

KVALITETA ŽIVOTA ADOLESCENATA S IDIOPATSKOM SKOLIOZOM PREMA HRVATSKOJ INAČICI SRS – 22R UPITNIKA

QUALITY OF LIFE OF ADOLESCENTS WITH IDIOPATHIC SCOLIOSIS ACCORDING TO THE CROATIAN VERSION OF THE SRS-22R QUESTIONNAIRE

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Sažetak

Uvod: Adolescentna idiopatska skolioza trodimenzionalan je razvojni deformitet kralježnice, koji najčešće progredira u periodima brzog rasta, najviše u adolescenciji. Zbog turbulentnosti psihološkog i fizičkog razvoja u periodu adolescencije, SRS - 22r upitnik predstavlja specifičan i koristan alat za procjenu kvalitete života adolescenata s idiopatskom skoliozom. Hrvatski prijevod i kulturološka adaptacija postignuta je 2021. godine. Osim prijevoda, validacije i kulturološke adaptacije, do sada se nije upotrebljavao u istraživanjima kao instrument procjene kvalitete života za područje Republike Hrvatske, a literatura o ovoj inačici upitnika na hrvatskom govornom području je oskudna.

Ciljevi: Ispitati kvalitetu života hrvatskih adolescenata s idiopatskom skoliozom s obzirom na dob, spol, školu koju pohađaju, bavljenje rekreacijom, mjesto stanovanja i upotrebu ortoze.

Metode: U ovoj presječnoj studiji sudjelovalo je 119 ispitanika u dobi od 10 do 18 godina. Za procjenu kvalitete života upotrebljavala se hrvatska inačica SRS – 22r upitnika.

Rezultati: Ispitanici su najzadovoljniji funkcijom, domenom bolova i ukupnom kvalitetom života, dok su najnezadovoljniji slikom o sebi. Ispitanici koji pohađaju osnovnu školu imaju značajno bolju funkciju od ispitanika koji pohađaju srednju školu ($p = 0,04$). Ispitanici koji se bave rekreacijom imaju značajno bolju ukupnu kvalitetu života ($p = 0,01$), imaju značajno bolju funkciju te sliku o sebi ($p =$

Abstract

Introduction: Adolescent idiopathic scoliosis is a three-dimensional developmental deformity of the spine that usually develops during periods of abrupt growth, mostly during the adolescent years. Given that the process of psychological and physical development during adolescence is often turbulent, the SRS-22r questionnaire serves as a specific and valuable tool for assessing the quality of life in adolescents with idiopathic scoliosis. The Croatian translation and cultural adaptation of this tool was completed in 2021. Although it has been translated, validated, and culturally adapted, it has not yet been widely used in research for assessing the quality of life of adolescents in Croatia, hence, literature on the Croatian version remains limited.

Objectives: The study aimed to examine the quality of life of Croatian adolescents with idiopathic scoliosis based on age, gender, school type, recreational activities, place of residence, and orthotics use.

Methods: This cross-sectional study involved 119 participants aged 10 to 18 years. The Croatian version of the SRS-22r questionnaire was used to assess their quality of life.

Results: Participants were most satisfied with function, pain domain, and overall quality of life, while they were least satisfied with body image. Participants attending primary school had significantly better function than those attending secondary school ($P = 0.04$). Participants engaged in recreational activities had significantly better overall quality of life ($P = 0.01$), as well as better function and body image

0,04), a zadovoljniji su liječenjem ($p = 0,03$). Ispitanici koji žive u gradu imaju značajno bolju ukupnu kvalitetu života ($p = 0,009$), bolju funkciju ($p = 0,005$), značajno manje osjećaju bolove ($p = 0,03$), imaju značajno bolju sliku o sebi ($p = 0,04$) te su značajno zadovoljniji liječenjem ($p = 0,05$). Statistički značajne razlike nisu utvrđene u odnosu na spol, dob i upotrebu ortoze.

