

## ORIGINAL ARTICLE

# Do spinal cord-injured individuals with stronger sense of coherence use different psychological defense styles?

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**Objectives:** Although the importance of sense of coherence (SOC) and psychological defense mechanisms (PDMs) in the process of coping has been demonstrated, it has not yet been clarified whether individuals with stronger SOC use specific PDMs.

**Study design:** Cross-sectional.

**Setting:** Iran.

**Methods:** Demographic and injury-related variables including injury level, time since injury, American Spinal Cord Association (ASIA) Scale and Spinal cord independence measure-III were collected among individuals with spinal cord injury (SCI). SOC was assessed by the Short-form Sense of Coherence Scale. PDMs were identified using 40-version of the Defense Style Questionnaire.

**Results:** Neurotic defense style was the most commonly used style especially. The overall most commonly used PDM was 'rationalization', which was used by 95%. Individuals with stronger SOC used more mature style ( $P=0.001$ ,  $r=0.52$ ), particularly 'humor' and 'suppression' mechanisms ( $P<0.0001$  and  $0.024$ , respectively). There was a negative correlation between stronger SOC and the use of immature defenses including passive aggression ( $P=0.001$ ,  $r=-0.51$ ), acting out ( $P=0.001$ ,  $r=-0.48$ ), isolation ( $P=0.009$ ,  $r=-0.50$ ), autistic fantasy ( $P=0.010$ ,  $r=-0.30$ ) and somatization ( $P<0.0001$ ,  $r=-0.62$ ). Married individuals had significantly stronger SOC ( $P=0.01$ ). Age, gender, age at the time of injury incidence, time since injury, ASIA score and cause of injury were not determinants of SOC.

**Conclusion:** In this study, PDMs, which are more probable to be used by individuals with stronger SOC, have been identified. Mature defenses including 'humor' and 'suppression' are used by stronger SOC more often, whereas immature mechanisms are less likely to be used.

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## INTRODUCTION

Sense of coherence (SOC) and psychological defense styles are both known as coping methods,<sup>1</sup> which are used to protect 'ego' from external stressors when facing catastrophic events in life. SOC has been defined as an intrinsic orientation expressing the extent to which one is confident to perceive the external environment as structured, explicable and predictable.<sup>2,3</sup> This concept has been developed by Antonovsky,<sup>2,3</sup> which is based on the salutogenic theory describing a close relationship between health, stress and coping. It seems that defense mechanisms and SOC are related to each other and contribute to the overall construct of coping. However, it has not yet been described which psychological defense styles are more prevalent by individuals with stronger SOC. Psychological defense mechanisms (PDMs) are known as powerful coping methods, which are mostly used to reduce anxiety after a disastrous event.<sup>4,5</sup> Although these mechanisms may have initially beneficial effects in protecting 'ego' against psychological diseases,<sup>6</sup> the underlying mechanism of their influence is sometimes exerted by manipulation and distortion of

reality.<sup>7</sup> The unreal world constructed by psychological defense styles can itself become a source of stress when specific defense mechanisms are persistently used.<sup>8</sup> Therefore, it is important to plan proper interventions to conduct defense styles to a favorable state during the rehabilitation process. In fact, better rehabilitation outcomes may be obtained when patients use more mature defenses. On the other hand, overusing immature defenses causes social dysfunction because these defenses are seriously out of touch with reality, and they usually lead to noticeable problems in an individuals' ability to cope effectively.<sup>9</sup> Thus, it is clinically essential to prevent persistent overuse of immature psychological defense styles. In order to identify the defense mechanisms that contribute to better coping behavior, we tried to identify defense mechanisms that are used more common among individuals with stronger SOC.

