

ORIGINAL ARTICLE

Examination and measurement of coping among adolescents with spinal cord injury

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Study design: Cross-sectional survey.

Objectives: To describe coping strategy use in adolescents with spinal cord injury (SCI), to explore the underlying factor structure of a measure of coping among adolescents with SCI and to assess relationships between coping and psychosocial outcomes. Setting: Multiple pediatric SCI centers in the United States.

Methods: One hundred and eighty-two participants aged 13–17 years who experienced an SCI completed measures including the Kidcope, Children's Depression Inventory, Revised Children's Manifest Anxiety Scale and the Pediatric Quality of Life Inventory.

Results: Participants reported that cognitive restructuring and resignation are the most used coping strategies, whereas social support, emotional regulation (calming) and cognitive restructuring are the most effective coping strategies. An exploratory factor analysis revealed that a three-factor solution provided the most parsimonious model for the relationships between the different coping strategies. However, only one of the three factors had acceptable internal consistency. This factor comprised escape-oriented coping strategies or an avoidant approach to coping with the sequelae of SCI. After controlling for demographic/injury-related factors, higher scores on the escape-oriented factor were associated with the lower quality of life and higher levels of depression and anxiety symptomatology.

Conclusion: Escape-oriented coping is associated with maladaptive psychosocial outcomes in adolescents with SCI. These adolescents report that active coping strategies are most effective in reducing SCI-related distress. Coping strategy use may mediate psychosocial outcomes in adolescents with SCI and represent an intervention target in adolescents who overly rely on escape-oriented coping.

Keywords: pediatric spinal cord injury; coping; adolescents; factor analysis; quality of life

INTRODUCTION

Pediatric spinal cord injury (SCI) is almost always a sudden, unexpected event, which often results in a host of changes in physical, emotional and social functioning. A youth's ability to effectively cope with SCI-related daily challenges and lifelong consequences may promote adaptation across the domains of functioning. Previous research has described coping in other pediatric populations and in adults with SCI, yet such findings may not inform coping with pediatric SCI as coping varies with both age and the nature of the stressor.¹ Therefore, in order to inform the rehabilitation process, it is important to examine patterns of coping that are specific to pediatric SCI.

Lazarus and Folkman² define coping as one's 'constantly changing cognitive and behavioral efforts to manage external and/or internal demands that are appraised as exceeding the resources of the individual.' Coping is viewed as a fluid process, which may change with individual and situational factors. For example, as they age, youth tend to rely less on behavior-based coping and use a wider range of coping strategies, including more cognitive strategies.³ Specific to situational factors, for youth with chronic illnesses,

coping strategy use varied between everyday life and disease-related stressors, suggesting some context-related differences in how youth cope.⁴

It is widely accepted that coping is a multidimensional construct; however, the number of factors and the nature of the factors that underlie coping are widely debated.⁵ Theoretical and empirical studies have classified the various coping strategies in behavioral (approach/avoidant) and functional terms (adaptive/maladaptive). One-factor analysis⁶ found that coping strategies on the Kidcope fall within two factors: escape oriented (distraction, social, withdrawal, self-criticism, blaming others, wishful thinking, resignation and emotion regulation yelling) and control oriented (cognitive restructuring, problem solving and emotion regulation calming). Across the pediatric psychology literature, however, the structure of coping varies, which is likely a function of differences between samples, the identified stressor, and how coping was defined and measured.¹

As a stressor, SCI represents a constellation of daily and long-lasting physical, emotional and social challenges, which change across development and with increased injury duration. Consistent with this, research has documented changes in coping over time among

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adults with SCI.⁷ Coping patterns have also been associated with injury severity, as adults with SCI with less physical impairment may be more likely to blame others.⁸ Consistent with coping in other populations, coping in adults with SCI is dynamic and varies with individual and situational factors. Finally, the literature on coping with SCI has also examined the relationship between the use of specific coping strategies and psychological health. In adults with SCI, cognitive coping strategies such as the use of acceptance⁷ were associated with more positive psychological health.

