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Research Paper: Relationship Between Locus of Control With Posttraumatic Growth Among Individuals With Spinal Cord Injury

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ABSTRACT

Introduction: The main purpose of this study was to explore the relationship between Locus of Control (LOC) with Post Traumatic Growth (PTG) among individuals with spinal cord injury.

Materials and Methods: This is a cross-sectional study. Two hundred and ninety-one individuals with spinal cord injury were randomly selected as participants. The study variables were measured by posttraumatic growth assessed by the 21-item version of Post Traumatic Growth Inventory Scale (PTGI) and locus of control assessed by the 29-item version of Rotter's internal-external locus of control scale. The collected data were analyzed with descriptive indexes and analytic tests, including the Levine's test, independent t test, analysis of variance (ANOVA), Chi-square test, and Pearson test.

Results: Descriptive findings showed that the mean (SD) of LOC in the study population was 8.60(4.72) and PTG mean (SD) was 60.8(26.48). The Independent t test showed significant difference in PTGI score between internal and external LOC in the studied population ($P<0.001$), so that individuals with higher mean scores in PTG had more internal LOC ($\mu=08.75$). Also the Pearson correlation coefficient showed a strong relationship between PTG with LOC ($r=0.630$, $P<0.001$).

Conclusion: The results suggest that the mean internal LOC scales in spinal cord injured patients with symptoms of PTG is higher. This study found that the LOC in spinal cord injury can affect individuals' health and result in an increased possibility for PTG.

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1. Introduction

Many individuals are exposed to losses or potentially traumatic events at some point in their lives; so that a large number of people at least once in their lifetime encounter fatal events. A study conducted by Vázquez (2015) showed that traumatic events in more than 50% of cases occur during a person's life. Joseph and Linley (2004) believed that exposure to highly stressful and traumatic events would cause acute and severe effects. Some types of accidents can cause traumatic situations, such as posttraumatic stress disorder, depression, and so on [1-3].

The studies in the field of rehabilitation and psychological sciences, have primarily focused on the negative consequences of individuals' reactions to stressful life events, but there is growing evidence that suggests people also perceive positive experiences after extremely traumatic events [4]. Some people after exposure to a highly stressful and traumatic event, choose and show various positive responses and more effective reactions in order to handle these situations [5].

In recent decades, researchers have shown interests to study the positive consequences of contracting the disease, severe injuries and serious damages to human life. There is a possibility that life-threatening diseases and severe traumas, in addition to physical and psychological disorders, are also associated with positive changes.

Posttraumatic Growth (PTG) is defined as experiencing positive psychological change after facing traumatic life events [6]. The "growth" component of this construct refers to one's subjective perception of the benefits gained from coping with the trauma and its aftermath [6]. Three categories of positive psychological changes are usually reported by trauma survivors: change in self-perceptions, change in relationships with others, and change in philosophy of life [7].

Perception of the benefits gained from coping with the trauma and PTG including but not limited to chronic diseases, natural disasters, accidents that may cause disability, and death of close relatives [1].

Spinal Cord Injury (SCI) is one of the worst traumatic events in all societies. A spinal cord injury at every moment of human life and any age is known as a disastrous incident with continuing and even everlasting physical and psychological consequences. The abrupt and unexpected nature of injury, with its long-term impact, makes SCI a severe and distinctive physical and mental trauma. People with spinal cord injuries are involved in major debilitating changes, susceptible to extreme stress and mental suffering [8]. The consequences of severe SCI profoundly affect the victim's life. SCI may disrupt the function of various organs of the human body, including bladder and bowel and may cause incontinence, mobility dysfunction, sexual dysfunction, autonomic dysreflexia, bedsore and pain. Spinal cord injury can be a personal and social crisis. Employment crisis and barriers in social participation can have potential adverse consequences. However, SCI as a highly traumatic event, can result in PTG [9, 10].

