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Original Article

THE MODERATING ROLE OF PERCEIVED STRESS IN THE RELATIONSHIP BETWEEN RESILIENCE AND QUALITY OF LIFE AMONG BURN SURVIVORS

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ABSTRACT

Burn injuries leave survivors with lasting physical, psychological, and social burdens, yet quality of life (QoL) after burns varies widely, and little is known about the conditions under which psychological resources matter most. Guided by conservation of resources theory, this cross-sectional study examined whether perceived stress moderates the relationship between resilience and QoL among burn survivors in Pakistan and whether these variables differ by gender. Burn survivors (N = 300; 169 men, 131 women) who had been injured at least 6 months earlier were recruited from three hospitals in Islamabad and Rawalpindi and completed the Nicholson McBride Resilience Questionnaire, the Perceived Stress Scale, and the WHOQOL-BREF. Resilience was positively correlated with QoL (r = .50), whereas perceived stress was negatively correlated with QoL (r = −.38) and with resilience (r = −.38). Moderation analysis revealed a significant Resilience × Perceived Stress interaction, R^2 = .32, F(3, 296) = 48.12, p < .001: the positive association between resilience and QoL grew stronger as perceived stress increased (conditional effects = .44, .78, and 1.12 at 1 SD below the mean, at the mean, and 1 SD above the mean of perceived stress). Men reported higher perceived stress and lower resilience than women, whereas QoL did not differ significantly by gender. Resilience was associated with better Quality of Life (QoL) at every level of stress and most strongly among survivors under high stress, supporting rehabilitation that combines resilience-building with stress management. Longitudinal, multi-site research is needed.

I. INTRODUCTION

Burn injuries continue to be a serious public health issue worldwide. According to projections from the World Health Organization (WHO, 2023), burns result in over 180,000 deaths year, the most majority of which occur in low- and middle-income nations, with Southeast Asia and Africa accounting for nearly two thirds of these deaths. The burden is only partially captured by deaths. One of the main causes of morbidity is non-fatal burns, which can result in humiliation and rejection, protracted hospital stays, disfigurement, and disability. Burns occur mainly in homes and workplaces, and females have slightly higher burn death rates than males (WHO, 2023). In Pakistan, a narrative review by Ali and Ali (2022) concluded that research on the long-term complications of burns is scarce, that rehabilitative services are limited, and that post-burn complications are common, including depression, post-traumatic stress, anxiety, sleep disturbance, and suicidal thoughts. As survival improves, the question facing clinicians and researchers is no longer only how to keep burn patients alive but how well survivors are able to live. Quality of life (QoL) is the appropriate yardstick for that question. The WHOQOL Group (1995) conceptualizes QoL

as a person's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards, and concerns. A systematic review of 94 studies of adult burn survivors showed that most QoL domains are impaired soon after injury and improve over time, yet work, heat sensitivity, emotional functioning, physical functioning, and pain-related domains remained low in the long term (Spronk et al., 2018). A second review of 32 studies showed that burn severity is not the only determinant: post-burn depression, PTSD symptoms, avoidance coping and lower emotional or social support also predicted poorer QoL in multivariable analyses (Spronk et al., 2018). These results put survivors' psychological response alongside the injury itself as a determinant of how their lives unfold and they point to psychological resources which can be strengthened.

