Predictive Factors of Mental Health and Psychological Distress in Children and Adolescents With Juvenile Idiopathic Arthritis

Lana Žigić Antić[1], Vicko Ćudina[2], Miroslav Harjaček[3], Mandica Vidović[4], Nataša Jokić-Begić[5] and Lovro Lamot[6,7]

[1] Department of Pediatrics, Sestre milosrdnice University Hospital Center, Zagreb, Croatia;
[2] Ivo Pilar Institute of Social Sciences, Zagreb, Croatia;
[3] Department of Pediatric and Adolescent Rheumatology, Srebrnjak Children's Hospital, Zagreb, Croatia;
[4] Department of Pediatrics, Division of Pulmonology, Allergology, Immunology and Rheumatology, Zagreb Children's Hospital, Zagreb, Croatia;
[5] University of Zagreb, Faculty of Humanities and Social Sciences, Zagreb, Croatia;
[6] Department of Pediatrics, Zagreb University Hospital Center, Zagreb, Croatia;
[7] Department of Pediatrics, University of Zagreb School of Medicine, Zagreb, Croatia

CORRESPONDENCE TO Lana Žigić Antić, Department of Pediatrics, Sestre milosrdnice University Hospital Center, Vinogradska c. 29, HR-10000 Zagreb, Croatia
lana.zigic@kbcsm.hr

RECEIVED May 28, 2025
ACCEPTED October 13, 2025

DOI 10.20471/acc.2026.65.03.05

SUMMARY

Mental health is a state of the body in which a person realizes their abilities, can cope with everyday stress, and contribute to their community. Mental health is on a continuum, so people can have impaired mental health, but without the presence of a mental illness, and *vice versa*. Juvenile idiopathic arthritis (JIA) is one of the most common chronic inflammatory diseases in children that begins before the age of 16, and manifests by inflammation of one or more joints that lasts for at least 6 weeks, has an unknown etiology, and occurs in all age groups. Children with JIA frequently experience emotional challenges and impairments in daily functioning. This study aimed to examine the significance of some biological (age), psychological (trait anxiety and anxiety sensitivity) and social (family and social support) factors on mental health and psychological distress. The study included 70 children and adolescents diagnosed with JIA by pediatric specialists and subspecialists in pediatric rheumatology. The results indicate a significant predictive contribution of age, trait anxiety, and social support to mental health, while trait anxiety was found to be a significant predictor of psychological distress. Future research should deepen understanding of these associations.

KEYWORDS

Juvenile idiopathic arthritis; *Mental health*; *Children*; *Adolescents*; *Biopsychosocial model*

Introduction

According to the World Health Organization, mental health is an integral part of overall health, and is defined as a state in which a person realizes his or her own abilities, is able to cope with everyday stress, work productively and fruitfully, and contributes to his or her community[1]. It means much more than the mere absence of mental illness, and includes various positive outcomes (self-esteem, positive self-image, self-efficacy, happiness, and optimism)[2]. In clinical psychology, the bipolar model of the relationship between mental health and mental disorders has long prevailed[3], and is primarily focused on the presence or absence of mental disorders[4]. Given the shortcomings of the aforementioned model, a dual model of mental health has emerged, according to which mental health and mental disorders/illnesses are considered related, but distinct constructs whereby individuals can experience a high level of health even with a diagnosis of mental illness[5]. The dual model of mental health integrates psychopathology and subjective emotional well-being and places them in a coordinate system, emphasizing that the absence of psychopathology alone is not a sufficient indicator of the presence of emotional well-being[6], and emotional well-being is used in the literature to define positive psychological health. Unpleasant emotions can be present in normal mood swings, but they can also be an indicator of psychological disorders. Depending on the type of unpleasant emotions, their intensity, and the degree to which they affect and interfere with daily functioning, we can determine whether they are short-term disturbances or signs of permanent psychological problems[7]. Psychological distress is often defined as a specific unpleasant emotional state that a person experiences when faced with a stressor, which results in temporary or permanent harmful consequences for the person[8].

Also, modern approaches emphasize the importance of biological, psychological and social factors in the development of mental disorders/illnesses. Risk factors for the development of mental disorders include social isolation, high school obligations and school pressure, low self-esteem, poor body image, drug and alcohol use, and trauma or stressful life events[9]. Protective factors for mental health include personality traits (high self-efficacy and optimism), family support, authoritative parenting style, positive parent-child relationships, supportive parents, and social support outside the family (friends and teachers)[10].

Juvenile idiopathic arthritis (JIA) is one of the most common chronic inflammatory diseases in children that begins before the age of 16. It is manifested by inflammation of one or more joints that lasts for at least 6 weeks, has an unknown etiology, and occurs in all age groups[11]. The disease is present in all races and on all continents, and the estimated prevalence in the world, including Croatia, is 3.8-400/100,000 children[12]. Children with JIA face numerous difficulties, including dependence on family, peer isolation, and a number of physical difficulties[13]. To our knowledge, there is no research that has examined the risk and protective factors of mental health and psychological distress as a measure of psychopathological deviation in children and adolescents with JIA. Data obtained from previous research in the field of mental health of children and young people with chronic pain are inconsistent. Research shows that children and young people with JIA have more psychological problems compared to the healthy population, and the earlier age at onset carries a greater risk for the development of certain psychiatric disorders[14]. Other studies have found no difference in mental health and psychiatric disorders in children and young people with JIA compared to the healthy population[15,16]. The study by Russo *et al.*[17] did not show any difference in psychological functioning (depression, anxiety and behavior) in children and youth with JIA compared to healthy children, as did the study by Hanns *et al.*[18]. Some studies show that children with JIA report lower