Traumatic spinal cord injury (SCI) is an overwhelming catastrophic event, which tremendously affects many aspects of life. The annual prevalence of SCI has been reported to be about 223–755 cases per million,<sup>10</sup> and increasing rates of SCI in developing countries have

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been demonstrated.<sup>11</sup> Psychological treatments are considered to be an important component of rehabilitation after SCI.<sup>12,13</sup> In order to improve coping abilities and SOC during psychological rehabilitation, understanding the etiologies behind better SOC is essential. Psychological interventions should be implemented based on the identification of factors that contribute to the construct of SOC to attain stronger coping capability. In the present investigation, the association between used PDMs and SOC has been assessed among individuals with SCI.

## PATIENTS AND METHODS

### Study design and participant

Individuals with SCI who were referred to Brain and Spinal Cord Injury Research Center between February 2014 and April 2015 were invited to participate in this observational cross-sectional investigation. Adequate information was given to each participant, and written consent was obtained from each individual before enrollment. Data collection was based on direct interviews with the subjects. Participants were assured about the confidentiality of their information. Participation in the study was voluntarily. The study protocol was approved by ethics committee of Tehran University of Medical Sciences. Participants were selected according to the following inclusion criteria: traumatic SCI, age  $\geq 18$  and normal mental status to obtain reliable answers when assessing subjective measures. The most prominent exclusion criteria were unwillingness to participate, blurred mental status, history of other chronic medical conditions (e.g. diabetes, endocrine diseases, liver dysfunction, renal failure, mental disorders, rheumatoid diseases, cancer, pulmonary diseases) and previous history of psychiatric disorders (e.g. depression, anxiety, personality disorders). Screening for psychiatric disorders has been performed during interviews by an expert psychiatrist. Consumptions of special medications including glucocorticoids, thyroid hormones, immunosuppressive agents, chemotherapy, antidepressants and antipsychotic agents were also considered as exclusion criteria. Those patients with a previous history of alcoholism or drug abuse were excluded as well.

### Demographic and SCI-related variables

Demographic variables including age, gender, marital status, educational level, employment and satisfaction with financial status and interpersonal relationships were asked during interviews and were recorded in predesigned forms. Participants were classified according to American Spinal Cord Injury Association (ASIA) scale into the following categories: ASIA-A (complete injury), ASIA-B (incomplete injury with preserved sensory function), ASIA-C (incomplete injury with preserved motor function of more than half of key muscles with grade  $<3$ ) and ASIA-D (incomplete injury with preserved motor function of half of key muscles with grade of 3 or more).<sup>14</sup> The level of injury was determined by clinical examination by an expert neurosurgeon and was confirmed by magnetic resonance imaging. Age at the time of incidence of the injury and post injury duration were also indexed. Among those patients who had a history of coma after SCI, time since injury was defined as the time interval after consciousness till the present time. Patients' independency level was assessed by Spinal cord independence measure-III (SCIM).<sup>15</sup> This instrument contains three subscales: self-care (0–20), mobility (0–40 scores) and respiration and sphincter management (0–40 scores). The total score SCIM ranges between 0 and 100. The higher SCIM scores are indicative of higher levels of independency in performing daily routine tasks. The validity and reliability of this measurement tool has been widely demonstrated.<sup>16,17</sup> Other assessed variables that were related to SCI were utilized transport device (e.g. wheelchair, cane, brace), coincidental head injury and suicidal ideation.

### Psychological defense mechanisms

PDMs were identified using 40-version of the Defense Style Questionnaire (DSQ-40) during interviews by an expert psychologist. In 1983, Bond *et al.*<sup>6</sup> designed the initial version of this instrument, which had 67 items, and 3 years later the 88-item version of this measurement tool was developed.<sup>18</sup> Finally, a shorter version of this questionnaire was designed, which was equally able to detect 20 defense mechanisms mentioned in Diagnostic and Statistical Manual

