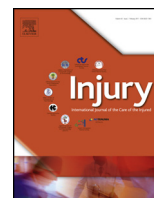




Contents lists available at ScienceDirect

Injury

journal homepage: www.elsevier.com/locate/injury



Physical injury, health, and well-being: Role of stress perception

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ARTICLE INFO

Keywords:

Perceived stress
Illness
Health-related quality of life
Psychoneuroimmunology

ABSTRACT

Objective: Physical injuries are common occurrences that can have substantial implications for mental health and well-being. Ample studies indicated that increased levels of perceived stress is associated with increased prevalence of general health problems, as well as reduced health-related quality of life. Thus, the goal of the present study was to examine the long-lasting association between bodily injuries and general health. In addition, the role of stress perception in moderating the association between injury and general health was assessed.

Methods: Two-hundred and forty victims of past injury and 251 non-injured participants completed a self-report health inventory questionnaire assessing illness prevalence during the six-month period prior to the study. In addition, they completed the short-form Medical Outcomes Survey (MOS SF-36) questionnaire and the Perceived Stress Scale.

Results: Victims of past injuries reported higher incidences of illness, mainly upper respiratory infections and fever, compared to non-injured participants. In addition, injured participants reported poorer perceived health status, including reduced general health, physical functioning, and health beliefs. Perceived stress levels were similar in injured and non-injured participants, however, correlations between perceived stress and self-reported medical outcomes were stronger in injured participants compared to non-injured controls.

Conclusions: Past physical injuries are associated with increased incidence of general health concerns and poorer health-related well-being. Moreover, injured individuals do not report increased stress perception; however, when stressed, injured individuals are more affected and health-related quality of life is reduced. Promoting well-being in individuals who have suffered a significant injury is, thus, a clinical necessity and a pressing social priority. This study highlights the role of stress perception in the association between physical injury and health, and may assist in providing better multi-disciplinary care for the injured.

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Introduction

Physical injury can be a sudden, serious, life-altering event. Injury leading to hospitalization may trigger intense fear or feelings of helplessness [1]. As a result, aside from the physical disabilities, injuries are accompanied by psychological distress, feelings of vulnerability, and depressive and anxiety symptoms [1,2]. Emotional problems affect the patient's daily activities, life roles, and independence and may thus interfere with the recovery process and physical rehabilitation. Studies showed that perceived

stress levels due to injury gradually subside several months after injury, and psychological intervention improves adjustment [2,3]. However, studies suggested that emotional symptoms, such as depression and anxiety may still be observed after physical recovery from the injury [4,5]. Several studies also suggested that certain types of injuries are associated with impaired perception of general health and well-being, perhaps due to increased distress or lasting pain [6–11]. Specifically, trauma victims reported impaired activities of daily living, decreased social and emotional role functioning, reduced levels of health-related quality of life and increased psychological distress, month to years following injury [6–11]. These studies suggest that physical injury may have long-lasting implications for quality of life, beyond physical impairment, rehabilitation and recovery.

The relationship between psychological well-being and physical functioning has been a major focus of research over the past

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several decades. Major negative life events have been linked with increased risk for infectious diseases (e.g., [12,13]), cardiac malfunction [14], changes in stress reactivity [15], and reduced longevity [16]. This link was demonstrated following a variety of stressors, such as academic examinations, marital conflict, violence, loneliness, low socioeconomic status, and more [17]. Several studies suggested a role for the immune system in mediating the relationship between psychosocial stress and disease susceptibility, as psychosocial stress was associated with immune dysregulation, including alteration in cytokine secretion, leukocyte migration, and function [17,18]. Previous studies further demonstrated an association between stress experience and reduced health-related quality of life, emotional exhaustion and physical fatigue, listlessness, tension, and cognitive weariness [19–22].

Based on literature associating physical injury with persistent stress-related emotional disturbances [2,4,5] and the reported connection between stress and immune dysregulation, it may be suggested that physical injury would result in lasting implications for the susceptibility to disease. Accordingly, victims of physical injury may be more susceptible to disease even after completion of the physical rehabilitation process. As a result, they may be more concerned about their health and well-being, more anxious about future life challenges, and more worried about daily-life stressors. Thus, the goal of the present study was to assess emotional and physical well-being in victims of injury occurring between two months and ten years prior to the study. In addition, the study aimed to examine possible associations between psychological well-being and increased risk for general illness.