Many studies have shown that psychological factors influence the formation of PTG. Locus of Control (LOC) can be one of the psychological factors that influence and affect PTG [11-15]. LOC refers to one's general predisposition to perceive, control, or lack thereof across various situations [16]. Individuals with an internal LOC accept that their own judgments, decisions and behaviors influence life events and control their own future. On the other hand, those with an external LOC, look to life events as commanded and dictated by surrounding factors out of one's control; some of these agents consist of luck, destiny, or powerful others [17]. As initially defined by Rotter (1966), LOC is "a broad concept that is present across dimensions of functioning" [16]. People with SCI and internal LOC in comparison with external LOC show lower degree of depression and mental stress. This group's reaction is more logical to the events and rehabilitation care is more effective and shorter on them [18]. The current study aimed to explore the relationship between LOC with PTG among people with SCI.

To the best of our knowledge, this is the first study which investigate the relationship between LOC and PTG among Iranian patients with SCI; the current study might be discussed as a pilot study for future research in this area. Concentrating on the probable positive consequences of trauma could provide many advantages to rehabilitation staff and specialists who work with patients with SCI in clinical situations and rehabilitation centers during adaptation process after diagnosis and post treatment.

2. Materials and Methods

Study design and population

A population-based cross-sectional survey was conducted among 291 members of Protection Center of Spinal Cord Disabled of Iran. The purpose of the study was explained to the participants. After the procurement of in-

formed consent, in-person interviews were conducted for filling study questionnaire with the individuals with SCI.

This study was approved by the Research Ethics Committee of the University of Social Welfare and Rehabilitation in Tehran, Iran.

Participants

Participants were 291 (89.5% response rate) members of Protection Center of Spinal Cord Disabled of Iran with SCI. The participants' range of age was between 18 and 57 years, with average age of 35.3 years, also 168 (57.7%) were men. Participation in the study was based on admission. The inclusion criteria comprised being members of Protection Center of Spinal Cord Disabled of Iran with SCI and lacking history of previous serious mental illness or developmental disabilities. We excluded 21 patients because they did not meet all the entry criteria. This was established by examining medical records and by obtaining collateral information from significant family members and friends.

Study instruments

Sociodemographic Data: Participants were asked to report their age, gender, familial status (single/married, etc.), income level, level of education, current occupational status, cause of the accident, and severity of injury.

Locus of Control Scale

In the current study, to measure locus of control (internal and external LOC), we used the 29-item Rotter's scale (range of privilege in Rotter's LOC scale is 5 to 23). Rotter's scale distinguishes two different types of internal and external LOC. The lower score (less than 8) indicates that the individual is more probably inclined toward internal LOC, and the higher score (9 to 23) shows that the individual possess external LOC [19, 20].

Reliability and validity of LOC scale in Iranian population were previously assessed. For example, Hassan Shahi (2004) study assessed reliability and validity of LOC scales by Cronbach α which was 0.78 for the total scale. Also it was 0.89 reported by Khosroabadi (1995) study and 0.79 by Ebrahimi (1991) [21].

Post Traumatic Growth Inventory (PTGI)

Post Traumatic Growth Inventory (PTGI), was created and developed by Tedeschi and Calhoun (1996). PTGI measures individual's positive changes comprehended as a consequence of coping with seismic and tragic events or severe diseases. PTGI contains 21 items and 5 subscales of "new possibilities", "relating to others", "personal strength", "spiritual change", and "appreciation of life." In this instrument, every item is rated on a 6-point scale. The range of values starts from 0 (I never experience this situation as a consequence of my disaster) to 5 (I fully experienced this alteration to a very excessive grade) [22]. Reliability and validity of scales were evaluated in a sample of patients with heart problems in the United States by Sheikh and Marotta. The obtained Cronbach α for the total scale was 0.96 [23].

PTGI was translated into Farsi by Mahmoudi (2008) and then revised and adapted by Mahmoudi et al. [24]. According to Mahmoudi (2008), agent analysis of PTGI confirmed three factors which were considered as changes in 'relationship with others' (Cronbach α=0.86), 'philosophy of life' (Cronbach α=0.87) and 'self-perception' (Cronbach α=0.88) in Iranian population [24, 25].