Resilience is the most prominent of these resources. It is usually defined as positive adaptation in the context of significant adversity (Luthar et al., 2000; Masten, 2001). Modern accounts treat resilience as dynamic and multiply determined capacity rather than fixed trait or absence of distress (Southwick et al., 2014; Windle, 2011) and they point out that stable healthy functioning after potentially traumatic events is common not exceptional (Bonanno, 2004). Burn samples show resilience to be linked with better outcomes: among 305 hospitalized burn patients in Iran resilience was positively related to QoL ($r = .58$); among 410 burn patients in China resilience was positively related to subjective well-being (He et al., 2013); Pakistani sample of 230 survivors treated at Pakistan Institute of Medical Sciences in Islamabad also had resilience and QoL positively associated (Batool et al., 2020). Perceived stress is a second conceptually distinct construct. It measures the extent to which someone views life as unpredictable, uncontrollable and overloaded (Cohen et al., 1983). In the transactional model of stress appraisals occur when environmental demands are judged to tax or exceed available resources (Lazarus & Folkman, 1984). Burn recovery provides plenty of such demands: pain, repeated procedures, altered appearance, financial strain, uncertain return to work and family roles. Perceived stress and resilience also appear to be intertwined; in a small study of 30 burn patients in Taiwan, perceived stress was the key predictor of resilience (Chen et al., 2020).

Conservation of resources (COR) theory offers an organizing framework for how these constructs may fit together (Hobfoll, 1989, 2001). COR proposes that people strive to obtain, retain, and protect the resources they value, that psychological stress follows the threat or actual loss of resources, and that people with larger resource pools are less vulnerable to loss and better placed to achieve gains (Hobfoll, 1989; Hobfoll et al., 2018). A severe burn is a multiple-resource loss event, affecting physical integrity, income, social standing, and sense of control. In this frame, resilience is a personal resource, and perceived stress is the survivor's subjective signal of how strained their resources are. COR and related stress research imply two competing predictions about how the two interact. Under a buffering or mobilization view, personal resources should matter most when demands are high, because that is when they are called upon (Cohen & Wills, 1985; Luthar et al., 2000); the association between resilience and QoL should therefore strengthen as stress rises. Under a depletion view high stress depletes the very capacities on which resilience depends so that the association should weaken as stress rises. Which pattern describes burn survivors is an empirical question. Gender adds a further layer. Females have slightly higher burn death rates (WHO, 2023), yet female gender emerged only as a weak predictor of QoL after burns in the review by Spronk, Legemate, Dokter, et al. (2018), and in general populations women typically report higher perceived stress than men (Cohen & Janicki-Deverts, 2012). We don't know whether burn survivors in Pakistan have similar differences in resilience, stress and QoL.

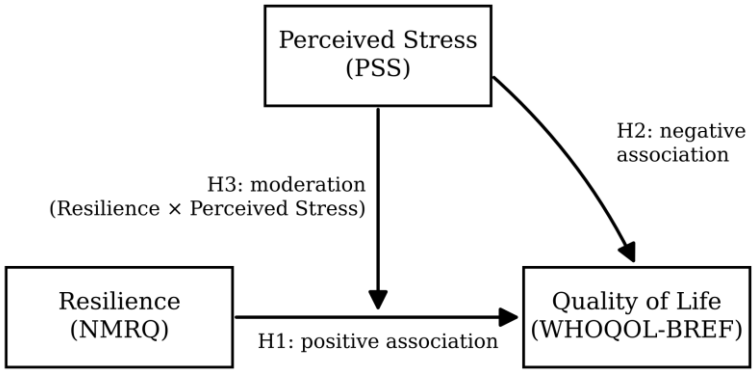
The Present Study

The present study addresses three gaps. First, studies of psychological resources in burn survivors have largely estimated their direct associations with outcomes and have less often asked under which conditions those associations are stronger or weaker. Perceived stress is a central element of the post-burn experience and the construct that COR theory places at the heart of resource strain, yet in the literature we reviewed we found no test of whether it moderates the association between resilience and QoL among burn survivors. Second, evidence from Pakistan is sparse (Ali & Ali, 2022), and survivors there face limited rehabilitation capacity and distinct social and family contexts, which restricts the transfer of findings from high-income settings. Third, whether resilience, stress, and QoL differ by gender in this population has not been established. The answers carry practical weight: if the benefit of resilience depends on stress level, rehabilitation services can decide whom to prioritize for resilience-building and how to pair it with stress reduction. Accordingly, the study had three objectives: (a) to examine the

associations of resilience and perceived stress with QoL among burn survivors; (b) to test perceived stress as a moderator of the relationship between resilience and QoL; and (c) to examine gender differences in resilience, perceived stress, and QoL. We hypothesized that:

H1. Resilience will be significantly and positively related to QoL.
H2. Perceived stress will be significantly and negatively related to QoL.
H3. Perceived stress will moderate the relationship between resilience and QoL.
H4. There will be significant gender differences in resilience, perceived stress, and QoL.