Although we have some knowledge about the coping patterns in adults with SCI and youth with other chronic illnesses, coping strategy use is a function of both individual and situational factors.⁹ Hence, it is currently unclear how adolescents cope with SCI. Further, although the adult SCI literature has begun to investigate relationships between specific coping strategies and psychosocial outcomes, these relationships are not understood among youth. Therefore, the purposes of this study were to: (1) describe coping strategy use and effectiveness among youth with SCI; (2) understand how strategies may come together to create coping factors; (3) examine relationships between these coping strategies/factors and demographic/injury-related factors; and (4) examine relationships between these coping strategies/factors and psychosocial health.

MATERIALS AND METHODS

Participants

Participants were drawn from a larger multisite project examining psychosocial outcomes among adolescents with SCI and their caregivers. Four hundred and nineteen youth aged 1–18 years were enrolled into the larger project between March 2007 and December 2010, and an additional 56 youth refused participation. Youth who were recruited all had an SCI for at least 1 year, did not have significant cognitive delays, spoke English as the primary language in their home (per caregiver-report) and were receiving services from one of the three pediatric SCI specialty hospitals. The subsample of 182 adolescents between the ages of 13 and 18 years ($M = 15.9$ years; $s.d. = 1.7$ years) was selected to participate in the current study. Participants below the age of 13 years completed a different (younger-child) version of the Kidcope and therefore were not included in this analysis. The sample was comprised of 57% male and 63% Caucasian participants; 63% with paraplegia and 54% with complete injuries according to the International Standards for Neurological Classification of Spinal Cord Injury.¹⁰

Measures

Demographic and injury-related information. A medical chart review gathered adolescent demographic and injury-related factors including: sex, birth date, injury date and the level and extent of injury. A caregiver-completed demographics form gathered information on the adolescent's race.

Coping. The *Kidcope*¹¹ is a reliable and valid self-report measure that assesses the frequency and perceived efficacy of 11 cognitive and behavioral coping strategies in response to a particular stressful event (here, having a SCI). The *Kidcope* assesses a range of clinically relevant cognitive and behavioral coping strategies (see Table 1 for a list of items). The 11-item older-child (13–18 years) version was completed by the adolescents in this study and demonstrated internal consistency reliability with the current sample (Cronbach's $\alpha = 0.63$) while this value falls below the 0.70 standard, the scale was still incorporated because a lower α rate may be expected for a multidimensional scale. Coping strategy frequency was measured on a four-point scale from not at all to almost all the time and effectiveness on a five-point scale from not at all to very much.

Depression. The *Children's Depression Inventory* is a widely used reliable and valid measure of self-reported depression in youth aged 7–17 years.¹² This 27-item scale yields scores that range from 0 to 54 with higher scores indicating greater depressive symptom severity. In this study, internal consistency

Table 1 Descriptives of coping strategy use and perceived effectiveness

Item	Use	Perceived effectiveness
	M(s.d.)	M(s.d.)
Cognitive restructuring	1.90 (1.02)	2.71 (1.12)
Resignation	1.82 (1.15)	2.63 (1.30)
Wishful thinking	1.54 (1.09)	1.29 (1.34)
Problem solving	1.43 (1.06)	2.64 (1.06)
Social support	1.41 (1.05)	2.82 (1.05)
Emotional regulation: calming	1.40 (1.13)	2.79 (1.02)
Distraction	1.32 (0.95)	2.47 (1.13)
Social withdrawal	1.12 (1.08)	2.14 (1.10)
Emotional regulation: yelling	0.87 (0.97)	1.96 (1.26)
Self-criticism	0.75 (0.95)	1.23 (1.29)
Blaming others	0.63 (0.96)	1.47 (1.30)

Note: Mean effectiveness is reported for the subsample that endorsed using the identified coping strategy.

reliability was established (Cronbach's $\alpha = 0.81$), and the total raw score was used as a measure of depressive symptom severity.

Anxiety. The *Revised Children's Manifest Anxiety Survey* is a reliable and valid self-report measure of anxiety for youth aged 6–19 years.¹³ The 37-item scale includes 28 items that are summed to form the total anxiety score and 9 items that yield a lie score, which measures socially desirable response style. Internal consistency reliability was established with the current sample (Cronbach's $\alpha = 0.80$), and the total raw score was used as a measure of adolescent anxiety symptom severity. In addition, consistent with recommendations from the authors of the instrument, adolescents were not included in *Revised Children's Manifest Anxiety Survey* analyses if their lie scale total score was 2 s.d. or greater above the mean.