Zaključak: Prema dobivenim statistički značajnim razlikama u kvaliteti života ispitanika prema mjestu stanovanja i bavljenju rekreacijom, autori ovog istraživanja sugeriraju provedbu daljnjih istraživanja kako bi se ove razlike mogle bolje razumjeti u kontekstu populacije adolescenata s idiopatskom skoliozom s hrvatskog govornog područja.

Cljučne riječi: Adolescencija, kvaliteta života, skolioza, SRS - 22r upitnik, rekreacija

1. UVOD

Skolioza predstavlja opći pojam koji obuhvaća širok spektar različitih stanja povezanih s njenom glavnom i najuočljivijom karakteristikom; deformitetom kralježnice i trupa, koji se klinički očituje kroz različite atipične promjene položaja i oblika kralježnice, prsnog koša i trupa, zbog čega ju je i sam Hipokrat nazivao „iščašenom kralježnicom“ (lat. *spina luxata*). Važno je istaknuti da je navedeni pojam obuhvaćao i sve ostale, tadašnjem antičkom svijetu poznate deformitete kralježnice, a ne isključivo skoliozu prema definiciji kakvu poznajemo danas. Smatra se da je Galen prvi definirao skoliozu označavajući tim pojmom vidljive lateralne devijacije trupa i kralježnice (Negrini i sur., 2018). Pojam idiopatske skolioze, odnosno skolioze kojoj nije poznat uzrok nastanka i koja se ne javlja u sklopu drugih sindroma, prvi je uveo Kleinberg 1922. godine (Negrini i sur., 2012). Prema sveobuhvatnijoj definiciji koju su ponudili autori Rigo i Grivas (2010), idiopatska skolioza može se definirati kao kompleksan trodimenzionalan deformitet kralježnice i trupa koji se pojavljuje u naizgled zdrave djece i može progredirati ovisno o više čimbenika tijekom bilo kojeg perioda brzog rasta. Dijagnoza adolescentne idiopatske skolioze uspostavlja se tek kada se diferencijalno dijagnostički isključe svi potencijalni sekundarni uzroci skolioze poput neuromuskularnih bolesti ili kongenitalnih malformacija, a radiološki se potvrdi iskrivljenje jednako ili veće od 10 stupnjeva

($P = 0.04$ for both); they were also more satisfied with their treatment ($P = 0.03$). Participants living in urban areas had significantly better overall quality of life ($P = 0.009$), better function ($P = 0.005$), experienced significantly less pain ($P = 0.03$), had significantly better body image ($P = 0.04$), and were significantly more satisfied with their treatment ($P = 0.05$).

Conclusion: Based on the statistically significant differences observed in the quality of life of participants with respect to their place of residence and involvement in recreational activities, we suggest conducting further research to better understand these differences in the context of the adolescent population with idiopathic scoliosis from the Croatian-speaking area.

Keywords: adolescence, quality of life, scoliosis, SRS-22r questionnaire, recreational activities

1. INTRODUCTION

Scoliosis is a general term that encompasses a wide range of conditions related to its main and most noticeable characteristic: the deformity of the spine and trunk, which clinically manifests through various atypical changes in the position and shape of the spine, rib cage, and trunk. This is why Hippocrates referred to it as the “dislocated spine” (lat. *spina luxata*). It is important to note that this term originally referred to all other spinal deformities known in the ancient world, not exclusively to scoliosis as we define it today. Galen is believed to be the first to define scoliosis, using the term to describe visible lateral deviations of the trunk and spine (Negrini et al., 2018). The term “idiopathic scoliosis”, referring to scoliosis with an unknown cause that is not associated with other syndromes, was first introduced by Kleinberg in 1922 (Negrini et al., 2012). According to a more comprehensive definition offered by Rigo and Grivas (2010), idiopathic scoliosis can be defined as a complex three-dimensional deformity of the spine and trunk that occurs in seemingly healthy children and can progress, depending on multiple factors, during periods of rapid growth. The diagnosis of adolescent idiopathic scoliosis is established only when all potential secondary causes of scoliosis, including neuromuscular diseases or congenital malformations, are ruled out, and when radiological imaging confirms a curvature of 10 degrees or more, according to Cobb’s method, in individuals under 16 years of age (Ne-