levels of stress and trait anxiety[19], while on the other hand they report higher levels of anxiety, depression, withdrawal, somatization difficulties, difficulties in following rules, as well as social difficulties compared to healthy children[20]. Anxiety sensitivity is a construct that refers to the fear of anxiety symptoms and physical sensations associated with anxiety, and which arises from the belief that anxiety and related physical sensations can have negative physical, psychological and social consequences. A person with high levels of anxiety sensitivity will interpret a sudden rapid heartbeat as a sign of an impending heart attack, will experience even greater anxiety, which will cause even stronger heart palpitations, and thus will find themselves in a vicious cycle[21]. Also, higher anxiety sensitivity is associated with poorer perceptions of general and mental health, more difficulties in family activities, lower self-esteem, more behavioral difficulties, and more social and academic limitations[22]. Moreover, anxiety sensitivity has been shown to be significant in the experience of chronic pain in children[23].

The purpose of this study was to examine the role of age, trait anxiety, anxiety sensitivity, and family and social support in mental health and distress (psychological distress), especially considering the lack of research examining the predictive significance of the biological, psychological, and social variables on mental health and psychological distress in children and youth with JIA. We predicted that psychological, biological, and social variables would have different predictive values for explaining mental health and psychological distress in children and youth with JIA, with psychological and social variables having a greater predictive value than some biological variables for mental health and psychological distress. In more detail, older subjects would have poorer mental health and higher levels of psychological distress, psychological variables (anxiety and anxiety sensitivity) would negatively predict mental health and positively predict psychological distress, while social variables (family and social support) would positively predict mental health and negatively predict psychological distress.

Subjects and methods

The study included 70 subjects diagnosed with JIA by a pediatrist subspecialized in pediatric rheumatology (Table 1). Patients filled out questionnaires during regular check-up at the Rheumatology Unit, Department of Pediatrics, Sestre milosrdnice University Hospital Center, Zagreb, Croatia. The study included children and adolescents aged 9-20 years (54 females and 16 males), mean age 12.77 years. Depending on their education, the majority of subjects attended primary school (74.3%), 22.9% attended secondary school, and 2.9% completed secondary school. Concerning school success, 54.3% were excellent, 37.1% were very good, and 8.6% were good students.

A pediatric rheumatologist recruited patients during regular check-up. Then the subjects were given a battery of pencil-and-paper tests. All subjects and their parents/guardians were informed about the aims of the study, the voluntary nature of participation, and the possibility of withdrawing at any time without consequences. Subjects older than 14 years signed an informed consent, while for children younger than 14 years, the informed consent was signed by an accompanying parent/guardian. Subjects did not receive any compensation for participating in the study. The study was not anonymous, but only the researchers had access to patient data. We collected self-assessments of JIA activity phase from patients and their parents, but not from rheumatology specialists, and accordingly these data were not included in further analyses.

The study was approved by the Research Ethics Committees of the Sestre milosrdnice University

Hospital Center and School of Medicine, University of Zagreb, as the research was part of a doctoral study. Also, all procedures were in accordance with Helsinki Declaration of 1975, as revised in 1983. To achieve high reliability, joint personnel training and supervision were provided continuously during the study period. Highly trained staff managed all assessment tools. Ongoing rating and supervision were provided by one PhD student psychologist.

All subjects completed a battery of tests that was structured according to the age of subjects:

- **General data questionnaire** constructed for the purposes of this study that contains general and demographic data on the subjects (gender, age, level of education, and school performance).
- **State-Trait Anxiety Inventory – Children form and older form – personality trait subscale** (STAIC-T, STAI-T; personality trait subscale)[24,25] examine trait anxiety in children aged 9-12 years, and older than 12 years. Both versions contain 20 self-report items each. In our study, Cronbach α for STAIC-T was 0.80 suggesting high internal reliability, also high reliability was obtained in this study for STAI-T (Cronbach α=0.94). Total score is obtained by summing the items, some of the items are reverse scored, and ranges from 20 (no anxiety) to 60 (extremely anxious) in children form, and from 20 (no anxiety) to 80 (extremely anxious) in older form. Higher score means higher trait anxiety.
- **The Childhood Anxiety Sensitivity Index and Anxiety Sensitivity Index** (CASI, ASI)[26,27] assess fear of anxiety symptoms. Childhood form contains 18 self-report items, and is used in younger than 18 children and adolescents. ASI consists of 16 statements and is used in older than 18 subjects. Both forms have a superordinate general factor (obtained by summing the items used in this study) according to Reiss *et al.*[27], while Zvolensky *et al.*[28] propose three subscales: physical worry, psychological worry, and social worry. Higher score means higher anxiety sensitivity. High reliability of general factor was obtained in this study for both CASI (Cronbach α=0.90) and ASI (Cronbach α=0.95).
- **Young Person's Clinical Outcome in Routine Evaluation and Clinical Outcomes in Routine Evaluation – Outcome Measure** (CORE-YP, CORE-OM)[29,30] are questionnaires for the assessment of psychological distress and general psychopathological difficulties in children and adults, while CORE-YP is an adapted version of the CORE-OM questionnaire. CORE-YP is applied to children aged 11 to 16 years, while CORE-OM is used in those older than 16 years. Younger version has the same structure as the CORE-OM, and it examines emotional state, level of functioning, and risk of auto-aggressive behaviors. Higher score means more psychological distress and more potential psychopathological difficulties. In this study, high reliability was obtained for CORE-YP (Cronbach α=0.75) and CORE-OM (Cronbach α=0.96).
- According to Profaca[31], **Family Support Scale** [Croatian: *Ljestvica obiteljske potpore*] (FSS) constructed by the authors Vizek-Vidović and Vlahović-Štetić, is a questionnaire with 5 statements. Total score varies from 5 (less family support) to 15 (high family support). A higher score indicates higher family support. In our study, good reliability was obtained (Cronbach α=0.67); it should be taken into account that the scale consists of only 5 items.
- **Perception of Social Support Questionnaire** [Croatian: *Upitnik percepcije socijalne potpore]* (PSSQ)[32] measures perception of social support among classmates. It contains 17 self-report items. The original scale measures instrumental social support and social support for self-esteem. In the study by Klarin[33], a unidimensional construct (general perception of peer social support) was used. A higher score means higher social support. In our study, high reliability was obtained (Cronbach α=0.87).

