

## Coping strategies and health-related quality of life in children and adolescents with type 1 diabetes

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The aim of this study was to identify relationships between coping strategies and different aspects of health-related quality of life in children with type 1 diabetes measured with the Croatian translation of the PedsQL 4.0 Generic Core Scales and PedsQL Diabetes Module. The sample consisted of 199 schoolchildren: 47 patients with type 1 diabetes and 152 healthy children. Children health problems were rated with *PedsQL 4.0 Generic Core Scale* and with *PedsQL Diabetes Module*. Coping strategies were measured with *The Coping Strategies Inventory for Children and Adolescents*. The results showed that all subscales of the PedsQL 4.0 Generic Core Scales and the PedsQL Diabetes Module have satisfactory reliability with the majority of scales exceeding a Cronbach  $\alpha$  of 0,70. Significant correlations were found between coping strategies and different aspects of health-related quality of life and those correlations were higher in girls than in boys. The findings of the present study suggest that child psychologists and clinicians treating children and adolescents suffering diabetes should address coping strategies related to specific health-related problems and assist them in developing more effective ways of coping.

*Key words:* children, adolescents, diabetes mellitus type 1, health-related quality of life, coping, Pediatric Quality of Life Inventory™ (PedsQL™)

*Abbreviations:* HRQL – Health Related Quality of Life, PedsQL™ - Pediatric Quality of Life Inventory™, CSS- Coping Skills Training, PSS- The Psychosomatic Symptoms Questionnaire for Children and Adolescents, HbA1c- Glycated Hemoglobin

Diabetes mellitus is a syndrome of disordered metabolism, usually due to a combination of hereditary and environmental causes, resulting in abnormally high blood sugar levels (hyperglycemia). Blood glucose levels are controlled by the hormone insulin made in the beta cells of the pan-

creas. The two most common forms of diabetes are due to either a diminished production of insulin (in type 1), or diminished response by the body to insulin (in type 2). Type 1 diabetes typically develops in children and young adults. It is estimated that type 1 diabetes accounts from 5 to 10 percent of all diagnosed cases of diabetes. It is the most common chronic disease of childhood, exceeded only by asthma. Roughly one in every 400 to 600 children and adolescents has this type of diabetes (CDC, 2008).

Children and adolescents with type 1 diabetes are confronted with different medical conditions and a variety of stressful situations that require coping responses. In the present study, coping strategies are assumed to be consciously and deliberately used methods for regulating negative emotions or to manage situations in which there is a perceived discrepancy between stressful demands and available resources (Carr, 1999). A distinction is made between problem- and emotion-focused coping strategies or between functional and dysfunctional strategies (Fields & Prinz, 1997). Problem- focused coping refers to effort directed toward rational management of a problem and it is aimed at changing the situation causing distress. Emotion-focused coping implies efforts to reduce emotional distress caused

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by stressful event and to manage or regulate emotions that might accompany or result from the stressor.

Research generally suggests that coping is an important factor in psychological adaptation to chronic stressors such as physical illnesses (Marsac, Funk, & Nelson, 2006; Tuncay, Musabak, Gok, & Kutlu, 2008). Active ways of coping like problem solving, cognitive distraction, self-calming and asking for help from others, contribute to better adaptation and decrease psychological and somatic symptoms, in contrast to the more passive ways of coping like avoidance and social isolation (Compas, Malcarne, & Fondacaro, 1988).

Some studies tried to answer the question how coping styles are related to quality of life in children and adolescents with type 1 diabetes. Most studies found a positive association between active, problem-focused coping behavior and an improved quality of life (Rose, Fliege, Hildebrandt, Schirop, & Klapp, 2002; Graue, Wentzel-Larsen, Bru, Hanestad, & Sovik, 2004) found that lower scores on diabetes-specific quality of life were significantly related to greater use of emotion-focused coping. Nevertheless, frequent use of mental disengagement was significantly related to lower degree of perceived diabetes-related impact. Similar results were also found by Tuncay, Musabak, Gok, & Kutlu (2008). Importantly, intervention studies in individuals with diabetes showed that participants who received Coping Skills Training (CST) had lower HbA1c levels and reported less distress than participants who did not receive CST (Ryff, 2008; Grey et al., 2009).