of Mental Disorders, 3rd edition (DSM III). This questionnaire has 40-items, and two statements are devoted for identification of each defense mechanism. Each item is rated on a scale from 1 to 9 (1 is indicative of complete disagreement and 9 shows complete agreement). According to scoring instruction of DSQ-40,<sup>20</sup> defense mechanisms with summed scores of both related statements  $>10$  are considered to have been used by participants. Defense mechanisms are classified into three defense styles as follows: mature defense style (sublimation, humor, anticipation and suppression), neurotic defense style (undoing, pseudo-altruism, idealization and reaction formation) and immature defense style (projection, passive aggression, acting out, isolation, devaluation, autistic fantasy, denial, displacement, dissociation, splitting, rationalization and somatization). Some investigations have shown that a substantial part of the DSQ-40 is lacking in face validity.<sup>19</sup> Moreover, some studies have reported limitations of the DSQ-40 concerning insufficient internal consistency<sup>20</sup> and unstable factor structure.<sup>21</sup> On the other hand, there are numerous investigations demonstrating the admissible reliability of this questionnaire. According to Cramer,<sup>22</sup> internal consistency of this instrument ranges from 0.58 to 0.80, and test–retest reliability over a 4-week period ranges from 0.75 to 0.85. In addition, the DSQ-40 has been shown to discriminate between anxious/depressed patients and normal controls.<sup>1</sup> The acceptable validity and reliability of this instrument has been widely documented in many languages.<sup>23–27</sup> It can be concluded that there may be many criticisms to the DSQ-40, still it seems that DSQ-40 is an available reliable tool to assess defense mechanisms. Shabanpour *et al.*<sup>28</sup> measured the Cronbach's  $\alpha$  for the Persian version of DSQ-40 to be 0.70, which indicates that this questionnaire is reliable to be used among Iranian population.

### Sense of coherence

The short form of the Sense of Coherence Scale (SOC-13) was used to measure SOC. In 1987, Antonovsky<sup>3</sup> developed a measure to assess SOC based on the extent to which the external stressors can be comprehensible, manageable and meaningful. This instrument contains 13 items, and each item is scored from 1 to 7. The total scoring range is 13–91. The higher scores are indicative of stronger SOC. The admissible validity and reliability of this instrument has been demonstrated in many languages.<sup>29–31</sup> The Farsi version of this instrument has been shown to be valid and reliable.<sup>32</sup> SOC was assessed during interviews with an expert psychologist.

### Statistical analysis

All statistical analysis was performed using SPSS software version 21 (IBM Corp., New York, NY, USA). Descriptive analysis was used to express categorical data as frequency (percentage) and continuous variables as mean  $\pm$  s.d. The  $\chi^2$  test (Fisher's exact test) was used to assess the relationships between categorical variables. Because of small sample size and ordinal scales and existence of possible skewed distribution, nonparametric statistics have been used. The Mann–Whitney *U*-test was used when two subgroups existed. By three or more subgroups, the Kruskal–Wallis test has been used, and *post hoc* pairwise comparisons were applied using the Dunn–Bonferroni approach. The reliability of each subscale of DSQ-40 was assessed by calculating the Cronbach's  $\alpha$ .  $P < 0.05$  was considered as statistically significant.

## RESULTS

Forty people with SCI with a mean age of  $30.47 \pm 25.86$ -year-old participated in this investigation. The baseline and SCI-related variables are summarized in Table 1. Most participants were unemployed ( $n = 30$ , 75.0%). The most commonly observed ASIA score was A ( $n = 24$ , 60.0%).

Cronbach's  $\alpha$  for mature defense style was 0.46. Calculated Cronbach's  $\alpha$  values for neurotic and immature defense styles were 0.45 and 0.60, respectively. Table 2 illustrates the Cronbach's  $\alpha$  of each subscale. Neurotic defense style was the most commonly used style by individuals with SCI. Among defense mechanisms categorized as neurotic defense style, 'idealization' and 'pseudo-altruism' were the most prevalent used mechanisms (used by 36 subjects, 90%).