Tedeschi and Calhoun (1996) reported that the internal reliability coefficient of the scale was 0.90 and the test-retest consistency with 2-month interval was 0.71 [26, 27].

Analytical framework

Descriptive statistics were utilized to describe the study sample characteristics. Exploratory analyses, including frequency, mean, percentage and standard deviation were completed to examine any potential effects of demographics and injury characteristics. After checking the equality of variances, statistical comparison between PTG and LOC were examined by performing Levine's test, Independent t test and analysis of variance as follow-up tests. The relationship between two variables was calculated by Pearson bivariate correlations and Chi-square test.

3. Results

Out of 300 participants who were randomly selected between April and June 2016, a total of 291 met study criteria and were included in the current study. Individuals with obscure or missing relevant data were excluded from the study and analyses. Demographic and injury variables are presented in Tables 1 and 2.

It was assumed that individuals who score high on measures of internal LOC will also score high on PTGI scales. Results were shown that Rotter-Internal LOC have positive correlations with all components of PTGI scale, and all correlations are significant (P<0.001). Independent t test showed significant difference between

Table 1. Demographic variables (N=291)

Characteristics		Value	
Age, Mean (Range), Y		35.3	(18-57)
		No.	%
Gender	Male	168	57.7
Marital status	Single	126	43.3
	Married	161	55.3
	Divorced	2	0.7
	Widowed	2	0.7
Education status	<High school	57	19.6
	High school diploma	129	44.3
	College (associate)	36	12.4
	College (bachelor)	57	19.6
	Graduate degree	12	4.1
Current occupational status	Working in the public sector	41	14.1
	Working in the privet sector	61	21.0
	Retired	21	7.2
	College Student	32	11.0
	Unemployed	136	46.7
Income Level	<300 $	211	72.5
	300 to 600 $	41	14.1
	>600 $	39	13.4

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internal and external LOC in PTGI score of the studied population (P<0.001). Thus, individuals with higher mean scores in PTG had higher internal LOC (μ=08.75).

This finding indicates that PTG is associated with internal LOC. Therefore, the hypothesis of PTG correlation with Rotter's internal LOC was accepted. In addi-

Table 2. Injury Characteristics (N=291)

Characteristics		Value	
		No.	%
Cause of accident	Traffic accidents	140	48.1
	Work accidents	51	17.5
	Diseases	50	17.2
	Congenital defects	12	4.1
	Dispute	38	13.1
Level of injury	Paraplegia	221	75.9
	Quadriplegia	70	24.1

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Table 3. Results of Pearson correlation and t test for PTGI score between internal and external LOC

Scales	No.	LOC			PTG			P Results of T Test for PTGI Score Between Internal and External LOC
		Mean	SD	Range	Mean	SD	Range	
Internal	152	4.79	2.10	7	75.08	22.65	88	
External	139	12.76	2.92	11	45.35	21.07	81	0.001
Total	291	8.60	4.72	19	60.83	26.48	94	
P-Value (Pearson Correlation)		r=0. 630, P<0.001						

tion, the correlation between total score of Rotter LOC and total score of the PTGI scale was calculated. Results showed a positive association between these two scales (r=0.630, P<0.001). The results are presented in Table 3. The correlation between demographic and injury characteristics with LOC and PTG was analyzed (Table 4). Univariate analyses revealed that men reported significantly higher LOC scores (more internal) compared to women (P=0.001).

Based on the results of current study, married persons had a significant difference in terms of internal control compared to single people (F=6; P<0.001). However, there was no significant difference between divorced and widowed people. Analysis of variance showed no significant difference in the LOC score between the educational status of the studied population with the external or internal control location (F=1; P=0.098).