Figure I: Conceptual Moderation Model of the Study



Note. Perceived stress is hypothesized to moderate (alter the strength of) the association between resilience and quality of life (H3), in addition to the direct associations of resilience (H1) and perceived stress (H2) with quality of life.

II. METHOD

Participants

This cross-sectional, correlational study was conducted in two phases: a pilot phase (Phase 1) to check the reliability of the instruments and a main study (Phase 2). Data were collected at the burn units of the Pakistan Institute of Medical Sciences (PIMS) and NESCOM IMC in Islamabad and at the Burn Centre of Holy Family Hospital in Rawalpindi. The pilot sample comprised 50 burn survivors (25 men, 25 women). The main sample comprised 300 burn survivors (169 men, 56.3%; 131 women, 43.7%) recruited by convenience sampling, with the male–female distribution set proportionally. Eligibility required a burn injury sustained at least 6 months earlier. Burn-centre staff screened potential participants and shortlisted those who were mentally and physically fit to take part. Participants were approached during outpatient department visits and while attending the hospitals as inpatients or outpatients. Table 1 presents the demographic characteristics of the main sample in the result section.

Measures

[I] Demographic Information Form: Participants provided information regarding their age, gender, education level, employment status, and marital status. **[II]** Resilience: Resilience was assessed using the Nicholson McBride Resilience Questionnaire (NMRQ; Nicholson McBride, 2010), a 12-item self-report tool focused on four dimensions of resilience: personal control, problem-solving, positive mindset and perspective, and social support. The items are evaluated from 1 (strongly disagree) to 5 (strongly agree), resulting in total scores ranging from 12 to 60; higher scores reflect increased resilience. In the current sample, Cronbach's α was .81. **[III]** Perceived Stress: The level of perceived stress was evaluated using the Perceived Stress Scale (PSS; Cohen et al., 1983), which gauges how respondents have assessed their lives as stressful over the past month. The utilized version consisted of 30 items evaluated on a scale from 0 (never) to 4 (very often), with items 1, 7, 10, 13, 17, 21, 25, and 29 scored in reverse. Increased scores reflect a higher perception of stress. Cronbach's α was 0.77. **[IV]** Quality of Life: QoL was assessed using the WHOQOL-BREF (WHOQOL Group, 1998), a 26-item tool addressing physical health, psychological well-being, social connections, and environmental factors (refer also to Skevington et al., 2004). Items receive ratings on a 5-point scale, with greater total scores signifying improved QoL. Cronbach's α equaled .88.

Procedure

In Phase 1, the instruments were administered to the 50 pilot participants, who were assured of confidentiality, and the scales were found to be reliable for use in the main study. In Phase 2, eligible participants received an information sheet, gave informed consent, and completed the questionnaire booklet (demographic sheet, NMRQ, PSS, and WHOQOL-BREF) at the study hospitals. The American Psychological Association's ethical standards were adhered to in this study. Every subject provided signed informed consent prior to data collection, and participation was entirely voluntary. Participants were informed that their information would be kept private and anonymous, used exclusively for research, and that they might withdraw at any time prior to the specified withdrawal deadline. They were made aware of the potential dangers and advantages of taking part, including the potential for inquiries about their injuries to cause them anguish. They were also provided with information on mental health supports in the event that this happened. SPSS was used to examine the data. Cronbach's α was used to evaluate internal consistency, and means, standard deviations, skewness, and kurtosis were used to characterize distributions. H1 and H2 were tested using Pearson correlations; H3 was tested using moderation analysis using the Hayes PROCESS macro (Hayes, 2018), where QoL was regressed on perceived stress, resilience, and their interaction; conditional effects of resilience were estimated at the mean and at 1 SD below and above the mean of perceived stress (Aiken & West, 1991). Independent-samples t tests were used to test H4. The threshold for statistical significance was established at α =.05.