**Table 1** Baseline and spinal cord injury-related characteristics among participants with spinal cord injury

Variable	Subgroup	Frequency (percentage)	Mean (s.d.)
Gender	Male	33 (82.5)	—
	Female	7 (17.5)	—
Age (years)	—	—	30.47 (25.86)
Marital status	Single	16 (40.0)	—
	Married	19 (47.5)	—
	Divorced	4 (10)	—
	Widow/Widower	1 (2.5)	—
Cause of the injury	Road accidents	28 (70.0)	—
	Fall	10 (25.0)	—
	Fight	2 (5.0)	—
Time since injury (months)	—	—	43.11 (40.25)
Age at the time of injury incidence (years)	—	—	25.86 (7.69)
Level of the injury	Cervical	10 (25.0)	—
	Thoracic	24 (60.0)	—
	Lumbosacral	6 (15.0)	—
Coincidental head injury	Yes	15 (37.5)	—
	No	25 (62.5)	—
Transport device	Wheelchair	31 (77.5)	—
	Walker	6 (15.0)	—
	Cane	3 (7.5)	—
Educational level	Primary school	6 (15.0)	—
	Middle school	10 (25.0)	—
	High school	14 (35.0)	—
	Academic education	10 (25.0)	—
Financial satisfaction	Totally satisfied	11 (27.5)	—
	Relatively satisfied	21 (52.5)	—
	Dissatisfied	8 (20.0)	—
Satisfaction with interpersonal relationships	Totally satisfied	32 (80.0)	—
	Relatively satisfied	8 (20.0)	—
	Dissatisfied	0 (0.0)	—
Employment	Employed	10 (25.0)	—
	Unemployed	30 (75.0)	—
ASIA score	A	24 (60.0)	—
	B	10 (25.0)	—
	C	5 (12.5)	—
	D	1 (2.5)	—
Suicidal ideation	Yes	5 (12.5)	—
	No	35 (87.5)	—
SCIM score	—	—	44.24 (23.21)

Abbreviations: ASIA, American Spinal Cord Injury Association; SCIM, Spinal cord independence measure-III; s.d., standard deviation

However, the most commonly used defense mechanism was 'rationalization', which was used by 38 individuals (95%). The least used defense mechanisms were 'projection' and 'displacement' ( $n = 14$ , 35%). Among mature defense mechanisms, anticipation was used by 36 (90%) patients. The obtained mean score of each defense mechanism and the prevalence of each defense used by individuals with SCI have been illustrated in Table 2.

Individuals with stronger SOC were using more mature style ( $P = 0.001$ ,  $r = 0.52$ ). 'Humor' and 'suppression' were significantly

more prevalent among people with a higher total score of SOC-13 ( $P < 0.0001$  ( $r = 0.65$ ) and  $P = 0.024$  ( $r = 0.38$ ), respectively). Furthermore, there was a negative correlation between stronger SOC and the use of immature defenses including projection ( $P = 0.009$ ,  $r = -0.41$ ), passive aggression ( $P = 0.001$ ,  $r = -0.51$ ), acting out ( $P = 0.001$ ,  $r = -0.48$ ), isolation ( $P = 0.009$ ,  $r = -0.50$ ), autistic fantasy ( $P = 0.010$ ,  $r = -0.30$ ) and somatization ( $P < 0.0001$ ,  $r = -0.62$ ). In fact, people with stronger SOC were less likely to use immature defense style ( $P = 0.004$ ,  $r = -0.45$ ). On the other hand, mature defense style was positively related to all three components of SOC ( $P = 0.038$ , 0.005 and 0.001 for meaningfulness, manageability and comprehensibility, respectively). 'Humor' had a positive relationship with all three domains of SOC (Table 3). People with a higher level of manageability and comprehensibility were more likely to use reaction formation defense ( $P = 0.036$  and 0.039, respectively). Lower meaningfulness was significantly associated with a higher probability of using 'isolation' defense ( $P < 0.0001$ ,  $r = -0.54$ ). Autistic fantasy was more probable to be used by individuals with lower comprehensibility ( $P = 0.005$ ,  $r = -0.43$ ). All three components of SOC were negatively correlated to the use of 'somatization' defense mechanism ( $P = < 0.0001$ , 0.005 and 0.004 for meaningfulness, manageability and comprehensibility, respectively). The relationship between used PDMs and SOC has been shown in Table 3.