About employment status, the results showed a significant difference between two groups in the LOC score (F=10; P<0.001). It was found that the mean scores of the LOC of employed people in the public sector were significantly different with those in students, the non-employed individuals, and the retired participants in the study (P<0.001). However, there was no significant difference between the mean scores of employed in the public sector and those employed in the private sector (P=1.000). Consistent with univariate analyses, the results showed a significant difference in the LOC score between the variables related to the level of income at least in one of the studied population groups (F=2; P<0.001). The positive relationship between LOC with monthly income of more than 600 USD were significantly different with those in the group whose income was less than 300 USD (P<0.001). However, there was no significant difference between the mean scores of this group and those with income between 300 to 600 USD (P=0.34). Also, it was found that the mean scores of LOC in individuals with monthly income between 300 to 600 USD with people with monthly income of less than 300 USD also did not have a significant difference (P=0.83).

In contrast to our univariate results, the multivariable analyses found a positive relationship between LOC with variables related to the cause of the accident in at least one of the studied population (F=4; P<0.001). The results of current study showed that LOC mean scores for people with SCI were significantly different with those who had SCI due to traffic accidents (P<0.001). The mean scores of LOC for this group are also significantly different (P<0.001) with those who have had SCI because of dispute. However, the mean scores of people with SCI were not significantly different with those who had SCI due to congenital defects (P=0.87). It was also found that the mean scores of LOC for SCI were not significantly different with those who had SCI due to work-related incidents (P=0.81).

The Chi-square test was used to examine the relationship between two groups for variables related to the level of injury. The results showed no significant difference in LOC scores between variables related to the level of injury in any studied population groups with external or internal control source (P=0.245).

No significant relations were found between PTG and demographic characteristics of participants such as sex, education status and income level, but PTG was positively associated with marital and occupational status, cause of accident, and injury level (paraplegia vs. quadriplegia). The results indicate that individuals with high score in Rotter-Internal (had internal LOC) had high score in components of PTGI scale too. In addition, participants whose scores were high in Rotter-External (had external LOC) had low score in components of PTGI scale.

4. Discussion

This study was designed to investigate the relationship between LOC with PTG. First, main results of the study

Table 4. Sample characteristics and relationship to PTG and LOC

Scales		LOC				PTG		
		Mean (SD)		Unadjusted Univariate Test Statistic for the Relationship With LOC (ANOVA for Categorical)		Mean (SD)	Unadjusted Univariate Test Statistic for the Relationship With PTG (ANOVA for Categorical)	
		Internal	External	F	P		F	P
Gender	Male	5(2)	13.3(3.2)	-	0.001	60.6(27.3)	-	0.891
	Female	4.2(2.1)	12.2(2.5)			61.08(25.3)		
Marital status	Single	9(5)		6	0.001	59.9(23.6)	3	0.001
	Married	7(4)				62.5(27.9)		
	Divorced	11(4)				14.5(4.9)		
	Widowed	14(1)				21.00(14.4)		
Education status	<High school	9(4)		1	0.098	62.2(24.8)	0.00	0.425
	High school diploma	8(4)				60.6(25.5)		
	College(associate)	9(4)				59.4(27.76)		
	College(bachelor)	7(3)				57.9(29.8)		
	Graduate degree	9(7)				73.5(22.4)		
Current occupational status	Working in the public sector	9(4)		10	0.001	70.6(25.3)	10	0.001
	Working in the privet sector	8(4)				75.01(23.3)		
	Retired	9(4)				47.8(37.1)		
	College Student	7(3)				58.8(11.71)		
	Unemployed	9(7)				53.9(25.4)		
Income level	<300 $	8(4)		2	0.001	58.3(24.4)	3	0.34
	300 to 600 $	9(4)				66.5(35.5)		
	>600 $	7(5)				68.1(24.5)		
Cause of accident	Traffic accidents	7(4)		4	0.001	63.2(25.00)	6	0.001
	Work accidents	9(5)				58.1(26.6)		
	Diseases	10(3)				46.4(27.8)		
	Congenital defects	10(4)				74.5(13.05)		
	Dispute	8(4)				70.1(25.4)		
Level of injury	Paraplegia	8(4)		-	0.245	51.1(22.4)		0.001
	Quadriplegia	9(5)				63.8(26.9)		

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Abbreviations: SD: Standard Deviation; LOC: Locus of Control; PTG: Posttraumatic Growth; ANOVA: Analysis of Variance. Indicates a significant difference in mean LOC & PTG (P<0.001) between variable category levels

(the effects of demographic variables and injury characteristics on PTG and the relationship between PTG and LOC) will be discussed. Afterwards, limitations of the current study will be presented and finally, suggestions for future research will be provided.