- **Mental Health Continuum** – Short Form (MHC-SF)[34] has 14 statements that measure mental health[35,36]. It contains three subscales: emotional, social, and psychological well-being[35], while total score is obtained by summing the items. Higher score means higher positive mental health. In our study, high reliability for general factor was obtained (Cronbach α=0.92).

This manuscript was reviewed for grammar and clarity using ChatGPT-4. The specific prompt used was: 'Please review the text for grammar, clarity, and conciseness while maintaining scientific accuracy and formal tone'. No content generation or data analysis was performed using artificial intelligence.

Statistics

In order to carry out hierarchical regression analysis, the prerequisites for carrying out the mentioned statistical analyses were checked. The Kolmogorov-Smirnov test and Shapiro-Wilks test proved to be significant for the variables in the study; however, small deviations on the P-P plots and skewness and kurtosis values that were between -3 and 3 indicated small deviation from normal distribution[37,38]. Furthermore, descriptive data of variables and correlations between variables are presented. IBM SPSS Statistics 23.0.0 (IBM Corp, 2015) was used to perform all statistical analyses.

Results

The results present descriptive data, correlation analysis, and two hierarchical regression models. Initially, as described, appropriate versions of the CORE-YP/OM, STAI/C-T, and (C)ASI scales were used based on the age of the participants. Accordingly, their results were presented in the form of Z scores to allow for possible further testing.

Table 1. Descriptive data of observed characteristics

Characteristic	N	M	SD	Min	Max	Skewness	Kurtosis	K-S test
Age	70	12.77	2.65	8	20	0.38	-0,22	0.10*
STAI/C- T(Z)	70	0.00	1	-1.88	2.43	0.46	-0.16	0.10*
(C)ASI(Z)	70	0.00	1	-1.29	3.20	1.01	1.04	0.13*
FSS	70	13.60	1.63	8	15	-1.17	1.01	0.23*
PSSQ	70	70.19	10.34	35	81	-1.53	2.41	0.16*
MHC-SF	70	57.36	10.86	26	70	-0.90	0.11	0.17*
CORE-YP/OM(Z)	70	0.00	1	-1.41	3.52	1.07	1.23	0.14*

*p<0.01; N = total sample size; M = mean; SD = standard deviation; Min = minimum value; Max = maximum value; K-S test = Kolmogorov-Smirnov test; STAI/C-T = Stait-Trait Anxiety Inventory, State-Trait Anxiety Inventory for Children – Trait Subscale; (C)ASI = The (Childhood) Anxiety Sensitivity Index; (Z) = Z – value; FSS = Family Support Scale; PSSQ = Perception of Social Support Questionnaire; MHC-SF = Mental Health Continuum-Short Form; CORE-YP/OM = Young Person's Clinical Outcome in Routine Evaluation, Clinical Outcomes in Routine Evaluation-Outcome Measure.

Table 2. Pearson's correlation coefficients of observed characteristics

	1	2	3	4	5	6	7
1) Age	-	0.07	0.19	-0.31**	-0.09	-0.30*	0.11
2) STAI/C-T		-	0.42**	-0.45**	-0.23	-0.61**	0.71**
3) (C)ASI			-	-0.21	-0.11	-0.39**	0.41**
4) FSS				-	0.33**	0.52**	-0.36**
5) PSSQ					-	0.37**	-0.24*
6) MHC-SF						-	-0.73**
7) CORE-YP/OM							-

*p<0.05, **p<0.01; STAI/C = Stait-Trait Anxiety Inventory, State-Trait Anxiety Inventory for Children – Trait Subscale; (C)ASI = The (Childhood) Anxiety Sensitivity Index; FSS = Family Support Scale; PSSQ = Perception of Social Support Questionnaire; MHC-SF = Mental Health Continuum-Short Form; CORE-YP/OM = Young Person's Clinical Outcome in Routine Evaluation, Clinical Outcomes in Routine Evaluation – Outcome Measure.

As already mentioned, the Kolmogorov-Smirnov test and Shapiro-Wilks test proved to be significant for the study variables, but the values of skewness and kurtosis indicated small deviation from normal distribution (Table 1).

Various correlation values proved to be significant, and as far as predictors and criteria are concerned, the highest were between trait anxiety (STAI/C-T) and mental health (MHC-SF) (r=-0.61) and between trait anxiety (STAI/C-T) and psychological distress (CORE-YP/OM) (r=0.71) (Table 2).

The first hierarchical regression model included mental health as a criterion variable. In the first step, age was used as a predictor and was found to be significant (β=-0.30), and continued to be significant in the second step along with trait anxiety (β=-0.54), while anxiety sensitivity was not significant. In the last step, along with trait anxiety, social support (β=0.19) was significant predictor, explaining 52% of the variance in mental health. Specifically, younger age and lower trait anxiety predicted higher mental health initially; once social variables were entered, broader social support positively accounted for additional variance, with trait anxiety remaining negative predictor.