Health-related quality of life (HRQL) has been increasingly recognized as an important factor in outcomes assessment of individuals with diabetes. HRQL is conceptualized as patient's perceptions of the impact of disease and treatment on functioning in a variety of dimensions including physical, mental, and social domains (Varni, Seid, & Rode, 1999).

The Pediatric Quality of Life Inventory (PedsQL) measurement model was designed to integrate the merits of generic and disease-specific instruments. While disease-specific measures may enhance measurement sensitivity for health domains closely related to a particular chronic condition, the utilization of a generic HRQL instrument enables comparisons across groups and bench-marking with healthy populations (Varni, Seid, & Kurtin, 2001).

The PedsQL 4.0 Generic Core Scales distinguish between healthy children and pediatric patients with acute or chronic health conditions (Varni et al., 2001) and they have demonstrated sensitivity, responsiveness and an impact on clinical decision making (Varni et al., 2002). The PedsQL 3.0 Type 1 Diabetes Module was developed to measure disease-specific HRQL for children with type 1 diabetes (Varni et al., 2003). It was designed to measure five aspects of illness: diabetes symptoms, treatment barriers, treatment adherence, worry and communication.

Since research results generally suggests that coping is an important factor in psychological adaptation to chronic

stressors such as physical illnesses the goal of this study was to examine the relationships among coping strategies and different aspects of general and diabetes-related quality of life in children with type 1 diabetes. It was hypothesized that problem-focused coping strategies would be positively associated and emotion-focused coping strategies negatively associated with higher levels of perceived health-related quality of life.

Furthermore, it was expected that healthy children would report higher PedsQL 4.0 scores than patients with type 1 diabetes based on previous PedsQL 4.0 findings with other pediatric chronic conditions (Varni et al., 2001; 2002; Varni, Burwinkle, Katz, Meeske & Dickinson, 2002).

## METHOD

### *Participants*

Two samples were examined. (1) A group of schoolchildren with diabetes type 1 ( $N=47$ ) in pediatric care. This is sub-sample from an ongoing study on psychosocial aspects of health in children and adolescence in six cities in Croatia. It includes individuals who met established criteria for identifying diabetes type 1 and were referred for examination by pediatric care. The children originally were seen through an outpatient clinic at 4 hospitals in Croatia over a 6 month period because of their regular medical examination. The children's diabetes problems were rated by an experienced pediatric specialist. A total of 47 subjects aged between 10 and 17 years (24 boys and 23 girls) were included in the study. (2) A group of healthy children ( $N=152$ ) from the *Psychosomatic Symptoms Questionnaire for Children and Adolescents*- PSS (described later) standardization sample. PSS was administered in the sample of 278 primary school children. An inclusion criterion for this group was established according to the answer *No* to the third question in PSS: *Do you suffer from an illness such as asthma, allergy, diabetes, etc.?* A total of 152 subjects (60 boys and 92 girls) fulfilled this inclusion criteria and were enrolled.

### *Measures*

Four self-report questionnaires were used in this study.

1) *The Psychosomatic Symptoms Questionnaire for Children and Adolescents* (PSS) (Vulić-Prtorić, 2005) is a 35-item scale that inquires about 35 somatic symptoms and sensations (cardiovascular, respiratory, gastrointestinal, dermatological, pseudoneurological, and pain/weakness). The participants scored each symptom for frequency (*How often did you have this problem in the last 3 months?*) as 1 (never), 2 (a few times a month), 3 (a few times a week), 4 (almost every day). PSS includes also 3 additional questions. The first is *How would you value*

*your health in generally?* (1= bad, 2= moderate, 3= very good, 4= excellent); in the second subjects are asked *Did you need to go to a physician due to the problems you experienced?* (1= yes, 2= no). The third question was about the general health status of the subjects and it asked *Do you suffer from any illnesses such as asthma, allergies, diabetes, etc.?* (1= yes, 2= no). Instead of serving as an outcome measure, PSS was used in this study to help select participants for the control groups.