Quality of life (QOL). The QOL study described in this paper was carried out using the PedsQL, developed by Dr James W Varni. The PedsQL is a reliable and valid measure of children's health-related QOL based on the physical, mental and social health dimensions delineated by the World Health Organization.¹⁴ The child self-report and parent proxy-report Psychosocial Health summary scores were included in the present study; internal consistency reliability was established for both (Cronbach's $\alpha = 0.85$ and 0.84, respectively). The Psychosocial Health summary score averages responses across emotional, social and school domains. The Physical Functioning scale was not included in the current study because of its lack of applicability to youth who use wheelchairs.

Procedure

Participants were recruited from the Shriners Hospitals for Children in Philadelphia, Chicago, and Northern California. Youth with SCI who met eligibility criteria and their primary caregivers were approached to participate during regularly scheduled outpatient visits or inpatient hospitalizations. Interested youth and caregivers completed written informed consent and assent forms and were given the option of completing questionnaires on their own or with assistance from a member of the research team. This project was approved by the institutional review boards at all three hospitals.

Data analysis

Descriptive statistics assessed the frequency of use and effectiveness of the measured coping strategies. Exploratory factor analysis (EFA) with varimax rotation of the *Kidcope* was conducted using Mplus.¹⁵ The robust weighted least square (WLSMBV) estimator was selected as *Kidcope* items were skewed and ordinal. EFA allowed for the extraction of up to four factors, based on previous findings in the coping literature, to determine the smallest number of factors needed to adequately explain the relationships between the items. Model fit was evaluated on the basis of the following indicators: (1) factor eigen values above 1; (2) a nonsignificant chi-square value that measures

model misfit; and (3) a root mean square error of approximation below 0.06. Furthermore, factors with an internal consistency ≥ 0.70 were considered acceptable as reliable subscales.

Pearson product moment correlations and *t*-tests examined relationships among identified coping strategies and factors and demographic variables, injury-related variables and psychosocial outcomes. Because of the large number of tests being conducted, a Bonferroni correction was applied to these analyses in order to control the type I error rate. In particular, this correction was applied to each demographic variable, injury-related variable and psychosocial outcome, as each involved 12 statistical tests. As a result the corrected α rate of 0.004 was applied to these tests.

Hierarchical linear regression modeling was used to assess the relationship between exploratory coping factors and psychosocial outcomes, controlling for age, age at injury, sex and injury level. Specifically, four regression models were tested, with depression, anxiety and self-reported and parent-reported QOL as the outcome variables. Analyses revealed issues with normality for the depression and anxiety variables; therefore, transformed versions of each were used as the dependent variables in the regression equations. We certify that all applicable institutional and governmental regulations concerning the ethical use of human volunteers were followed during the course of this research.

RESULTS

Frequency and perceived effectiveness of coping strategies

Cognitive restructuring and resignation were the two most frequently used coping strategies reported among adolescents with SCI (Table 1). In contrast, blaming others and self-criticism were used least frequently. With regard to perceived effectiveness, social support and emotional regulation (calming) were seen as the most effective strategies, whereas self-blame and wishful thinking were perceived as least effective.

EFA

EFA was conducted for the Kidcope, allowing for extraction of up to four factors (Table 2). Compared with the other factor solutions, the three-factor solution provided the best fit as eigen values were all above 1 and chi-square was nonsignificant, whereas root mean square error of approximation was below 0.06. Although the four-factor solution had a lower root mean square error of approximation compared with the three-factor solution, the eigen value for the fourth factor was below 1. Taken together, this suggests that the three-factor solution maintained adequate fit and is more parsimonious than the four-factor solution.

The three-factor solution with varimax rotation (Table 3) had seven items loading onto the first factor and two items each loading onto the second and third factors. Item 7a was the only item to cross-load onto factor 1 (0.50) and factor 2 (−0.33). After assessing the item loadings, the first factor was labeled escape-oriented coping and had the highest internal consistency ($\alpha = 0.70$). The second ($\alpha = 0.55$) and third ($\alpha = 0.11$) extracted factors had unacceptable internal consistencies and therefore were not labeled or included in subsequent analyses. For subsequent analyses, the escape-oriented coping factor score was computed by summing raw scores from items loading onto the factor.