III. RESULTS

Table I: Demographic Characteristics of Participants (N = 300)

Characteristic	Category	*n*	%
Gender	Male	169	56.3
	Female	131	43.7
Age (years)	Under 35	131	43.7
	35–55	119	39.7
	56–70	45	15.0
	Over 70	5	1.7
Education	SSC/HSSC	85	28.3
	Bachelor's/Master's	124	41.3
	Above Master's	62	20.7
	No formal education	29	9.7
Marital status	Married	80	26.7
	Unmarried	202	67.3
	Divorced/separated	18	6.0

Note. N=Total sample size; n=Frequency; %=Percentage

Table 1 presents demographic characteristics of participants (N = 300). Males were more common than females (56.3% vs. 43.7%). Most participants were under 35 years old (43.7%) followed by 35–55 years old (39.7%). Education was bachelor's or master's degree (41.3%) and SSC/HSSC education (28.3%). Marital status: unmarried majority (67.3%), married participants (26.7%), divorced/separated participants (6.0%).

Table II: Psychometric Properties of the Study Variables (N = 300)

Variable	*k*	α	*M*	*SD*	Skewness	Kurtosis
Resilience	12	.81	38.15	6.59	−0.33	−1.00
Perceived stress	30	.77	82.82	12.48	0.11	−0.79
Quality of life	26	.88	72.78	13.09	−0.09	−0.89

Note. k = number of items; α = Cronbach's alpha.

Table 2 presents the psychometric properties of the study variables. All three scales showed acceptable to good internal consistency (α = .77 to .88). Skewness values were close to zero and kurtosis values were negative and within about one unit of zero, indicating approximately symmetric, slightly flat distributions suitable for the

parametric analyses used. Mean resilience (*M* = 38.15) was above the scale midpoint, and mean QoL (*M* = 72.78) was above the midpoint of its possible range.

Table III: Correlations Among Resilience, Perceived Stress, and Quality of Life (N = 300)

Variable	1	2	3
Resilience	—		
Perceived stress	−.38*	—	
Quality of life	.50*	−.38*	—

Note. *$p < .001$.

As shown in Table 3, resilience was positively and strongly correlated with QoL. Perceived stress was negatively correlated with QoL, supporting H2, and was also negatively correlated with resilience. Survivors who were more resilient therefore tended to report better QoL and lower stress, and survivors who reported more stress tended to report poorer QoL. These correlations are associations only and do not establish causal direction.

Table IV: Resilience and Stress as Predictors of Quality of Life: A Moderation Analysis (N = 300)

Predictor	*B*	*SE*	95% CI
Constant	147.62	25.31	[97.80, 197.44]
Resilience	−1.48	0.65	[−2.76, −0.19]
Perceived stress	−1.25	0.29	[−1.82, −0.68]
Resilience × Perceived stress	0.02	< 0.01	[0.01, 0.04]

Note. $R^2 = .32$; $F(3, 296) = 48.12$, $p < .001$. CI = confidence interval.

To test H3, QoL was regressed on resilience, perceived stress, and their product term. The model accounted for 32% of the variance in QoL, $R^2 = .32$, $F(3, 296) = 48.12$, $p < .001$. The Resilience × Perceived Stress interaction was significant and positive, B = .02, SE < .01, 95% CI [.01, .04] (Table 4), supporting H3. Because the lower-order coefficients represent the effect of each variable when the other equals zero, a value well outside the observed range, the negative coefficients for resilience (B = −1.48) and perceived stress (B = −1.25) should not be interpreted on their own; the conditional effects in Table 5 are the interpretable estimates.