va po Cobbu u osoba mladih od 16 godina života (Negrini i sur., 2018; Weinstein, 2019; Almahmoud i sur., 2023). Stoga se adolescentna idiopatska skolioza uvjetno može smatrati solitarnim deformitetom (Negrini i sur., 2018). Adolescentna idiopatska skolioza najčešća je vrsta skolioze koja se pojavljuje u više od 80 % svih slučajeva skolioze (Belli i sur., 2022). Preciznije procjene navode postotak od 84 % do 89 % te značajno veću zastupljenost u ženskog spola (Schreiber i sur., 2016). U općoj populaciji adolescenata njena prevalencija iznosi 0,47 % do 5,2 % (Essex i sur., 2021; Schreiber i sur., 2016). U kontekstu Republike Hrvatske, Glavaš i sur. (2023a) izvještavaju kako je prevalencija pozitivnog nalaza na Adamsovom testu preklona, koji upućuje na moguću dijagnozu adolescentne idiopatske skolioze, u njihovu istraživanju iznosila 5,8 %, što je usporedivo s globalnim vrijednostima koje se kreću između 0,47 % i 12 %. Zbog razvoja skolioze u periodu puberteta i adolescencije, od 13. do 18. godine života (Almahmoud i sur., 2023), koji predstavlja dinamičan period psihološkog, emocionalnog i socijalnog razvoja, a u prisustvu deformiteta, koji baš u tom periodu života ima najveći potencijal progresivnosti (Babae i sur., 2022), idiopatska skolioza može uzrokovati značajne mentalne poteškoće (Belli i sur., 2022), bolove, ograničenje funkcionalnih sposobnosti i respiratorne tegobe (Schreiber i sur., 2016; Oseku i Metolli, 2021). Posljedica toga može biti ukupno narušavanje kvalitete života adolescenata s idiopatskom skoliozom, posebno kada se promatra aspekt samopercepcije vlastitog izgleda tijela i samoidentifikacije (Belli i sur., 2022). Utjecaj idiopatske skolioze na kvalitetu života adolescenata vrlo je dobro dokumentiran, a dosadašnji radovi sugeriraju da je njen utjecaj promatran iz psihološke perspektive najčešće negativan jer utječe na procijenjene kategorije samopouzdanja i socijalnih interakcija s vršnjacima (Torén i Diarbakerli, 2022). Adolescenti s idiopatskom skoliozom mogu osjećati sram i inferiornost zbog svog tjelesnog izgleda, a kada se promatra ukupna mjerena kvaliteta života uočava se da gotovo 40 % adolescenata s idiopatskom skoliozom ima promjene u razini kvalitete života, ali je još uvijek vrlo nejasno u kojim sve domenama kva-