Univariate relationships between demographic/injury-related factors and coping

Generally, increased injury duration was associated with lower use of escape-oriented coping strategies; however, increased age was associated with increased social withdrawal (Table 4). Participants with tetraplegia used distraction more often than participants with paraplegia (Table 4).

Table 2 Eigen value and fit indices for EFA of Kidcope

Number of factors	Eigen value	χ^2	df	P	RMSEA
1	3.139	157.945	25	<0.001	0.149
2	2.075	57.932	21	<0.001	0.078
3	1.284	24.254	17	0.113	0.045
4	0.864	15.508	13	0.277	0.034

Abbreviations: EFA, exploratory factor analysis; RMSEA, root mean square error of approximation.
Note: $N = 182$. Number of items in Kidcope = 11. χ^2 is a measure of model misfit where nonsignificant values represent better model fit. RMSEA is a measure of model fit, lower values represent better model fit.

Table 3 Factor loadings for Kidcope EFA three-factor solution

Item number	Item	Factor 1	Factor 2	Factor 3
1	Distraction	0.51	−0.04	0.13
2	Social withdrawal	0.62	0.21	−0.06
3	Cognitive restructuring	−0.07	−0.14	0.56
4	Self-criticism	0.59	0.14	0.16
5	Blaming others	0.45	−0.11	−0.13
6	Problem solving	0.14	−0.07	0.81
7a	Emotional regulation: yelling	0.50	−0.33	0.16
7b	Emotional regulation: calming	0.60	−0.28	0.42
8	Wishful thinking	0.69	0.03	−0.06
9	Social support	0.10	−0.81	0.28
10	Resignation	−0.10	−0.65	0.03

Abbreviation: EFA, exploratory factor analysis.
Note: $N = 182$. Standardized factor loadings from varimax rotation. Factor loadings > 0.30 in bold.

Coping and psychosocial outcomes

Relationships between escape-oriented coping, individual coping strategies and psychosocial outcomes were examined (Table 5). Higher scores on the escape-oriented factor were associated with lower PedsQL psychosocial health scores on both parent-report ($r = -0.33$, $P < 0.004$) and child-report forms ($r = -0.49$, $P < 0.004$). In addition, increases in escape-oriented factor scores were associated with higher *Children's Depression Inventory* ($r = 0.52$, $P < 0.004$) and *Revised Children's Manifest Anxiety Survey* total scores ($r = 0.52$, $P < 0.004$). In general, escape-oriented strategies were associated with poorer psychosocial outcomes, whereas active coping strategies were unrelated to psychosocial outcomes. Next, hierarchical linear regression models were evaluated to examine relationships between the escape-oriented factor and psychosocial outcomes, after controlling for current age, age at injury, sex and injury level. Results show that increased scores on the escape-oriented factor were associated with increased anxiety and depressive symptomatology and lower psychosocial QOL (Table 6).

DISCUSSION

The purpose of this study was to further understand the nature and role of coping among adolescents with SCI. Findings suggest that adolescents most often use cognitive-oriented coping strategies (for example, cognitive restructuring and resignation). This pattern of results is consistent with adolescents in the general population who emphasize cognitive over behavioral coping strategies.³ Although adolescents reported utilizing cognitive-oriented strategies most often, they perceived that social support and emotional regulation strategies are slightly more effective.

Table 4 Relations between coping strategy use and demographic/injury-related factors