Materials and methods

Participants and procedure

The study included a total of 491 participants aged 17–69 years ($m = 31.1$, $sd = 11.2$). Age limits of participants was chosen to cover working age. Participants were included in the injured group if they reported suffering an injury leading to emergency room treatment or hospitalization between two months and ten years prior to the study. Participants having suffered from head injuries were excluded from the study to avoid possible cognitive or emotional complications that may result from head injuries. Non-injured participants did not suffer a significant injury during the same period. Injuries were identified based on the participants' responses and were not directly verified by the researchers. Recruitment of participants was conducted via two sources: participants were approached in relevant forums over the Internet (electronic participation), or in person using a snowball/convenience sampling (paper-and-pen participation). All participants completed four questionnaires: Demographics, Illness Prevalence Report (IPR), Medical Outcomes Health Survey (MOS) Short-Form 36 (SF-36) and Perceived Stress Scale (PSS). The study was approved by the Academic College of Tel Aviv-Yaffo Helsinki committee.

Questionnaires

Demographics

Demographic measures were assessed using a survey designed for this study. Participants reported age and sex. In addition, injured participants reported the circumstances of their injury and the time elapsed since injury, and rated the perceived severity of their injury on a 7-point Likert scale. Level 1 on the severity scale was defined as "very mild", and level 7 was defined as "very serious/severe".

Illness prevalence report (IPR)

Prevalence of illness during the six months preceding the study was measured using a questionnaire designed by the authors of this study. The questionnaire included a list of nine common mild illnesses (Table 1). Participants were asked to report illnesses they experienced and the number of times they were sick within the past six months.

The medical outcome health survey (MOS) short-form 36 (SF-36)

Health-related quality of life was assessed using the MOS SF-36 questionnaire ([23], translated to Hebrew by 24). The questionnaire has been widely used in different patient populations suffering from a range of diseases and allows comparison across different diseases [25,26]. The original MOS SF-36 has eight scales. To avoid overlap between similar items in the different questionnaires, the current study utilized only five of these scales, including general health, physical functioning, emotional functioning, vitality, and health beliefs. Reliability and validity of the MOS SF-36 were assessed in 3445 subjects of different ages, socioeconomic status, and illnesses. Internal reliability (Cronbach's α) of the different scales were 0.65–0.94 [25]. Internal reliability (Cronbach's α) of the Hebrew version were 0.76–0.93 [24]. Cronbach's α in the current study ranged between 0.75–0.91 for the different subscales and was 0.92 for the overall scale.

Perceived stress scale (PSS)

The PSS is a 14-item self-report measure of perceived stress ([27], translated to Hebrew by [28]). Participants are asked to rate statements such as "In the past month, how often have you been upset because of something that happened unexpectedly?" and "In the past month how often have you felt that things were going your way?" Participants rate the items on a 5-point Likert scale with higher scores reflecting greater perceived stress. Seven items are reverse-scored and items are summed to obtain the final score. Internal reliability (Cronbach's α) of this scale was 0.84–0.86 [27,29] and of the Hebrew version 0.77 [30]. In the current study, Cronbach's α was 0.92.

Statistical analysis

Differences between injured and non-injured respondents in sample characteristics were tested using the chi-square test for categorical variables or a one-way ANOVA for continuous variables. Principal axis factoring analysis with Oblimin rotation was used to find underlying factors in the IPR questionnaire. Two-way ANOVA was used to test for differences between study groups in illness prevalence (IPR), stress (PSS) and health-related quality of life (MOS) measures, controlling for sex. The Pearson correlation

Table 1

Factor loadings on two factors of the IPR analysis. Loadings marked in bold indicate item assignment to the factor.

	Factor	
	1	2
High fever	.58	-.01
Flu	.57	.02
Throat infection	.56	-.02
Common cold	.50	.02
Asthma	-.02	.54
Seasonal Allergies	.06	.48
Eye infection	-.05	.42
Skin rash or infection	-.03	.39
Ear infection	.11	.37

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