grini et al., 2018; Weinstein, 2019; Almahmoud et al., 2023). Therefore, adolescent idiopathic scoliosis can conditionally be considered a solitary deformity (Negrini et al., 2018). Adolescent idiopathic scoliosis is the most common type of scoliosis, occurring in more than 80% of all scoliosis cases (Belli et al., 2022). More precise estimates suggest a percentage of 84-89%, with a significantly higher prevalence in females (Schreiber et al., 2016). In the general adolescent population, its prevalence ranges from 0.47-5.2% (Essex et al., 2021; Schreiber et al., 2016). In the context of the Republic of Croatia, Glavaš et al. (2023a) reported that the prevalence of a positive result on the Adams forward bend test, which indicates a potential diagnosis of adolescent idiopathic scoliosis, was 5.8% in their study, which is comparable to global values ranging from 0.47-12%. Given that the development of scoliosis typically occurs during the puberty and adolescence period, i.e., from 13 to 18 years of age (Almahmoud et al., 2023), which represents a dynamic period of psychological, emotional, and social development, and the fact that one develops a deformity, which has the greatest potential for progression during this period (Babae et al., 2022), idiopathic scoliosis can cause significant mental distress (Belli et al., 2020), pain, functional limitations, and respiratory difficulties (Schreiber et al., 2016; Oseku and Metolli, 2021). As a consequence, this can lead to an overall deterioration in the quality of life of adolescents with idiopathic scoliosis, especially when considering aspects of self-perception of body image and self-identification (Belli et al., 2020). The impact of idiopathic scoliosis on the quality of life of adolescents is well-documented, and previous studies have suggested that its impact, when viewed from a psychological perspective, is most often negative, as it affects self-esteem and social interactions with peers (Torén and Diarbakerli, 2022). Adolescents with idiopathic scoliosis may feel shame and inferiority due to their physical appearance. When the overall measured quality of life was examined, nearly 40% of adolescents with idiopathic scoliosis experienced changes in their quality-of-life levels. However, the specific domains of quality of life where these

litete života se te promjene događaju (Belli i sur., 2022).

1.1. Utjecaj metoda liječenja na kvalitetu života adolescenata s idiopatskom skoliozom

Različite metode i pristupi koji se primjenjuju u svrhu korekcije deformiteta mogu imati značajan utjecaj na parametre kvalitete života povezane sa zdravljem (Babae i sur., 2022). Kod pacijenata s blažim do umjerenim deformitetima kralježnice liječenje uključuje redovitu i periodičnu opservaciju (Negrini i sur., 2018; Babae i sur., 2022). Terapijski pristupi najviše ovise o veličini skolio tične krivine, a mogu uključivati korektivne vježbe, ortotičko liječenje i operativno liječenje, koje se provodi s ciljem prevencije, korekcije ili zaustavljanja progresije deformiteta (Kocaman i sur., 2021). Adolescenti s umjerenim stupnjevima skolio tične krivine koji su uključeni u programe fizikalne terapije i specifičnih vježbi prema Schroth metodi, pokazali su veće razine kvalitete života koja je povezana sa zdravljem. Međutim, još je uvijek nerazjašnjeno kakva je kvaliteta života osoba koje su blizu završetka skeletne maturacije, te kakva je kvaliteta života adolescenata s većim skolio tičnim deformitetima. Također je, između različitih autora koji su istraživali utjecaje specifičnih vježbi prema Schroth metodi na kvalitetu života, uočljiva velika diskrepancija u rezultatima istraživanja (Gao i sur., 2021). Osim specifičnih vježbi prema Schroth metodi, konzervativno liječenje adolescentne idiopatske skolioze često uključuje i upotrebu korektivne ortoze. Liječenje ortozom za adolescente s idiopatskom skoliozom predstavlja čimbenik stresa, a pokazalo se da najveći negativan utjecaj ima na kategoriju percepcije vlastitog izgleda (eng. *self image*), mentalnog zdravlja i vitalnosti. Pojam vitalnosti u ovom se slučaju odnosi na svakodnevno funkcioniranje i na pacijentov osjećaj entuzijazma i energičnosti prilikom obavljanja svakodnevnih životnih aktivnosti, što je izravno povezano sa slabijom fizičkom izvedbom, smanjenim kapacitetom za vježbanje, te čak usporenijom brzinom hoda u odnosu na adolescente koji ne nose ortozi (Wang i sur., 2021). Dosadašnja istraživanja koja su ispitivala utjecaj ortoze pokazala su da ona zaista može biti

changes occur are yet to be determined (Belli et al., 2020).