Coping strategy use	Age (<i>r</i>)	Time since injury (<i>r</i>)	Sex				Level of injury			
			Male <i>M</i> (<i>s.d.</i>)	Female <i>M</i> (<i>s.d.</i>)	T-test	P-value	Para <i>M</i> (<i>s.d.</i>)	Tetra <i>M</i> (<i>s.d.</i>)	T-test	P-value
Escape-oriented factor	0.11	-0.07	3.19 (1.90)	3.50 (1.46)	-1.24	0.22	3.10 (1.68)	3.72 (1.75)	2.37	0.02
Distraction	0.12	-0.18	1.33 (1.00)	1.31 (0.89)	0.14	0.89	1.15 (0.88)	1.61 (1.00)	3.26	<0.01*
Social withdrawal	0.24*	-0.21*	1.13 (1.11)	1.10 (1.05)	0.20	0.84	1.16 (1.07)	1.06 (1.10)	-0.58	0.56
Cognitive restructuring	0.08	-0.05	1.81 (1.09)	2.01 (0.90)	-1.39	0.17	1.81 (1.01)	2.04 (1.02)	1.52	0.13
Self-criticism	0.16	-0.16	0.74 (0.96)	0.77 (0.95)	-0.20	0.84	0.73 (0.93)	0.79 (0.99)	0.41	0.68
Blaming others	0.01	-0.15	0.60 (0.93)	0.68 (1.01)	-0.58	0.57	0.66 (0.94)	0.58 (1.00)	-0.53	0.60
Problem solving	0.10	-0.06	1.38 (1.13)	1.49 (0.98)	-0.66	0.51	1.29 (1.07)	1.67 (1.01)	2.39	0.02
ER: yelling	-0.09	-0.02	0.83 (0.95)	0.94 (1.00)	-0.75	0.45	0.86 (1.01)	0.90 (0.91)	0.23	0.82
ER: calming	-0.08	-0.05	1.29 (1.14)	1.54 (1.10)	-1.49	0.14	1.43 (1.12)	1.34 (1.14)	-0.48	0.63
Wishful thinking	-0.01	-0.34*	1.40 (1.06)	1.73 (1.11)	-2.02	0.05	1.53 (1.11)	1.57 (1.06)	0.22	0.83
Social support	-0.01	-0.03	1.24 (1.07)	1.63 (0.99)	-2.50	0.01	1.37 (1.07)	1.46 (1.02)	0.55	0.58
Resignation	0.10	-0.13	1.90 (1.19)	1.72 (1.09)	1.08	0.28	1.86 (1.12)	1.76 (1.21)	-0.56	0.57

Abbreviations: ER, emotional regulation; Para, adolescents with paraplegia; Tetra, adolescents with tetraplegia.
 Note: (*r*) = Pearson product-moment correlation; T-test degrees of freedom = 180. **P*<0.004 (Bonferroni adjustment for 12 comparisons).

Table 5 Pearson's Correlations between Coping Strategies, Escape-Oriented Coping and Psychosocial Outcomes

	Child PedsQL	Parent PedsQL	CDI	RCMAS
Escape oriented	-0.49*	-0.33*	0.52*	0.53*
Distraction	-0.28*	-0.28*	0.28*	0.34*
Social withdrawal	-0.31*	-0.14	0.37*	0.28*
Cognitive restructuring	-0.02	-0.02	-0.16	0.07
Self-criticism	-0.24*	-0.22	0.34*	0.26*
Blaming others	-0.27*	-0.27*	0.18	0.25*
Problem solving	-0.06	-0.07	-0.03	0.20
Emotional regulation: yelling	-0.42*	-0.16	0.46*	0.35*
Emotional regulation: calming	-0.18	-0.16	0.15	0.26*
Wishful thinking	-0.37*	-0.18	0.41*	0.39*
Social support	-0.10	-0.09	0.04	0.22
Resignation	0.06	-0.01	-0.01	-0.09

Abbreviations: CDI, Children's Depression Inventory; RCMAS, Revised Children's Manifest Anxiety Survey.
 Note: Child PedsQL, *n* = 181; Parent PedsQL, *n* = 151; CDI = 136; RCMAS = 144. **P*<0.004 (Bonferroni adjustment for 12 comparisons).

Given that adolescents use an array of strategies to cope with SCI-related stress, it is important to also examine the interrelationships among coping strategies. The EFA indicated one strong factor comprising escape-oriented coping strategies and two less-reliable factors comprising more positive or adaptive strategies. The escape-oriented factor was similar to an escape-oriented factor described previously,⁶ which comprised distraction, social withdrawal, self-criticism, blaming others, wishful thinking, emotion regulation (outbursts) and resignation. In the current study, all these strategies (except for resignation) also loaded onto the escape-oriented factor; therefore, for consistency, the escape-oriented label was retained.