- 2) *The Coping Strategies Inventory for Children and Adolescents* (Vulić-Prtorić, 2002) is the 58 item self-report instrument that measures the frequency and effectiveness of coping strategies used by children and adolescents in response to stressful events. This scale is divided into 7 subscales with conceptually distinct coping categories. The children scored each coping strategy for frequency of use in their efforts to deal with stress situation (Frequency scale) and then for degree of helpfulness (Effectiveness scale). A 4-point Likert scale was used for ratings: from 0= *Never* to 3= *Very often* for Frequency scale and from 0= *Not helpful at all* to 3= *Very helpful* for Effectiveness scale. Internal consistency for the seven subscales was established in the representative sample of 573 children and adolescents and appeared to be moderate to high (from .67 to .83). Up to date this instrument was used in 14 studies in community and clinical samples of children and adolescents (Vulić-Prtorić, 2002). Only frequency scale data were used in this study.
- 3) *The PedsQL 4.0 Generic Core Scales* (Varni et al., 1999) is the 23-item multidimensional instrument for measuring health-related quality of life. It encompasses 4 scales: 1) physical functioning (8 items), 2) emotional functioning (5 items), 3) social functioning (5 items) and 4) school functioning (5 items). The PedsQL 4.0 Generic Core Scales are comprised of parallel child self-report and parent proxy-report formats. Child self-report includes ages 5-7 years (young child), ages 8-12 years (child), ages 13-18 years (adolescent). The parent proxy-report forms are designed to assess the parent's perception of their child's health-related quality of life. The items for each of the forms are essentially identical, differing in developmentally appropriate language or in first-versus third-person tense. According to the instructions, participants were to rate to what extent they experienced particular problem described in each of the items during the past one month. A five-point scale was transformed into the 0-100 scale (0=100, 1=75, 2=50, 3=25, 4=0), so that higher scores indicate better HRQL. Scale scores were computed as the sum of the item scores divided by the number of items answered. The original PedsQL 4.0 showed good internal consistency, construct validity and known groups' validity in large samples of healthy and ill children (Varni et al., 2001), cancer patients on- and off-treatment (Varni, Burwinkle et al., 2002), patients with rheumatic diseases and patients recruited from pediatric cardiology, or-

thopedics and rheumatology clinics (Varni, Seid et al., 2002). Since this was the first time this instrument was used in Croatia, three independent translations were conducted by psychology professor and one psychology student as well as by the English professor. The translators discussed semantic and conceptual discrepancies and finally developed a consensus toward translation.

- 4) *The PedsQL 3.0 Type 1 Diabetes Module* (Varni et al., 2003) is the 28-item multidimensional instrument which encompasses five scales: diabetes symptoms (11 items); treatment barriers (4 items); treatment adherence (7 items); worry (3 items); and communication (3 items). The format, instructions, Likert-type response scale, and scoring method are identical to the PedsQL 4.0 Generic Core Scales, with higher scores indicating fewer symptoms or problems. The PedsQL 3.0 Diabetes Module development consisted of a review of literature, patient and parent focus groups and individual focus interviews, item generation, cognitive interviewing, pretesting and subsequent field testing. Original version of PedsQL Diabetes Module showed satisfactory reliability in terms of internal consistency with all scales exceeding the recommended minimum  $\alpha$ -coefficient standard of .70 for group comparisons for child self-report for ages 8-18 years, and parent proxy-report for ages 2-18 years. For young-child self-report ages 5-7 years, only the treatment adherence scale met .70 standards for group comparison (Varni et al., 2003). The procedure of translation and linguistic validation of this questionnaire was the same as for the PedsQL 4.0 Generic Core Scales.

#### *Procedure*

Subjects were approached when they came to outpatients clinics in 4 towns in Croatia (Zadar, Zagreb, Osijek and Split) for a medical check-up. The questionnaires and results presented in this paper were only a part of the broader battery of instruments dealing with psychosocial aspects of health during childhood and adolescence.