The second hierarchical regression model included psychological distress as a criterion variable

Table 3. Hierarchical regression analysis with MHC-SF as a criterion variable

Predictor		β	t
Step I	Age	-0.30	-2.58*
		R2 *F*	0.09 6.65*
Step II	Age	-0.24	-2.57*
	STAI/C	-0.54	-5.33**
	(C)ASI	-0.12	-1.21
		R2 *ΔR2* *F*	0.45 0.36 21.21**
Step III	Age	-0.17	-1.83
	STAI/C	-0.41	-3.87**
	(C)ASI	-0.13	-1.35
	FSS	0.19	1.80
	PSSQ	0.19	2.02*
		R2 *ΔR2* *F*	0.52 0.09 4.92*

*p<0.05, **p<0.01; β = beta coefficient; t = t-value; STAI/C = The Stait-Trait Anxiety Inventory, State – Trait Anxiety Inventory for Children; (C)ASI = The (Childhood) Anxiety Sensitivity Index; FSS= Family Support Scale; PSSQ= Perception of Social Support Questionnaire; MHC-SF = Mental Health Continuum-Short Form; R^2 = coefficient of determination; ΔR^2 = change in the coefficient of determination; F = F-statistic.

Table 4. Hierarchical regression analysis with CORE-YP/OM as a criterion variable

Predictor		β	t
Step I	Age	0.11	0.94
		R2	0.01
		F	0.88
Step II	Age	0.05	0.52
	STAI/C	0.65	6.90**
	(C)ASI	0.14	1.43
		R2	0.52
		ΔR2	0.51
		F	34.83**
Step III	Age	0.03	0.37
	STAI/C	0.62	5.91**
	(C)ASI	0.14	1.43
	FSS	-0.02	-0.16
	PSSQ	-0.08	-0.86
		R2	0.53
		ΔR2	0.01
		F	0.45

**p<0.01; β = beta coefficient; t = t-value; STAI/C = Stait-Trait Anxiety Inventory, State – Trait Anxiety Inventory for Children; (C)ASI= The (Childhood) Anxiety Sensitivity Index; CORE-YP/OM = Young Person's Clinical Outcome in Routine Evaluation, Clinical Outcomes in Routine Evaluation – Outcome Measure; FSS = Family Support Scale; PSSQ = Perception of Social Support Questionnaire; R^2 = coefficient of determination; ΔR^2 = change in the coefficient of determination; F = F-statistic.

while the same predictors were used. In the first step, age was used as a predictor and was not significant. In the second and third steps, trait anxiety (β=0.62) was the only significant predictor and explained 53% of the variance in psychological distress. More specifically, higher levels of trait anxiety were associated with higher levels of psychological distress.

Discussion

Our research found a significant association between mental health and age, trait anxiety, anxiety sensitivity, and family and social support, while trait anxiety, anxiety sensitivity, and family and social support were significantly associated with psychological distress. Similarly, age, trait anxiety and social support were found to be significant predictors of mental health, while trait anxiety was found to be significant predictor of psychological distress. Accordingly, social support serves as a protective and supportive factor of mental health, while trait anxiety is a risk factor for mental health and psychological distress.

More closely, in this research pattern was consistent with the dual-continua view of mental health, where psychological distress and positive mental health are related yet distinct constructs. In our data, trait anxiety (STAIC/STAI-T) correlated moderately with distress (CORE-YP/OM; r=0.71) and positive mental health (MHC-SF; r=-0.61). Once anxiety sensitivity and social resources were entered, STAI/C remained a unique predictor of psychological distress (CORE-YP/OM) (see Tables 3 and 4). This suggests that trait anxiety primarily indexes general negative affectivity that maps onto distress, but also flourishing is more directly supported by protective social factors (peer support) and by the absence of trait anxiety. Moreover, in a pediatric chronic-illness context, trait anxiety appears more proximal to day-to-day well-being, as a stable construct than global anxiety sensitivity, hence its stronger link with mental health and psychological distress. Methodologically, this is unlikely to be a collinearity artifact (STAI/C–C/ASI; r=0.42). Still, some attenuation is plausible given the distributional features (MHC-SF skewed toward higher scores) that reduce the sensitivity of MHC-SF to negative-valence traits once positive resources are controlled. Overall, the findings indicate overlapping but distinct nomological networks: trait anxiety aligns with negative symptomatology

(CORE-YP/OM), whereas flourishing (MHC-SF) is better explained by higher levels of social support.

Accordingly, focusing attention on these dimensions may help improve mental health of the aforementioned population, but this will not necessarily be sufficient to reduce their psychological distress, which is in line with the dual model of mental health.

To our knowledge, this is the first study to examine predictive factors of mental health and psychological distress in children and young people with JIA. Contemporary research emphasizes the importance of the interrelationship of biological, psychological, and social factors on mental health in general.

In this research, age was a significant predictor of mental health; more specifically, younger children had more positive mental health. In the context of developmental psychology, the primary school age is perhaps marked by the greatest number of changes, both physically, cognitively, emotionally and socially[39]. In lower grades of primary school, a child encounters a defined structure, clear demands and rules for the first time. Most children respond adequately to these demands, while for some children these demands manifest some problems (neurodevelopmental disorders or generate anxiety or depressive symptoms). Transition to the upper grades of primary school implies a greater burden of school material, change in class dynamics, and coupled with physical changes of puberty and new social challenges, it causes most adolescents to reconsider their self-image, oscillations in self-esteem, and in some it leads to the development of serious anxiety and depressive symptoms. Also, transition from early childhood to adolescence usually means a period of psychological maturation, personality formation, development of attitudes, emotional independence from parents and adults, building relationships with peers, adopting sexual identity, learning socially responsible behavior, and other[39].

