while the BRS score was used to determine the

corresponding resilience category. The collected data were checked, organized, and processed before statistical analysis. The resulting stress and resilience scores and categories were then used to examine relationships between the variables.

2.9 Statistical analysis

The collected data were subjected to descriptive and inferential statistical analysis to evaluate the relationship between perceived stress and resilience. Stress and resilience scores were summarized and represented graphically to identify patterns across different categories. ANOVA was used to assess differences between relevant groups, while effect size was calculated to determine the magnitude of observed differences. Association between categorical variables was further examined using mean scores, standard deviation, Spearman's rank correlation coefficient, and chi-square, Cramér's V and the Pearson contingency coefficient. The relationship between stress and resilience categories was also evaluated, with the obtained statistical values used to determine the strength of association between the variables.

2.10 Ethical considerations

Participation in the study was voluntary, and participants were informed about the purpose of the questionnaire before providing their responses. The questionnaire was administered electronically, and responses were collected anonymously to maintain participant privacy and confidentiality. No, personally identifiable information was required for the analysis. The collected data were used solely for the purpose of the study and were handled in accordance with basic principles of research ethics.

3. Results

3.1. Descriptive analysis

A total of 347 participants were included in the analysis. Perceived stress was assessed using the Perceived Stress Scale (PSS), while resilience was assessed using the Brief Resilience Scale (BRS). The overall mean PSS score was 23.64 ± 7.61 , with scores ranging from 7 to 40. The overall mean BRS score was 2.60 ± 0.83 , with scores ranging from 1 to 5. The median scores for PSS and BRS were 21 and 2.83, respectively.

Table 1: Descriptive Statistics of Perceived Stress and Resilience Score

	PSS Total Score	BRS Score
Mean	23.64	2.6
Median	21	2.83
Std.Deviation	7.61	0.83
Minimum	7	1
Maximum	40	5

Based on the categorization used in the analysis, the majority of participants fell within the moderate stress category. The mean PSS score among females was 24.41 ± 7.85 , compared with 22.75 ± 7.32 among males. Participants who preferred not to disclose their gender had a mean PSS 22.55 ± 6.31 . For resilience, the mean BRS scores were 2.56 ± 0.81 among females, 2.65 ± 0.87 among males, and 2.44 ± 0.63 among participants who preferred not to say.

3.2. Association Between Stress and Resilience Categories

A chi-square test of independence was performed to determine whether the stress category was associated with the resilience category. The analysis demonstrated a statistically significant association between stress and resilience categories ($\chi^2 = 112.44$, $df=4$, $p<0.001$).

Table 2: Observed Frequency for Chi Square Test

		Resilience Category			
		Normal	Low	High	Total
Stress Category	Moderate	148	79	1	228
	Low	10	5	1	16
	High	6	97	0	103
	Total	164	181	2	347

Table 3: Chi-Square Test

	r	p	95% CI
PSS Total Score and BRS Score	-0.82	<.001	[-0.85,-0.78]

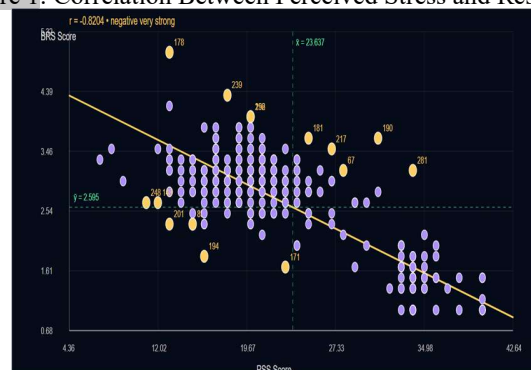
The observed frequency distribution showed that participants with moderate stress were predominantly classified as having normal resilience (148 participants), while 79 participants with moderate stress were classified as

having low resilience. Among participants in the high-stress category, 97 were classified as low resilience, whereas only 6 were classified as having normal resilience. In contrast, among participants with low stress, 10 had normal resilience, 5 had low resilience, and 1 had high resilience. The strength of association was further assessed using Cramér's V, which was 0.40, while the Pearson contingency coefficient was 0.61. These values indicate a meaningful association between stress and resilience categories. The pattern of the cross-tabulation suggests that higher stress was generally associated with lower resilience. However, the chi-square test itself establishes the presence of an association rather than a causal relationship.

3.3. Correlation Between Perceived Stress and Resilience

Pearson's Correlation analysis was performed to examine the linear relationship between the continuous PSS and BRS scores. A strong negative correlation was observed between perceived stress and resilience ($r=-0.820$, $p<0.001$).