#### *Statistical analysis*

PedsQL 4.0 Generic Core Scales scores in groups differing in known health condition (healthy children and children with type 1 diabetes) were computed using one-way ANOVA. Independent T-test was performed to examine gender differences in coping strategies. Spearman Rank Order Correlations were calculated to examine the relationships between coping strategies and different dimensions of health-related quality of life.

## RESULTS AND DISCUSSION

All self-report scales for the Croatian version of PedsQL 4.0 Generic Core Scales approached or exceeded the

minimum reliability standard of .70 for group comparisons with Cronbach  $\alpha$ -coefficients from .71 for *School functioning* to .81 for *Social functioning* in the sample of healthy children, and from .76 for *School functioning* to .82 for *Social functioning* in the sample of children with diabetes. All subscales of PedsQL Diabetes Module also exceeded high Cronbach  $\alpha$ -coefficients from .76 for *Treatment barriers* to .86 for *Diabetes symptoms*. The results of psychometric validation of the Croatian version of these two PedsQL scales were presented elsewhere (Vulić-Prtorić et al., 2009).

Unlike the items from PedsQL 4.0 Generic Core Scales, two items from original PedsQL Diabetes Module were excluded from further analyses due to their low correlations ( $r < .20$ ) with total scores on the scales. Those two items are: "It is hard for me to prick my finger or give insulin shots" (scale *Treatment barriers*) and "It is hard for me to wear my id bracelet" (scale *Treatment adherence*). Their correlations with total score on the scale are .19 and .06, respectively, while all other items correlate at .43 or higher. Thus it was decided to remove those items from further analysis. This was expectable result for item considering wearing id bracelets because wearing such bracelets is not common among young people with type 1 diabetes in Croatia and in this sense this item does not apply to Croatian population of children and adolescents with diabetes. It is less clear why item "It is hard for me to prick my finger or give insulin shots" is low correlated with the total scale score (some of the possible reasons are: ambiguity of the item, giving insulin shots and pricking finger are routine activities for diabetics, injections for diabetic patients are nowadays very sophisticated and cause less pain etc.). These findings ask for further investigations on larger samples of children with type 1 diabetes.

Table 1 demonstrates the comparisons between the PedsQL 4.0 Generic Core Scales for healthy children and children with type 1 diabetes. Results show that the level of reported quality of life for the sample of patients with type 1 diabetes is similar to that of healthy children. The only difference was found in school functioning where children with diabetes reported more problems than healthy children.

It seems surprising that despite of all difficulties that children with diabetes are faced with because of their ill-

ness (everyday insulin injections, blood glucose checks, frequent snacks etc.) youths with diabetes do not perceive a compromised quality of life. Other investigators have also reported that children with diabetes generally do not have severe psychological problems and when they do struggle, it is often in the social-emotional and peer relationship areas of functioning (Laffel et al., 2003).

The similarity in HRQL between children with diabetes and their healthy peers has been noted elsewhere (Varni et al., 2003; Upton et al., 2005; Nardi et al., 2008), but this is not the case with other chronic conditions like cancer and pediatric rheumatology (Varni, Burwinkle et al., 2002; Varni, Seid et al., 2002). One of the possible explanations is offered by Upton and al. (2005) who suggested that such findings probably do not indicate that there are some problems with PedsQL™ measurement, but might speak of a meaningful difference in the health-related quality of life of children with diabetes and those with other chronic health problems. However, it still remains unclear what are the origins of these differences (good diabetes management, positive support from parents and medical staff, good disease knowledge or some other factors).

Also, our results could be explained by the fact that PedsQL 4.0 Generic Core Scales questionnaire does not directly address issues related to nutrition and exercise, two fundamental components of diabetes management that are primary to a child's sense of spontaneity and well-being (Laffel et al., 2003). Again, the results stress the importance of taking into account not only measures of general HRQL but also diseases-specific measures.

*Relationships between coping strategies and different dimensions of general HRQL*

Since significant gender differences were found in frequency of use of different coping strategies (Table 2) relationships between coping strategies and dimensions of

Table 1

PedsQL 4.0 Generic Core Scales- differences between healthy (N=152) and children with type 1 diabetes (N=47)

	M healthy	M diabetes	df	F
Physical health	77.85	78.72	1	0.13
Emotional functioning	68.08	68.30	1	0.005
Social functioning	90.47	89.26	1	0.28
School functioning	76.51	67.77	1	9.10*

Note. \*  $p < .05$ .