Married individuals had significantly higher scores in the domain of meaningfulness and comprehensibility of SOC ( $P = 0.043$  and 0.039, respectively). Subsequently, the total SOC-13 score was higher among married patients ( $P = 0.015$ ). People with the injury level at cervical sections had significantly lower scores in meaningfulness and total SOC-13 score ( $P = 0.038$  and 0.012, respectively). Cause of the injury, transportation device, ASIA score, employment, financial satisfaction, existence of suicidal ideation and satisfaction with interpersonal relationships were not related to SOC (Table 4). The higher SCIM scores were significantly related to better scores in meaningfulness and comprehensibility domains ( $P = 0.006$  with  $r = 0.53$  and  $P < 0.0001$  with  $r = 0.65$ , respectively). The SCIM score was positively correlated with the total SOC-13 score ( $P < 0.0001$ ,  $r = 0.66$ ). Gender, marital status and injury-related variables (injury level, ASIA score, cause of the injury and transportation device) were not significantly associated with the use of defense styles (Table 4). Longer time since injury was associated with the use of more mature defenses ( $P = 0.001$ ). Older ages were associated with more use of projection and less use of devaluation defenses ( $P = 0.021$  and 0.008, respectively). Educational level and employment were also not significant determinants of defense styles. Furthermore, it seems that suicidal ideation has insignificant effect on defense styles ( $P = 0.84$ , 0.69 and 0.81 for immature, neurotic and mature defense styles, respectively).

## DISCUSSION

This study shows that spinal cord-injured individuals with stronger SOC significantly use more mature defense style, especially 'humor' and 'suppression' defense mechanisms. Furthermore, weaker SOC was associated with more prevalent use of immature defense style, especially 'passive aggression', 'acting out', 'autistic fantasy' and 'somatization'. Our results demonstrate that the construct of SOC is affected by the used PDMs. Until now, the role of defense mechanisms in determining SOC has not yet been described. In this regard, Valliant<sup>33</sup> showed that defense mechanisms, which are highly adaptive (such as humor), are used to maintain SOC. Our study demonstrated similar results among people with SCI. These results showed that spinal cord-injured individuals who had stronger SOC were more likely to use 'humor' and 'suppression' defenses. 'Humor' defense

**Table 2** The used psychological defense mechanisms in participants with spinal cord injury

Psychological defense mechanisms	Mean (s.d.)	Prevalence (percentage) <sup>a</sup>	Cronbach's $\alpha$
<i>Mature</i>	11.97 (2.71)	—	0.46
Sublimation	10.15 (4.63)	25 (62.5%)	0.19
Humor	12.40 (5.13)	28 (70.0%)	0.75
Anticipation	14.70 (3.11)	36 (90.0%)	0.41
Suppression	10.65 (4.48)	22 (55.0%)	0.63
<i>Neurotic</i>	12.34 (2.60)	—	0.45
Undoing	12.22 (4.55)	28 (70.0%)	0.38
Pseudo-altruism	14.45 (3.87)	36 (90.0%)	0.41
Idealization	13.40 (3.400)	36 (90.0%)	0.49
Reaction formation	9.30 (4.94)	19 (47.5%)	0.65
<i>Immature</i>	9.64 (1.94)	—	0.60
Projection	7.32 (3.04)	14 (35.0%)	0.84
Passive aggression	10.17 (4.47)	25 (62.5%)	0.22
Acting out	8.67 (4.74)	18 (45.0%)	0.58
Isolation	7.75 (4.18)	17 (42.5%)	0.40
Devaluation	9.87 (4.09)	19 (47.5%)	0.27
Autistic fantasy	8.75 (5.21)	18 (45.0%)	0.61
Denial	10.52 (3.92)	26 (65.0%)	0.35
Displacement	7.47 (3.47)	14 (35.0%)	0.70
Dissociation	11.82 (3.92)	29 (72.5%)	0.63
Splitting	8.87 (3.85)	22 (55.0%)	0.10
Rationalization	14.52 (3.35)	38 (95.0%)	0.55
Somatization	9.95 (4.41)	24 (60.0%)	0.66