The factor analysis also extracted two unreliable factors, which comprised strategies that have been associated with positive psychosocial outcomes among adults with pediatric-onset SCI.⁷ Each factor, however, comprised only two items and lacked internal consistency. This suggests that the Kidcope may not provide adequate coverage of more adaptive coping styles used by adolescents with SCI. Considering that levels of anxiety and depression in youth with SCI are comparable to the general population,¹⁶ many youth with SCI may rely on a variety of

Table 6 Summary of hierarchical linear regressions for escape-oriented coping predicting psychosocial outcomes

Predictor	Psychosocial outcomes							
	Child PedsQL		Parent PedsQL		CDI		RCMAS	
	Δ <i>R</i> ²	β	Δ <i>R</i> ²	B	Δ <i>R</i> ²	β	Δ <i>R</i> ²	β
Step 1	0.08*		0.06*		0.06		0.11*	
Control variables								
Step 2	0.20**		0.08**		0.25**		0.24**	
Escape-oriented		-0.47**		-0.30**		0.53**		0.50**
Total <i>R</i> ²	0.28**		0.14*		0.32**		0.35**	

Abbreviations: CDI, Children's Depression Inventory; RCMAS, Revised Children's Manifest Anxiety Survey.
 Note: Control variables included age at interview, age at injury, sex and injury level. Child PedsQL, *n* = 181; Parent PedsQL, *n* = 151; CDI = 136; RCMAS = 144.
 **P*<0.05.
 ***P*<0.001.

positive coping strategies, which promote emotional well-being. For example, some individuals with SCI have indicated that they cope by comparing themselves with individuals who are worse off or by having a fighting spirit.¹⁷ To account for such processes, more comprehensive measures of coping and resilience may be needed to more effectively measure positive coping and psychosocial outcomes in pediatric SCI.

Consistent with coping in other pediatric populations, coping strategy use was also associated with demographic and injury-related factors in adolescents with SCI. Generally, adolescents who were older, recently injured or who had tetraplegia used escape-oriented strategies more often. Avoidance has been elevated among individuals with SCI¹⁸ and has been shown to be a risk factor for psychopathology in the general population.¹⁹ Similarly, the current study found that individuals who were high on escape-oriented coping had increased depression and anxiety symptom severity and decreased psychosocial QOL as rated by themselves and their caregiver. Individual escape-oriented strategies were also consistently associated with increased

depression and anxiety and a lower self- and parent-reported QOL. Although escape-oriented coping may be beneficial in the short term (for example, using distraction to cope with discomfort), the continued reliance on escape-oriented strategies may make it more difficult to adapt to SCI in the long term.

With respect to clinical implications, adolescents with SCI who largely use escape-oriented strategies may be at greater risk for maladjustment. Therefore, in order to support adolescents with SCI both during rehabilitation and after rehabilitation, clinicians may attempt to decrease the use of these strategies through the use of techniques such as cognitive behavioral therapy. As individuals rely less on escape-oriented strategies, they may be better able to adapt to SCI-related stress.

These findings need to be considered in light of study limitations. First, the Kidcope is a brief measure of coping in youth. It was not designed specifically for youth with chronic medical conditions who face many unique daily stressors. Second, the cross-sectional nature of this study does not allow for interpretation of the directionality of relationships between coping and psychosocial outcomes. Future longitudinal research would allow for a more thorough examination of the dynamic process of coping in youth with SCI. Third, two of the main tools in this study were focused on measuring psychological deficits (that is, depression and anxiety); future research may also examine how coping relates to the promotion of emotional well-being. Fourth, the participants were recruited from a single-hospital system in the United States so may not be representative of the population of adolescents with SCI. Finally, in the future, larger studies should examine the impact that interactions between demographic/injury-related factors have on coping style in adolescents with SCI.

In conclusion, adolescents with SCI use a variety of coping strategies when addressing SCI-related stressors. In particular, escape-oriented coping is associated with maladaptive psychosocial outcomes. Interventions aimed at reducing escape-oriented coping, whereas broadening adolescent coping skills, may help to decrease distress and psychopathology. In addition, assessment of adolescent coping with SCI should include a broad spectrum of coping strategies, especially more positive or adaptive types.

DATA ARCHIVING

There were no data to deposit.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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