1.1. Impact of Treatment Methods on the Quality of Life of Adolescents with Idiopathic Scoliosis

Different methods and approaches used to correct deformities can have a significant impact on health-related quality-of-life parameters (Babae et al., 2022). In patients with mild to moderate spinal deformities, treatment typically involves regular and periodic observation (Negrini et al., 2018; Babae et al., 2022). Therapeutic approaches largely depend on the size of the scoliotic curve and may include corrective exercises, orthotic treatment, and surgical treatment, which aim to prevent, correct, or halt the progression of the deformity (Kocaman et al., 2021). Adolescents with moderate degrees of scoliotic curvature, who are involved in physical therapy programmes and specific exercises according to the Schroth method, have shown higher levels of health-related quality of life. However, little is known about the quality of life of individuals nearing the end of skeletal maturation or adolescents with more severe scoliotic deformities. There is also a significant discrepancy in the research findings of different authors who have studied the effects of specific exercises based on the Schroth method on quality of life (Gao et al., 2021). In addition to specific exercises based on the Schroth method, conservative treatment of adolescent idiopathic scoliosis often includes the use of corrective braces. Orthosis treatment for adolescents with idiopathic scoliosis is considered a stress factor, and it has been shown to have a highly significant negative impact on self-image, mental health, and vitality. In this context, vitality refers to daily functioning and the patient's sense of enthusiasm and energy when performing daily life activities, which is directly linked to poorer physical performance, reduced exercise capacity, and even slower walking speed compared to adolescents who do not wear a brace (Wang, Tetteroo, Arts, Markopoulos, and Ito, 2021). Previous studies investigating the impact of orthosis have shown that it can indeed be a factor in the development of var-

čimbenik razvoja različitih maladaptivnih psiholoških stanja kao što su negativna razmišljanja, povećanje stresa, poremećaji percepcije vlastitog izgleda i poremećaji samopouzdanja (Babaei et al., 2022). U usporedbi sa zdravim vršnjacima, adolescenti koji su konzervativno liječeni ortozom imaju niži stupanj kvalitete života (Torén i Diarbakerli, 2022). Kada konzervativne metode liječenja ne daju rezultate, posebice kod teških slučajeva deformiteta, najčešće onih od 45 do 55 stupnjeva po Cobbu, pribjegava se kirurškom liječenju, a studije su pokazale da kirurška korekcija adolescentne idiopatske skolioze značajno poboljšava kvalitetu života pacijenata, osobito u domeni slike o sebi i zadovoljstva (Abdelaziz et al., 2020; Herdea et al., 2022).

1.2. Koncept i parametri kvalitete života

Prema definiciji Svjetske zdravstvene organizacije, kvaliteta života subjektivna je percepcija pozicije u životu pojedinca u kontekstu kulture i sustava vrijednosti u kojoj žive, a koja je povezana s njihovim ciljevima, očekivanjima, standardima i brigama (Aulisa et al., 2010; Kovač, 2017; Archer et al., 2021). Kvaliteta života smatra se multidimenzionalnim konceptom (Kovač, 2017; Alamrani et al., 2023) kojim se nastoji nadići isključivi biološki kriterij povezan s ishodima zbrinjavanja pojedine bolesti ili stanja, čime se nastoje obuhvatiti i druga područja života pacijenta izvan samog oboljenja ili stanja. To je, stoga, mjera uspješnosti određenog terapijskog ili drugog postupka zbrinjavanja osobe s ciljem poboljšanja funkcioniranja u svakodnevnim životnim aktivnostima, a odnosi se na razinu prosperiteta, općeg zadovoljstva životom i osjećaja radosti (Zaręba et al., 2021). Iako se više znanstvenih disciplina bavi ovim konceptom (Kovač, 2017) te ne postoji jedinstvena definicija samog pojma kvalitete života, Schipper je ekstrahirao tri koherentna elementa od kojih bi se pojam kvalitete života mogao sastojati, kao i alate za njenu objektivizaciju i mjerenje: tjelesni indikatori koji se odnose na bol i onesposobljenje, mentalna stanja poput depresivnosti i anksioznosti, te socijalni element kojim se opisuje stupanj izoliranosti od okoline i ispunjavanja društvenih uloga (Zaręba et al., 2021). Kada se ispituje kvali-