Table 2

Coping strategies (frequencies): gender differences among children with type 1 diabetes ( $N_{boys}=24, N_{girls}=23$ )

	M boys	M girls	t
Problem solving	1.75	1.75	-0.01
Avoidance	0.83	1.26	-2.38*
Expressing feelings	0.35	0.70	-2.45*
Social support-friends	1.12	1.73	-3.25*
Social support-family	1.26	1.58	-1.54
Cognitive restructuring	1.30	1.44	-0.66
Distraction	1.26	1.60	-4.09*

Note. \*  $p < .05$ .



Table 3  
Relationships between coping strategies and dimensions of PedsQL in boys with type 1 diabetes

PedsQL 4.0 Generic Core → COPING STRATEGIES ↓	Physical health	Emotional functioning	Social functioning	School functioning
Problem solving	0.15	0.12	0.09	0.02
Avoidance	-0.22	-0.22	-0.11	-0.13
Expressing feelings	-0.36	-0.23	-0.13	-0.01
Social support-friends	0.09	0.04	0.06	-0.15
Social support-family	0.28	0.33	0.13	0.27
Cognitive restructuring	0.08	-0.01	0.02	-0.05
Distraction	0.13	0.35	0.17	0.37

Table 4  
Relationships between coping strategies and dimensions of PedsQL in girls with type 1 diabetes

PedsQL 4.0 Generic Core → COPING STRATEGIES ↓	Physical health	Emotional functioning	Social functioning	School functioning
Problem solving	-0.17	-0.11	-0.04	-0.30
Avoidance	-0.47*	-0.51*	-0.16	-0.56*
Expressing feelings	-0.28	-0.32	0.06	-0.17
Social support-friends	-0.53*	-0.43*	-0.15	-0.50*
Social support-family	-0.13	0.04	0.05	-0.02
Cognitive restructuring	-0.38	-0.14	0.00	-0.21
Distraction	-0.01	0.11	0.31	-0.17

Note. \* $p < .05$ .

HRQL were performed separately for boys ( $N=24$ ) and girls ( $N=23$ ) with type 1 diabetes.

There were no significant correlations between coping strategies and dimensions of general HRQOL in boys with type 1 diabetes (Table 3). To the contrary, in girls with type 1 diabetes greater use of *Avoidance* and *Seeking for social support from friends* was correlated with more problems in physical, emotional and school functioning (Table 4).

*Avoidance* is emotion-focused coping representing cognitive attempts to avoid thinking about problem in stressful situation. It includes the use of fantasy, wishful thinking or imagining that the situation was better. Avoidance permits the regulation of negative mood states that arise from exposure to stress situation and do little to alter the source of the stress. It is well documented strategy for dealing with anxiety as a part of health problems (Spilberger & Rickman, 1990). But, it appears that in some cases the avoidance ways of dealing with stress situations could even elicit symptoms of different psychological and health problems (Compas et al., 1988; Herman-Stahl, Stemmler, & Peterson, 1995; Fields & Prinz, 1997; Tuncay et al., 2008).

*Seeking for social support from friends* is coping strategy that includes use of other people as resources of emotional comfort as well as of assistance in seeking solutions to the problems or of direct task assistance. In this case, it refers more to seeking support in regulating negative mood

states that arise from stress situation than seeking solutions to the problem (Vulić-Prtorić, 2002). Like *Avoidance*, this strategy does not lead to the solution of the problem and, in the long run, can have negative influence on individuals' physical and psychosocial functioning.

#### *Relationships between coping strategies and different dimensions of diabetes-related quality of life*

Relationships between coping strategies and different dimensions of diabetes-related quality of life were also performed separately for boys and girls with type 1 diabetes.