The occurrence of the disorder can be explained by the diathesis-stress model[40], according to which the disorder arises due to biological and/or psychological vulnerability (e.g., genetics, temperament, personality traits) and environmental and/or psychosocial stressors (illness, poverty, trauma, lack of support, parenting style). According to this model, individuals are vulnerable to a certain level of vulnerability, which predisposes them to the development of a disorder, but mere predisposition to the development of any disorder does not mean that an individual will develop the disorder. This depends on the stressors that a person faces throughout life and that moderate this relationship. Namely, the dual model of mental health integrates psychopathology (mental distress as a measure) and subjective emotional well-being (a measure of positive mental health) and places them in a coordinate system, emphasizing that the absence of psychopathology alone is not a sufficient indicator of the presence of emotional well-being[6], and emotional well-being is used in the literature when defining positive mental health[41]. According to this model, mental health and mental illness are two independent continua that are intertwined. One encompasses the presence or absence of illness, and the other encompasses poor or high personal well-being (emotional, psychological, social, physical, and spiritual). Thus, a person suffering from mental illness (with severe psychopathological symptoms) can simultaneously have high personal well-being (good mental health), which means that a person with mental illness can be as productive for themselves, their family, society, and community as a person with low or no psychopathological symptoms (mental illness)[41]. Precisely, the dual model of mental health describes how mental health is not just the absence of illness and that different predictors predict or explain mental illness, while others explain mental health.

Previous studies have highlighted the importance of the harmful effects of negative environmental factors, such as inadequate parenting and poor family relationships[42], as well as poor peer relationships[43]. Previous studies have also shown

that children with JIA have more frequent psychiatric diagnoses than their healthy peers, and the age at onset of illness influences the risk of developing psychiatric illness, with the most common diagnoses being affective disorder and anxiety[14]. Blom and Nicholls[44] describe higher levels of depression, low self-esteem and social problems (shyness, passivity and impaired parent-child relationships) in children with rheumatic diseases. Children diagnosed with rheumatic diseases may often be prevented from participating in everyday social activities due to the nature of the disease itself, which consequently certainly has an impact on their social functioning. When comparing children with juvenile arthritis according to their disease-related limitations (no limitations/moderate limitations/severe limitations), children with significant limitations were found to have more physical and psychological problems, including higher levels of anxiety and less involvement in family and social activities, while children with moderate and no limitations spent more time in family activities but less time with friends compared to healthy children[45]. There are differences in the experience of depressive and anxiety symptoms in children with JIA compared to healthy children, but they did not differ compared to children with other chronic diseases[46].

Other studies did not find significant difference in anxiety between JIA patients and healthy children[15,16]. However, there is very little research examining anxiety sensitivity in children and adolescents. In a study by Tsao *et al.*[22], higher anxiety sensitivity was associated with poorer mental health, poorer family relationships, and more social limitations in the context of emotional problems. Anxiety sensitivity was shown to be a significant predictor of mental health, and also, higher levels of anxiety sensitivity were associated with greater perceived impairment in family activities due to the child's health[22]. Anxiety sensitivity was also shown to be a good predictor of interoceptive fear, i.e., fear of bodily sensations during some physical exertion or health problems[47]. Children with higher anxiety sensitivity have a greater fear of pain, which leads to greater perception of limitations caused by pain[48]. In a study by Muris *et al.*[49], anxiety sensitivity was the best predictor of fear of pain in children, and children who had high levels of anxiety sensitivity rated the same levels of pain significantly more intensely than children who had average or low levels of anxiety sensitivity. Students who developed a chronic illness over a three-year period had higher levels of anxiety sensitivity, but not all physical symptoms were associated with anxiety sensitivity, only those associated with pain and psychological distress, while allergy and inflammation symptoms were not associated with anxiety sensitivity[50]. There was no difference in the perception of mental health levels between adults who had JIA in childhood and healthy adults[51]. Accordingly, anxiety, anxiety sensitivity, pain perception, and distress are interrelated constructs that are repeated. Accordingly, people who are more anxiety-sensitive will have increased sensitivity to physical symptoms, which they will misinterpret (for example, worry about pain), which will increase the experience of pain and psychological distress. This will consequently increase the level of anxiety, thus repeating the entire cycle.

The findings of this study have important implications for clinical practice, particularly in pediatric rheumatology. Specifically, the results highlight the dual role of psychosocial and personality-related factors in shaping mental health outcomes among children and adolescents with JIA. Social support has emerged as a significant protective factor for positive mental health, suggesting that efforts to strengthen supportive networks may be critical in promoting psychological resilience. Clinicians should therefore prioritize the involvement of patient's social network in care plans wherever possible, and actively assess the availability and quality of a child's social support system. Conversely, trait anxiety and anxiety sensitivity were associated with increased psychological distress, identifying them as possible psychological risk factors. Notably,

trait anxiety was a particularly strong predictor of both reduced well-being and elevated distress. This underscores the clinical value of incorporating routine screening for trait dimensions (anxiety) in pediatric rheumatology clinics. Identifying children who are more fearful and anxious may allow for early psychological intervention aimed at reducing maladaptive interpretations and enhancing coping strategies. Given the emotional burden often associated with chronic medical treatments, these findings also point to the importance of addressing children's fears related to pain and medical procedures. Psychoeducation, cognitive-behavioral strategies, and preparatory interventions can be tailored to reduce anticipatory anxiety and anxiety sensitivity in this population.