<sup>a</sup>Prevalence indicates the number of participants who were unconsciously using that specific defense mechanism (DSQ-40 score > 10 in that specific defense mechanism).

mechanism indicates overt expression of ideas and feelings in a funny way that gives pleasure to others. However, it should be considered that two dimension of 'humor' defense mechanism have been described: adaptive and maladaptive.<sup>34</sup> The maladaptive humor describes aggressive humor with a tendency to self-criticizing to amuse others. Although adaptive humor defense may have beneficial effects on psychological well-being, maladaptive humor defense mechanism may itself become a source of psychological disturbance.<sup>34</sup> Suppression defense, which is also considered as a mature defense mechanism, describes the conscious decision to delay paying attention to an emotion so that distressing and uncomfortable emotions are later accessed. As acceptance of a distressful emotion requires time, the use of 'suppression' defense makes it possible to later access uncomfortable emotions while accepting them. Use of specific defense mechanism enables people with SCI to adapt with their situation. It has been shown that people adapt noticeably well even after extremely catastrophic events such as SCI, and therefore psychiatric morbidity is rare after the first year of the injury.<sup>35,36</sup> Our study shows that 'rationalization', 'idealization', 'pseudo-altruism' and 'anticipation' are the most commonly used defenses among people with SCI. In rationalization defense mechanism, behaviors or feelings are justified in a seemingly rational manner to avoid the true explanation, which makes the uncomfortable feelings tolerable. Rationalization can be used to avoid admitting disappointment. Disappointment is likely to be observed among patients with SCI because they have to deal with a permanent disability. Therefore, it is expected to observe a high percentage of using 'rationalization' defense mechanism in people with SCI. Previously Sammallhati *et al.*<sup>37</sup>

described a pattern of adaptation after injury. According to Sammallhati *et al.*,<sup>37</sup> immature defenses are initially used after injury. These mechanisms are powerful defenses that distort reality to protect ego against overwhelming distress. Later on, mature defense mechanisms with no reality distorting qualities will suffice. For instance, instead of using ambivalent destructive immature defense, people learn to anticipate anxiety-provoking situations, which enable them to reach a higher level of self-preparation in advance. In line with our study, Sammallhati *et al.*<sup>37</sup> reported that 'idealization' is frequently used by individuals with SCI. 'Idealization' defense mechanism indicates that an individual believes that someone is extraordinary and unable to do wrong. In fact, idealization describes dependent identity. Independent identity is characterized on the fact that no one is perceived as saint or villain. The high frequency of usage of 'idealization' defense mechanisms indicates the development of dependent identity. It can be concluded that, perhaps, long-term physical dependence may contribute to the development of psychological-dependent identity to some extents.

Our study showed that people, who use 'somatization' defense mechanism more often, are more likely to have lower scores of SOC. Similar results have been reported among patients with cancer by Hyphantis *et al.*<sup>38</sup> 'Somatization' expresses a tendency toward experiencing somatic symptoms as a consequence of psychological distress.<sup>39</sup> It has been described that 'somatization' defense mechanism is the unconscious re-channeling of repressed emotions into somatic symptoms. Our study shows that weaker SOC is associated with a higher probability of using 'somatization'. In fact, it seems that when individuals lack the capability of comprehending and managing the external stressors, physical symptoms emerge in order to reduce anxiety. This shift toward somatic symptoms due to existence of a psychological distress has been observed in our study more commonly among spinal cord-injured individuals with lower scores of SOC. When addressing the use of different defense mechanisms, the close relationship between these mechanisms should be taken into consideration. In this regard, it has been described by Vaillant<sup>40</sup> that defenses like projection, repression and sublimation lie along a continuum of personality maturation as well as psychopathology. Furthermore, 'acting out' has been described as the basis of development of 'reaction formation' and 'pseudo-altruism'.<sup>41</sup> Several types of defenses may be used at the same time, and based on the psychological status of an individual some defenses are dominant.