Results show that boys who experience more diabetes symptoms and girls who have more worries about the disease use *Problem solving* more frequently. Problem solving is active coping strategy directed toward rational management of a problem and this finding disagrees with results of some studies which found that active ways of coping are associated with better psychosocial adjustment (Compas et al., 1988; Rose et al., 2002). This might be explained by the reciprocal relation between adjustment and coping suggested by Aldwin and Revenson (1987, cited in Zehnder, Prchal, Vollrath, & Landolt, 2006), where active coping affects psychosocial adjustment, but psychosocial adjustment in turn activates coping. Also, characteristics of the situation should be taken into account because they can influence

Table 5  
Relationships between coping strategies and dimensions of PedsQL Diabetes Module in boys with type 1 diabetes

PedsQL Diabetes Module → COPING STRATEGIES ↓	Diabetes symptoms	Treatment barriers	Treatment adherence	Worry	Communication
Problem solving	-0.41*	-0.30	-0.32	-0.35	-0.07
Avoidance	-0.53*	-0.35	-0.45*	-0.38	-0.13
Expressing feelings	0.04	-0.05	-0.14	-0.19	-0.27
Social support-friends	-0.29	-0.28	-0.38	-0.15	-0.16
Social support-family	-0.19	0.13	0.01	0.00	0.09
Cognitive restructuring	-0.55*	-0.26	-0.47*	-0.27	-0.08
Distraction	0.05	0.31	0.23	0.04	0.46*

Note. \* $p < .05$ .

Table 6  
Relationships between coping strategies and dimensions of PedsQL Diabetes Module in girls with type 1 diabetes

PedsQL Diabetes Module → COPING STRATEGIES ↓	Diabetes symptoms	Treatment barriers	Treatment adherence	Worry	Communication
Problem solving	-0.33	-0.08	-0.25	-0.47*	0.10
Avoidance	-0.70*	-0.52*	-0.68*	-0.68*	-0.51*
Expressing feelings	-0.32	-0.73*	-0.77*	-0.50*	-0.59*
Social support-friends	-0.57*	-0.22	-0.52*	-0.73*	-0.36
Social support-family	-0.09	0.30	0.08	-0.20	0.16
Cognitive restructuring	-0.40	-0.16	-0.37	-0.41*	-0.11
Distraction	-0.20	0.02	-0.12	-0.23	0.16

Note. \* $p < .05$ .

coping effectiveness. It has been suggested that active coping strategies could be maladaptive in uncontrollable situations, such as chronic illness (Vulić-Prtorić, 1998; Zehnder et al., 2006).

Greater use of emotion-focused coping strategies (*Avoidance*, *Cognitive restructuring*, *Expressing feelings* and *Seeking for social support from friends*) is associated with more problems on different dimensions of diabetes-related quality of life in boys and girls with type 1 diabetes (Tables 5 and 6). Several studies (Compas et al., 1988; Spilberger & Rickman, 1990; Zehnder et al., 2006) showed that using emotion-focused coping strategies may have positive adjustment effects in a short-term perspective but not in the long-term use.

Finally, in boys with type 1 diabetes greater use of *Distraction* is associated with fewer problems in communication about the disease with medical staff and other people. *Distraction* is emotion-focused coping strategy which includes efforts to avoid thinking about the problem situation by using distracting stimuli, entertainment, or some distracting activity. Together with avoidance it is a palliative coping strategy that provides temporary reduction of stress and anxiety and consequently could help in reducing some health and psychological problems.

The results presented in Tables 3, 4, 5 and 6 show that the relationships found between coping strategies and the dimensions of general and diabetes related quality of life largely apply to the girls' sample. Such findings suggest that diabetes can have differential impacts on the adjustment of boys and girls.

Finally, the findings of this study suggest that child psychologists and clinicians treating children suffering from diabetes should address coping strategies related to specific health-related problems and assist them in developing more effective ways of coping. Furthermore, specific attention should be given to the girls, because they tend to use coping strategies that could be considered as a risk factor for poorer quality of life.

For the future studies, In conclusion, it is worth noting that this study is cross-sectional and does not allow causal inferences on the relationships between measured constructs. Rather, the results indicated the consistency with which emotion-focused coping behaviors are associated with poorer outcomes in youths with diabetes. The use of such behaviors might therefore be considered a kind of risk factor marker for poorer quality of life of these children.

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