In summary, integrating psychosocial screening tools into routine assessments, and actively involving social dimensions in the care process may improve mental health outcomes and mitigate psychological distress in children with JIA and other chronic rheumatic conditions.

It should be noted that the sample used in our research was small, but we are talking about a specific population, a clinical sample, and conducting research during the period of the COVID-19 pandemic, which made it difficult for us to collect respondents. Also, the sample was not homogeneous in terms of gender (there were more girls than boys) or age (9-20 years). In future research, the stage and activity of the disease in which people with JIA are currently found, with special emphasis on the assessment of a rheumatologist about the disease activity levels should be included in the analysis.

Conclusion

This study identified key psychological and social predictors of mental health and psychological distress in youth with JIA. Trait anxiety consistently emerged as a risk factor, while social support served as a protective one. These findings may guide targeted interventions and inform mental health screening in pediatric rheumatology.

ACKNOWLEDGMENTS We would like to thank medical team at Rheumatology Unit, Department of Pediatrics, Sestre milosrdnice University Hospital Center, Zagreb, Croatia. Special gratitude to all the study participants and their parents.

References

1. Herrman H, Saxena S, Moodie R. Promoting mental health: concepts, emerging evidence, practice: a report of the World Health Organization, Department of Mental Health and Substance Abuse in collaboration with the Victorian Health Promotion Foundation and the University of Melbourne. Geneva: World Health Organization; 2005.
2. Keyes CL. Promoting and protecting mental health as flourishing: a complementary strategy for improving national mental health. Am Psychol. 2007;62:95-108. https://doi.org/10.1037/0003-066X.62.2.95.
3. Iasiello M, Van Agteren J. Mental health and/or mental illness: a scoping review of the evidence and implications of the dual-continua model of mental health. Evidence Base. 2020;1:1-45. https://doi.org/10.21307/eb-2020-001.
4. Suldo SM, Shaffer EJ. Looking beyond psychopathology: the dual-factor model of mental health in youth. School Psychol Rev. 2008;37(1):52-68. https://doi.org/10.1080/02796015.2008.12087908.
5. Tomljanović N, Jokić-Begić N. Upotreba upitnika YP-CORE u procjeni mentalnog zdravlja djece s intelektualnim teškoćama. Soc

psihijat. 2021;49:113-29. https://doi.org/10.24869/spsih.2021.113. (in Croatian)
6. Xiao R, Zhang C, Lai Q, Hou Y, Zhank X. Applicability of the dual-factor model of mental health in the mental health screening of Chinese college students. Front Psychol. 2020;11. https://doi.org/10.3389/fpsyg.2020.549036.
7. Jokić-Begić N, Lauri Korajlija A, Jurin T, Evans C. Faktorska struktura, psihometrijske karakteristike i kritična vrijednost hrvatskoga prijevoda CORE-OM upitnika. Psihologijske teme [Internet]. 2014 [accessed on March 13, 2025];23(2):265-288. Dostupno na: https://hrcak.srce.hr/125093 (in Croatian)
8. Ridner SH. Psychological distress: concept analysis. J Adv Nurs. 2004;45(5):536-45. https://doi.org/10.1046/j.1365-2648.2003.02938.x.
9. Dray J, Bowman J, Freund M, Campbell E, Wolfenden L, Hodder RK, Wiggers J. Improving adolescent mental health and resilience through a resilience-based intervention in schools: study protocol for a randomised controlled trial. Trials. 2014;15(1):1-9. https://doi.org/10.1186/1745-6215-15-289.
10. Wille N, Bettge S, Ravens-Sieberer U, and the BELLA study group. Risk and protective factors for children's and adolescents' mental health: results of the BELLA study. Eur Child Adolesc Psychiatry. 2008;17:133-47. https://doi.org/10.1007/s00787-008-1015-y.
11. Tambić Bukovac L, Perica M. Juvenilni idiopatski artritis. Reumatizam [Internet]. 2016 [pristupljeno 13.03.2025.];63(suppl.1). Available at: https://hrcak.srce.hr/182838. (in Croatian)
12. Thierry S, Fautrel B, Lemelle L, Guillemin F. Prevalence and incidence of juvenile idiopathic arthritis. A systematic review. Joint Bone Spine. 2014;81:112-7. https://doi.org/10.1016/j.jbspin.2013.09.003.
13. Keefe FJ, Lumley M, Anderson T, Lynch T, Carson K. Pain and emotion: new research directions. J Clin Psychol. 2001;57:587-607. https://doi.org/10.1002/jclp.1030.
14. Kyllönen M, Ebeling H, Kautiainen H, Puolakka K, Vähäsalo P. Psychiatric disorders in incident patients with juvenile idiopathic arthritis – a case-control cohort study. 2021;19:105. https://doi.org/10.1186/s12969-021-00599-x.
15. Tarakci E, Yeldan I, Kaya Mutlu E, Baydogan SN, Kasapcopur O. The relationship between physical activity level, anxiety, depression, and functional ability in children and adolescents with juvenile idiopathic arthritis. Clin Rheumatol. 2011;30(11):1415-20. https://doi.org/10.1007/s10067-011-1832-0.
16. Ding T, Hall A, Jacobs K, David J. Psychological functioning of children and adolescents with juvenile idiopathic arthritis is related to physical disability but not to disease status. Rheumatology (Oxford). 2008;47(5):660-4. https://doi.org/10.1093/rheumatology/ken095.
17. Russo E, Trevisi E, Zulian F, Battaglia MA, Viel D, Facchin D, *et al.* Psychological profile in children and adolescents with severe course juvenile idiopathic arthritis. Sci World J. 2012;1-7. https://doi.org/10.1100/2012/841375.
18. Hanns L, Radziszewska A, Suffield L, Josephs F, Chaplin H, Peckham H, *et al.* Association of anxiety with pain and disability but not with increased measures of inflammation in adolescent patients with juvenile idiopathic arthritis. Arthritis Care Res (Hoboken). 2020;72(9):1266-74. https://doi.org/10.1002/acr.24006.
19. Hanns L, Suffied L, Josephs F, Chaplin H, Radziszewska A, Carvalho LA, *et al.* Adolescents with juvenile idiopathic arthritis experience lower levels of life event stress and trait anxiety than healthy adolescents. Rheumatology. 2019;56:13-4. https://doi.org/10.1093/rheumatology/kex390.021.
20. Memari, AH, Chamanara E, Ziaee V, Kordi R, Raeeskarami SR. Behavioral problems in juvenile idiopathic arthritis: a controlled study to examine the risk of psychopathology in a chronic pediatric disorder. Int J Chronic Dis. 2016:2016:5726236. https://doi.org/10.1155/2016/5726236.
21. Taylor S. Anxiety sensitivity: theoretical perspectives and recent findings. Behav Res Ther. 1995;33:243-58. https://doi.org/ 10.1016/0005-7967(94)00063-p.
22. Tsao JCI, Meldrum M, Kim SC, Zeltzer LK. Anxiety sensitivity and health related quality of life in children with chronic pain. J Pain. 2007;8:814-23. https://doi.org/10.1016/j.jpain.2007.05.011.
23. Lipsitz JD, Masia-Warner C, Apfel H, Marans Z, Hellstern B, Forand N, *et al.* Anxiety and depressive symptoms and anxiety sensitivity in youngsters with noncardiac chest pain and benign heart murmurs. J Pediatr Psychol. 2004;29:607-12. https://doi.org/10.1093/jpepsy/jsh062.