Our study showed that employed individuals had better SOC only in the domain of meaningfulness, whereas the total score of SOC-13 was relatively similar between employed and the unemployed patients. The significant effect of employment on SOC among healthy able-bodied people has been demonstrated by Liukkonen *et al.*<sup>42</sup> Here, we observed that employment's beneficial influences on SOC among disable individuals are not noticeable, and only one component of SOC (meaningfulness) is significantly affected by employment status.

The role of injury-related variables including post injury duration, injury level and ASIA score in determining SOC is poorly described among people with SCI. Here, we observed no significant effect of time since injury, ASIA score, cause of injury and type of transport device on SOC. On the other hand, meaningfulness, and subsequently total SOC-13 score, was significantly lower in patients with injury at the cervical level. People with injury at cervical levels have quadriplegia, and furthermore autonomic dysreflexia is more likely to occur among patients with cervical lesions.<sup>43</sup> Cervical injuries mostly lead to a higher level of restriction of physical abilities, and affected individuals have lower SCIM scores. Our study also detected a

**Table 3** The association between sense of coherence and the use of specific psychological defense mechanisms among individuals with spinal cord injury

Psychological defense mechanism	Meaningfulness	Manageability	Comprehensibility	Total score of SOC-13
<i>Mature</i>	0.038 ( $r=0.33$ )	0.005 ( $r=0.43$ )	0.001 ( $r=0.51$ )	0.001 ( $r=0.52$ )
Sublimation	0.80	0.76	0.85	0.98
Humor	0.002 ( $r=0.47$ )	0.003 ( $r=0.46$ )	<0.0001 ( $r=0.64$ )	<0.0001 ( $r=0.65$ )
Anticipation	0.023 ( $r=0.36$ )	0.46	0.54	0.07
Suppression	0.45	0.027 ( $r=0.35$ )	0.001 ( $r=0.49$ )	0.024 ( $r=0.38$ )
<i>Neurotic</i>	0.32	0.75	0.16	0.17
Undoing	0.46	0.79	0.29	0.50
Pseudo-altruism	0.78	0.09	0.05	0.06
Idealization	0.17	0.06	0.08	0.22
Reaction formation	0.32	0.036 ( $r=0.37$ )	0.039 ( $r=0.21$ )	0.048 ( $r=0.19$ )
<i>Immature</i>	0.002 ( $r=-0.48$ )	0.047 ( $r=-0.32$ )	0.049 ( $r=-0.15$ )	0.004 ( $r=-0.45$ )
Projection	0.032 ( $r=-0.34$ )	0.58	0.004 ( $r=-0.44$ )	0.009 ( $r=-0.41$ )
Passive aggression	0.001 ( $r=-0.49$ )	0.17	0.003 ( $r=-0.45$ )	0.001 ( $r=-0.51$ )
Acting out	0.39	0.005 ( $r=-0.43$ )	<0.0001 ( $r=-0.60$ )	0.001 ( $r=-0.48$ )
Isolation	0.006 ( $r=-0.43$ )	0.07	0.27	0.009 ( $r=-0.50$ )
Devaluation	0.10	0.27	0.84	0.31
Autistic fantasy	0.08	0.18	0.001 ( $r=-0.50$ )	0.010 ( $r=-0.30$ )
Denial	0.21	0.45	0.76	0.83
Displacement	0.17	0.036 ( $r=-0.33$ )	0.20	0.08
Dissociation	0.18	0.30	0.41	0.18
Splitting	0.21	0.88	0.35	0.23
Rationalization	0.48	0.78	0.38	0.55
Somatization	<0.0001 ( $r=-0.54$ )	0.005 ( $r=-0.43$ )	0.004 ( $r=-0.45$ )	<0.0001 ( $r=-0.62$ )

P-values stand for Spearman's bivariate correlation analysis.