Table V: Conditional Effects of Resilience on Quality of Life at Different Levels of Perceived Stress (N = 300)

Perceived stress level	Effect of resilience (*B*)	*SE*	*t*	*p*
Low (−1 *SD*; 70.34)	0.44	0.14	2.97	.003
Mean (82.82)	0.78	0.10	7.59	< .001
High (+1 *SD*; 95.30)	1.12	0.13	8.54	< .001

Note. Effects are unstandardized regression coefficients.

Table 5 shows the conditional effect of resilience on QoL at three levels of perceived stress. Resilience was positively and significantly related to QoL at all three levels, and the effect increased as perceived stress rose. At low perceived stress (1 *SD* below the mean), the effect was *B* = .44, 95% CI [.15, .73]. At the mean it was *B* = .78, 95% CI [.58, .98], and at high perceived stress (1 *SD* above the mean) it was *B* = 1.12. The association between resilience and QoL was thus about two and a half times as large among survivors reporting high stress as among those reporting low stress.

Table VI: Gender Differences in Resilience, Perceived Stress, and Quality of Life (N = 300)

Variable	Men (*n* = 169) *M* (*SD*)	Women (*n* = 131) *M* (*SD*)	*t*	*p*
Resilience	37.07 (7.07)	39.54 (5.64)	3.35	< .001
Perceived stress	84.43 (13.90)	80.74 (10.00)	2.67	< .01
Quality of life	71.47 (13.58)	74.46 (12.28)	1.97	.106

Note. Independent-samples t tests, df = 298.

Table 6 presents gender comparisons. Women reported significantly higher resilience than men, $t(298) = 3.35$, $p < .001$, and significantly lower perceived stress, $t(298) = 2.67$, $p < .01$. QoL was somewhat higher among women than men, but the difference was not statistically significant, $t(298) = 1.97$, $p = .106$. H4 was therefore partially supported: gender differences emerged for resilience and perceived stress but not for QoL.
In sum, H1, H2, and H3 were supported, and H4 was partially supported.

IV.DISCUSSION

This study asked whether perceived stress changes how strongly resilience is associated with QoL among burn survivors in Islamabad and Rawalpindi. It does. Resilience was positively associated with QoL, perceived stress was negatively associated with QoL, and the resilience–QoL association became steeper as perceived stress increased. Men reported higher stress and lower resilience than women, but the two groups did not differ significantly in QoL.

Resilience, Perceived Stress, and Quality of Life

The strong positive correlation between resilience and QoL ($r = .50$; H1) is in line with the findings of Tehranineshat et al. (2020) in Iranian burn patients ($r = .58$), with the positive association between resilience and well-being reported by He et al. (2013), and with the Pakistani findings of Batool et al. (2020). That similar associations appear across three countries and with different instruments suggests that the link is robust. In COR terms, resilient survivors can draw on emotional, cognitive, and social resources to manage the physical, psychological, and social demands of life after a burn, and the WHOQOL-BREF, which spans physical, psychological, social, and environmental domains, is well placed to register those gains. The negative association between perceived stress and QoL ($r = −.38$; H2) supports the finding that survivors' psychological response (not injury characteristics alone) determines QoL (Spronk, Legemate, Dokter et al., 2018). Stress appraisals were also lower in resilient survivors ($r = −.38$), confirming close relationship between the two constructs found by Chen et al. (2020). In the transactional model (Lazarus & Folkman, 1984), a survivor who appraises life as unpredictable and overwhelming is one who judges demands to exceed resources and such an appraisal will be associated with lower satisfaction across life domains