24. Spielberger CD, Edwards CD, Lushene R, Montuori J, Platzek D. Priručnik za Upitnik anksioznosti kao stanja i osobine ličnosti za djecu. Jastrebarsko: Naklada Slap; 1999. (in Croatian)
25. Spielberger CD, Gorsuch RL, Lushene R, Vagg PR, Jacobs GA. Priručnik za Upitnik anksioznosti kao stanja osobine ličnosti STAI. Jastrebarsko: Naklada Slap; 2000. (in Croatian)
26. Silverman WK, Ginsburg GS, Goedhart AW. Factor structure of the Childhood Anxiety Sensitivity Index. Behav Res Ther. 1999;37(9);903-17. https://doi.org/10.1016/s0005-7967(98)00189-2.
27. Reiss S, Peterson RA, Gursky GM, McNally RJ. Anxiety sensitivity, anxiety frequency and the prediction of the fearfulness. Behav Res Ther. 1986;24:1-8. https://doi.org/10.1016/0005-7967(86)90143-9.
28. Zvolensky MJ, Goodie JL, McNeil DW, Sperry JA, Sorrell JT. Anxiety sensitivity in the prediction of pain-related fear and anxiety in a heterogeneous chronic pain population. Behav Res Ther. 2001;39:683-96. https://doi.org/10.1016/s0005-7967(00)00049-8.
29. Twigg E, Barkham M, Benick BM, Mulhern B, Connell J, Cooper M. The young person's CORE: development of a brief outcome measure for young people. Couns Psychother Res. 2009;9(3):150-68. https://doi.org/10.1080/14733140902979722.
30. Evans C, Margison F, Barkham M, Audin K, Connell J, McGrath G. CORE: clinical outcomes in routine evaluation. J Ment Health. 2000;9(3):247-55. https://doi.org/10.1080/713680250.
31. Profaca B. Roditeljski stres i neke karakteristike emocionalnog i socijalnog razvoja djeteta predškolske dobi [MS thesis]. Zagreb: University of Zagreb, Faculty of Humanities and Social Sciences; 2002. (in Croatian)
32. Živčić-Bećirević I. Konstrukcija skale percipirane socijalne podrške za djecu. Godišnjak Odsjeka za psihologiju 1995/96. Rijeka: University of Rijeka, Faculty of Teacher Education, 1996; p. 91-9. (in Croatian)
33. Klarin M. Uloga socijalne podrške vršnjaka i vršnjačkih odnosa u usamljenosti predadolescenata i adolescenata. Društvena istraživanja [Internet]. 2004 [accessed March 13, 2025];13(6 (74)):1081-97. Available at: https://hrcak.srce.hr/16251. (in Croatian)
34. Keyes CLM. The mental health continuum: from languishing to flourishing in life. J Health Soc Behav. 2002;43:207-22.
35. Keyes CL. The subjective well-being of America's youth: toward a comprehensive assessment. Adolesc Fam Health. 2006;4:3-11.
36. Lamers SM, Westerhof GJ, Bohlmeijer ET, ten Klooster PM, Keyes CL. Evaluating the psychometric properties of the Mental Health Continuum-Short Form (MHC-SF). J Clin Psychol. 2011;67:99-110. https://doi.org/10.1002/jclp.20741.
37. Field A. Discovering statistics using IBM SPSS Statistics. Sage; 2013.
38. Tabachnick BG, Fidell LS. Using multivariate statistics. Pearson Education; 2013.
39. Berk LE. Psihologija cjeloživotnog razvoja. Jastrebarsko: Naklada Slap, 2008. (in Croatian)
40. Monroe SM, Simons AD. Diathesis – stress theories in the context of life stress research: implications for the depressive disorders. Psychol Bull. 1992;110(3):406-25. https://doi.org/10.1037/0033-2909.110.3.406.
41. Keyes CLM. The mental health continuum: from languishing to flourishing in life. J Health Soc Behav. 2002;43(2):207. https://doi.org/10.2307/3090197.
42. Sušac N, Ajduković M, Rimac I. Učestalost vršnjačkog nasilja s obzirom na obilježja adolescenata i doživljeno nasilje u obitelji. Psihologijske teme [Internet]. 2016;25(2):197-221. [accessed March 13, 2025]; Available at: https://hrcak.srce.hr/161862. (in Croatian)
43. Rajhvajn Bulat L, Sušac N, Ajduković M. Doprinos nekih osobnih i okolinskih varijabli u objašnjavanju eksternaliziranih problema adolescenata. Društvena istraživanja. 2019;28(2):271-93. https://doi.org/10.5559/di.28.2.05. (in Croatian)
44. Blom GE, Nichols G. Emotional factors in children with rheumatoid arthritis. Am J Orthopsychiatry. 1954;24:588-600. https://doi.org/10.1111/j.1939-0025.1954.tb06130.x.
45. Billings AG, Moss RH, Miller JJ, Gottlieb JE. Psychosocial adaptation in juvenile rheumatic disease: a controlled evaluation. Health Psychol. 1987;6(4):343-59. https://doi.org/10.1037//0278-6133.6.4.343.
46. Fair DC, Rodriguez M, Knight AM, Rubinstein TB. Depression and anxiety in patients with juvenile idiopathic arthritis: current insights and impact