Figure 1: Correlation Between Perceived Stress and Resilience



The negative correlation indicates that participants with higher perceived stress scores tended to have lower resilience scores, whereas participants with lower perceived stress scores tended to have higher resilience scores. The magnitude of the correlation indicates a strong inverse relationship between the two variables. The relationship was statistically significant, suggesting that the observed association is unlikely to be due to random variation alone.

The scatter plot illustrating PSS scores against BRS scores demonstrates this inverse pattern, with the observation showing a general downward trend as PSS scores increase. However, correlation does not establish causation; therefore, these findings indicate an association between perceived stress and resilience rather than demonstrating that increased stress directly caused reduced resilience.

3.4. Effect Of Occupation on Stress and Resilience

An analysis of variance was performed to examine whether stress and resilience scores differed according to occupation. The analysis did not identify a statistically significant effect of occupation ($F=0.32$, $p=0.925$). The effect size was very small ($\eta^2=0.00$; partial $\eta^2=0.01$), indicating that occupation accounted for very little of the observed variation in the measured scores.

The interaction between the repeated-measures factor and occupation was also not statistically significant ($F = 0.35$, $p = 0.912$), with $\eta^2 = 0.00$ and partial $\eta^2 = 0.01$. This suggests that the pattern of the measured stress and resilience scores did not differ significantly across occupational groups in this sample.

The mean PSS scores across occupational groups ranged from 17.00 among the single housewife participant to 24.26 among self-employed/freelancer participants, while mean BRS scores ranged from 2.57 to 3.33. Because some occupational categories contained very few participants, particularly the housewife category, these subgroup means should be interpreted cautiously.

Table 4: Effect of Occupation on Stress and Resilience (Annova Test)

	Sum of Squares	df	Mean Squares	F	p	η^2	η^2_p
PSS Total Score, BRS Score	76721.38	1	76721.38	2199.13	<.001	0.79	0.87
Occupation	47.16	6	7.86	0.32	.925	0	0.01
RM Factor	72.39	6	12.06	0.35	.912	0	0.01
Residuals (Between Subjects)	8215.37	338	24.31				
Residuals (Within Subjects)	11791.83	338	34.89				

3.5. Overall Finding

Overall, the findings demonstrate a statistically significant inverse relationship between perceived stress and resilience. Participants experiencing higher levels of perceived stress were more frequently classified within the lower-resilience category and the continuous PSS and BRS scores showed a strong negative correlation. The findings therefore support an association between stress levels and resilience in the surveyed population. However, because the study was survey-based and did not directly measure circulating cortisol concentrations, the results should not be interpreted as direct evidence that cortisol caused the observed behavioural or resilience-related differences.

4. Discussion

The findings of the present study indicate that perceived stress and psychological resilience are closely related. The participants generally showed moderate levels of perceived stress, suggesting that stress is a common experience within the studied population. The overall pattern of the findings suggests that individuals who experience greater stress may have less ability to recover or adapt effectively to stressful situations.

A major finding of the study was the strong negative association between perceived stress and resilience. As stress increased, resilience tended to decrease. This relationship was consistently observed through both correlation and categorical analyses, indicating that resilience may have an important role in how individuals respond to stressful experiences. The findings therefore suggest that individuals with stronger resilience may be better equipped to cope with stress, whereas those with lower resilience may be more vulnerable to its effects.

The study also suggests that stress may influence human behavioural and psychological responses through both direct and physiological pathways. Chronic or repeated psychological stress can activate the HPA axis and increase cortisol secretion, which may influence mood, emotional regulation, cognition and behaviour. The findings demonstrate a strong association between perceived stress and resilience, while cortisol may represent a potential physiological mediator linking psychological stress with behavioural responses. However, since cortisol was not directly measured in this study, this mechanism remains a possible explanation rather than a confirmed causal pathway.

Overall, the study highlights that stress, and resilience should be considered interconnected factors in understanding human responses to stressful situations. Strengthening psychological resilience may therefore be relevant for improving coping and reducing the potential behavioural and psychological impact of stress.

However, the cross-sectional nature of the study means that a causal relationship cannot be established, and further studies incorporating direct cortisol measurements and longitudinal assessment would be useful.

5. Conclusion

The present study demonstrates a clear negative relationship between perceived stress and psychological resilience. Higher stress levels were associated with lower resilience,

suggesting that stress may affect how individuals cope with and respond to challenging situations.

Stress may also influence behavioural and psychological responses, while cortisol could represent a possible physiological pathway. However, since cortisol was not directly measured, this mechanism cannot be confirmed.

Overall, the findings highlight the importance of psychological resilience in coping with stress. As the study was cross-sectional, future longitudinal studies with direct cortisol measurements are needed to further understand these relationships.

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