The effects of demographic variables on PTG

In this study, the effects of some demographic variables (e.g. age, sex, socioeconomic status, education level and marital status) were investigated. Initially, age was found to be related to PTG. Based on the study results, PTG is more likely seen in older age participants. On the other hand, according to literature review, age was one of the demographic variables that predicts the probability of PTG occurrence. For example, Cordova et al. (2007) found that individuals with younger age was associated with greater PTG [28, 29]. Belizzi (2004) also noticed that younger cancer survivors would experience more PTG compared to older cancer survivors [30, 31].

Moreover, Arpawong et al. reported that younger age was associated with greater PTG [32]. A study conducted by Ruini, Albieri, and Vescovelli indicated that PTG was significantly higher in older participants [33]. Regarding the relationship between sex and PTG, studies show contradictory results. While we did not found a significant relationship between PTG and gender in the current study, Em Arpawong et al. (2013) reported that PTG was significantly related to sex. According to the study results, PTG scales in men were significantly higher compared with those in women [32]. The results of study conducted by Yuchang Jin were quite different. The results showed that PTG was significantly higher in women than in men [34].

A meta-analysis was conducted by Tanya Vishnevskyto et al. (2010) examined the direction and magnitude of gender differences in self-reported PTG. Results from 70 studies (N=16076) revealed a small to moderate gender difference, with women reporting more PTG than men [35].

Socioeconomic status includes some other things as well: education status, personal or family income and marital status that was found to be related with PTG in the literature. It was found that income level was positively correlated with PTG in HIV-related positive changes and higher education was associated with more positive changes in them. Furthermore, income level was one of the most important predictors of HIV-related positive changes (Updegraff, Taylor, Kemeny, & Wyatt, 2002) [36]. However, the result of the present study was incompatible with the literature, because the results showed no significant difference between SCI survivors with low and middle income level on PTG [36, 37].

Education status was also found to be related to PTG in the literature. According to the study of Weiss (2004), education level was negatively associated with PTG of breast cancer survivors and it was also one of the predictors of PTG. Updegraff et al. (2002) also found that education level was correlated with HIV-related positive changes and it was one of the most significant predictors of HIV-related positive changes. However, contrary to the results of Weiss (2004), Updegraff et al. (2002) claimed a positive relationship between education and PTG [38].

A study conducted by Chung, M.C showed that LOC (internal and external) can affect the health and compatibility with disabilities in SCI. The results showed a significant positive relationship between external LOC with PTG disorder in participants with SCI [37-40]. However, the current study revealed a significant correlation between LOC and PTG. Moreover, internal LOC was a significant predictor in occurrence for PTG in patients with SCI participated in the current study.

Several limitations were observed in this study. First of all, study participants were mainly chosen from one city and all had received care from a single rehabilitation system. Also our analyses were limited by the possibility of misunderstanding or wrong answers to questions in the questionnaire by participants due to lack of time and a lot of questions in the questionnaire. Another possible limitation was small sample size and inability to generalize the results to the entire population of patients with SCI. Other limitations include survey design, questions format, and time shortage.

The study results suggest that the majority of individuals with SCI experience some degree of positive psychological growth after their injury. The study findings also suggest that SCI participants with internal LOC show higher levels of PTG. Therefore, the hypothesis by which PTG is correlated with Rotter's internal LOC is accepted. In other words, this study verifies that participants with spinal cord injuries and internal LOC would be more likely to progress toward PTG.

These findings, in combination with the other PTG and LOC literature in disability populations due to SCI, can help the development of more comprehensive, theoretical models for understanding and predicting PTG after injury. Also the results of this study can be used for health policy makers, health providers, and rehabilitation administrators. Furthermore, results of current study can

be used to design future studies and interventions in the field of rehabilitation for patients with SCI.

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Conflict of Interest

The authors have declared no conflicts of interest.

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