on quality of life, a systematic review. Open Access Rheumatol. 2019;11:237-52. https://doi.org/10.2147/OARRR.S174408.
47. Vulić-Prtorić A, Cohza R, Grubić M, Lopižić J, Padelin P. Anksiozna osjetljivost i psihosomatski simptomi u djece i adolescenata. Klinička psihologija [Internet]. 2008 [accessed April 2, 2025];1(1-2):7-25. Available at: https://hrcak.srce.hr/158295. (in Croatian)
48. Martin AL, McGrath PA, Brown SC, Katz J. Anxiety sensitivity, fear of pain and pain-related disability in children and adolescents with chronic pain. Pain Res Manag. 2007;12:267-72. https://doi.org/10.1155/2007/897395.
49. Muris P, Vlaeyen J, Meesters C. The relationship between anxiety sensitivity and fear of pain in healthy adolescents. Behav Res Ther. 2001;39:1357-68. https://doi.org/ 10.1016/s0005-7967(01)00018-3.
50. Čović M, Jurin T. Uloga anksiozne osjetljivosti u kroničnim bolestima i različitim aspektima uzimanja lijekova. In: Knjiga sažetaka 23. Dana Ramira i Zorana Bujasa. Zagreb: Medicinska naklada; 2017; p. 128. (in Croatian)
51. Tollisen A, Selvaag AM, Aulie HA, Libelly V, Aasland A, Lerdal A, Flatø B. Physical functioning, pain, and health-related quality of life in adults with juvenile idiopathic arthritis: a longitudinal 30-year follow up study. Arthritis Care Res. 2018;70(5):741-9. https://doi.org/10.1002/acr.23327.

SAŽETAK

Prediktivni čimbenici mentalnog zdravlja i psihološkog distresa kod djece i adolescenata s juvenilnim idiopatskim artritisom

Lana Žigić Antić, Vicko Ćudina, Miroslav Harjaček, Mandica Vidović, Nataša Jokić-Begić i Lovro Lamot

Mentalno zdravlje je stanje organizma u kojemu osoba ostvaruje svoje sposobnosti, može se nositi sa svakodnevnim stresom te doprinositi vlastitoj zajednici. Mentalno zdravlje nalazi se u kontinuumu pa tako osobe mogu biti narušenog mentalnog zdravlja, ali bez postojanja psihičke bolesti i obrnuto. Juvenilni idiopatski artritis (JIA) jedna je od najčešćih kroničnih upalnih bolesti u djece koja započinje prije navršene 16. godine. Očituje se upalom jednog ili više zglobova koja traje najmanje 6 tjedana, nepoznate je etiologije i javlja se u svim dobnim skupinama. Djeca s JIA suočavaju se s brojnim emocionalnim teškoćama te poteškoćama u obavljanju svakodnevnih aktivnosti. U ovom istraživanju željeli smo ispitati značenje određenih bioloških (dob), psiholoških (anksioznost kao osobina ličnosti i anksiozna osjetljivost) te socijalnih (obiteljska i socijalna potpora) čimbenika na mentalno zdravlje te psihičku uznemirenost kao mjeru psihopatološkog odstupanja. U istraživanju je sudjelovalo 70 djece i adolescenata s dijagnozom JIA koju je postavio pedijatar, subspecijalist pedijatrijske reumatologije. Dobiveni podaci ukazuju na značajan prediktivni doprinos dobi, anksioznosti kao osobine ličnosti te socijalne potpore na mentalno zdravlje, dok se kao značajni prediktor psihičke uznemirenosti pokazala anksioznost kao osobina ličnosti. Buduća istraživanja bi trebala dodatno istražiti navedeno područje.

KLJUČNE RIJEČI

Juvenilni idiopatski artritis; *Mentalno zdravlje*; *Djeca*; *Adolescenti*; *Biopsihosocijalni model*