**Table 4** Effect of demographic and spinal cord injury-related variables on sense of coherence in people with spinal cord injury

Variable	Immature defense style	Mature defense style	Neurotic defense style	Total SOC-13 score
Gender <sup>a</sup>	0.862	0.917	0.553	0.485
Marital status <sup>b</sup>	0.162	0.705	0.511	0.015 <sup>c</sup>
Time since injury <sup>a</sup>	0.630	0.001 <sup>d</sup>	0.708	0.436
Level of the injury <sup>b</sup>	0.540	0.061	0.674	0.012 <sup>c</sup>
Cause of the injury <sup>b</sup>	0.174	0.068	0.225	0.461
Transportation device <sup>b</sup>	0.554	0.210	0.256	0.919
Educational level <sup>b</sup>	0.122	0.944	0.820	0.836
Employment <sup>a</sup>	0.747	0.272	0.363	0.548
Financial satisfaction <sup>b</sup>	0.348	0.821	0.850	0.444
Satisfaction with interpersonal relationships <sup>b</sup>	0.654	0.650	0.670	0.164
ASIA score <sup>b</sup>	0.101	0.461	0.880	0.801
Suicidal ideation <sup>a</sup>	0.843	0.812	0.691	0.578

Abbreviation: ASIA, American Spinal Cord Injury Association.

<sup>a</sup>P-values stand for the Mann-Whitney U-test in independent nonparametric statistics to compare values between two subgroups.

<sup>b</sup>P-values stand for the Kruskal-Wallis test with *post hoc* Dunn-Bonferroni approach.

<sup>c</sup>Significance at the level of  $P<0.05$ .

<sup>d</sup>Significance at the level of  $P<0.01$ .

negative effect of low SCIM score on SOC. In this study, weaker SOC has been observed among patients with injury at the cervical level, which is perhaps due to persist overwhelming coping with extremely limited abilities and higher levels of dependency. Exhaustion during

persistent utilization of coping behaviors may contribute to decline of SOC among people with injury at the cervical level. However, it is recommended that these findings be confirmed in future studies with larger sample size. This study also reveals the association between demographic and injury-related variables and PDMs. Older ages were associated with less use of devaluation defenses. Previous studies on healthy population have shown that older individuals who score higher on ego development are less likely to use immature defense styles compared with younger individuals,<sup>44</sup> which is in line with our findings. Furthermore, longer time since injury was correlated with more use of mature defenses, which is suggestive of the adaptability of people with SCI through time with their disability. These outcomes show that defense mechanisms are complex, and they are affected by numerous factors including SOC, demographic and injury-related variables.

## CONCLUSION

In the presents study, the correlation between SOC and used PDMs was assessed among people with SCI. Neurotic defense style was the most commonly used style by individuals with SCI. Among defense mechanisms categorized as neurotic defense style, 'idealization' and 'pseudo-altruism' were the most prevalent used mechanisms. However, the overall most commonly used defense mechanism was 'rationalization'. Individuals with stronger SOC were using more mature style, especially 'humor' and 'suppression' defense mechanisms. Stronger SOC was related with less use of immature defense style, especially 'acting out', 'somatization', 'isolation', 'autistic fantasy' and 'passive aggression' defense mechanisms.

### Study limitations

The sample size of this study is relatively small. Therefore, it is recommended that further investigations with larger sample size be performed to approve the findings in our study. The calculated Cronbach's  $\alpha$  for the subscales of DSQ-40 in this study shows that the reliability of this instrument is at the accepted minimum for comparisons at the group level, which limits the power of this study. Recruitment of larger sample size and the use of more reliable instruments to assess psychological defenses are recommended to further investigate these defenses in patients with SCI.

### DATA ARCHIVING

There were no data to deposit.

### CONFLICT OF INTEREST

The authors declare no conflict of interest.

### AUTHOR CONTRIBUTIONS

MYG contributed to study design, data collection and interpretation of data; RE contributed to data collection; MA contributed to statistical analysis and writing the manuscript; SH contributed to editing and revising the manuscript; and SAHT contributed to interpretation of data and revising the manuscript.

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