The Moderating Role of Perceived Stress

The central finding (H3) is about the form of the interaction. The conditional effect of resilience rose from .44 at low stress to .78 at average stress to 1.12 at high stress so resilience was associated with roughly two and a half times as much difference in QoL among high-stress survivors as low-stress survivors did. Interaction terms are symmetric, so the result can equally be read as showing that the negative association between stress and QoL was weaker among more resilient survivors. Both readings describe the same pattern: resilience and stress jointly shape QoL and resilience matters most where stress is greatest. This pattern fits the buffering (or mobilization) prediction (Cohen & Wills, 1985), not depletion (Introduction prediction), of COR theory. Resources are marshalled and invested when loss threatens (Hobfoll, 1989, 2001; Hobfoll et al., 2018); a resilient survivor may be better able to convert personal resources into coping and recovery precisely when demands are high. It also fits with the view that resilience presupposes adversity (Luthar et al., 2000): when perceived adversity is low resilience has less to do and QoL may depend more on other factors (physical status, income or living environment). Resilience was still significantly associated with QoL at low stress so its benefit was not restricted to high-stress survivors. Nor does the pattern mean stress is harmless: stress was negatively correlated with QoL and remains a target of care in itself. The depletion pattern was not observed within range of stress in this sample although extreme or chronic stress beyond that range may behave differently.

Gender Differences

Women reported higher resilience and lower perceived stress than men but QoL did not differ significantly so H4 was partially supported. This is the opposite of what is normally found in general populations where women report more perceived stress (Cohen & Janicki-Deverts, 2012). The present data cannot explain it because mechanism of injury, burn severity, occupational status and social support were not measured. One possible untested explanation is that men in this setting have heavier expectations to return to income earning roles and fewer socially accepted outlets for distress whereas women may draw on family networks more readily. Burns occur at

home as well as at work (WHO, 2023) and circumstances of injury may be different by gender so also confounding by injury type is possible. That QoL did not differ significantly despite differences in stress and resilience supports the broader view that QoL after burns reflects many factors other than gender (Spronk, Legemate, Dokter et al., 2018).

Implications of the Study

Three practical implications follow. First, brief low-cost screening for perceived stress and resilience during burn follow-up could identify survivors at greatest risk of poor QoL (this is particularly important where rehabilitation capacity is limited) (Ali & Ali, 2022). Second, interventions to build resilience (problem solving, positive reappraisal, social support skills— the domains captured by NMRQ) might be prioritised for high-stress survivors but intervention trials are needed to show this cross-sectional pattern translates into change; third because stress was linked with lower QoL resilience building should not be offered in place of stress management but rather paired with it. The higher stress and lower resilience among men also suggests outreach to male survivors should be considered.

Limitations and Future Research

Several limitations should be noted. Cross-sectional design precludes causal or temporal conclusions and reverse relationships are possible (e.g., better QoL may lower stress appraisals and enhance resilience); convenience sample from three hospitals in the twin cities limits generalizability; survivors who attend hospital follow-up may differ from those who do not; all measures were self-reported so response bias is possible; resilience and stress appraisals overlap conceptually (one NMRQ item refers to managing stress levels) so their association might be inflated; burn size and depth, location, mechanism, pain, time since injury beyond 6 months minimum and social support were not examined and could influence both stress and QoL; 30-item PSS used here differs from more common 10- and 14-item versions so absolute scores should not be compared with other studies. Longitudinal designs (follow-up from discharge to first years of recovery) are needed to test whether the moderation pattern persists; multi-site samples with rural survivors and wider burn severities would increase generalizability and models need clinical covariates. Other moderators (social support, stigma, pain, coping styles) should also be studied in future research as well as intervention trials and qualitative studies to understand and improve survivors' quality of life.

V. CONCLUSION

Among burn survivors in Islamabad and Rawalpindi resilience was positively associated with QoL; perceived stress negatively with QoL; resilience-QoL association was strongest among survivors who perceived the most stress. Women had higher resilience and lower stress than men, no significant gender difference for QoL. These results suggest that burn rehabilitation should assess stress and resilience together; resilience building is most likely to pay off when attention is also paid to survivors' stress (especially high strain).

Conflict of interest.

There isn't any conflict of interest.

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