ous maladaptive psychological conditions, such as negative thinking, increased stress, body image disturbances, and self-esteem issues (Babaei et al., 2022). Compared to healthy peers, adolescents who undergo conservative treatment with a brace report a lower quality of life (Torén and Diarbakerli, 2022). When conservative treatment methods do not yield results, surgical treatment is often pursued, particularly in severe cases of deformity, typically those ranging from 45 to 55 degrees according to Cobb. Studies have shown that surgical correction of adolescent idiopathic scoliosis significantly improves patients' quality of life, especially in the domains of body image and satisfaction (Abdelaziz et al., 2020; Herdea et al., 2022).

1.2. Concept and Parameters of Quality of Life

According to the definition outlined by the World Health Organisation, quality of life is the subjective perception of an individual's position in life in the context of the culture and value system in which they live, which is linked to their goals, expectations, standards, and concerns (Aulisa et al., 2010; Kovač, 2017; Archer et al., 2021). Quality of life is considered a multidimensional concept (Kovač, 2017; Alamrani et al., 2023) that seeks to go beyond the exclusive biological criteria related to the outcomes of treating a specific disease or condition, aiming to encompass other areas of the patient's life beyond the disease or condition itself. Therefore, it is a measure of the success of a particular therapeutic or other treatment procedure aimed at improving functioning in daily life activities, and it relates to the level of prosperity, general life satisfaction, and a sense of joy (Zaręba et al., 2021). Although several scientific disciplines address this concept (Kovač, 2017), and there is no single definition of the term quality of life, Schipper extracted three coherent elements from which the concept of quality of life could be composed, and tools for its objectification and measurement can be developed: physical indicators related to pain and disability, mental states such as depression and anxiety, and a social element that describes the degree of isolation from the environment and fulfilment of social roles (Zaręba et al., 2021). When examining the quality of life of adolescents with idiopathic sco-

teta života adolescenata s idiopatskom skoliozom, najčešće se nastoje obuhvatiti parametri općeg zdravlja, funkcioniranja, bolova i zadovoljstva liječenjem. Većina upitnika kojima se nastoji evaluirati kvaliteta života adolescenata s idiopatskom skoliozom sastoji se od parametara fiziološkog funkcioniranja, tjelesnih bolova, općeg zdravlja, mentalnog zdravlja i emocionalnog funkcioniranja (Han i sur., 2015). Pojedini upitnici specifični za populaciju adolescenata sa skoliozom uključuju i parametre percepcije estetike vlastitog tijela, vitalnosti, aktivnosti u školi i u društvu (Aulisa i sur., 2010; Karatel, Yakut i Yagci, 2024). Nezadovoljstvo vlastitim izgledom tijela jedan je od parametara koji je najviše dokumentiran u istraživanjima i smatra se najznačajnijim čimbenikom narušavanja kvalitete života zbog negativnog utjecaja na ukupno mentalno zdravlje adolescenata s idiopatskom skoliozom. Definiran je kao složeni psihološki konstrukt koji se odnosi na subjektivni doživljaj izgleda tijela, koji je isprepleten s emocijama, uvjerenjima i mislima (Bertuccelli i sur., 2023). Zbog negativnog učinka tjelesnog dismorfizma na percepciju izgleda vlastitog tijela, parametri samopouzdanja i socijalne adaptabilnosti sniženi su, a zabrinutost za društvene odnose s vršnjacima i promjene raspoloženja povećane, što u značajnoj mjeri dugoročno narušava ukupnu kvalitetu života adolescenata s idiopatskom skoliozom (Karatel i sur., 2024).

1.3. SRS – 22r upitnik i hrvatski prijevod

Upitnici Društva za istraživanje skolioze (*eng. Scoliosis Research Society*) naširoko se upotrebljavaju za procjenu kvalitete života povezane sa zdravljem kod pacijenata s deformitetima kralježnice, osobito adolescentne idiopatske skolioze (Babae i sur., 2022; Zaina i sur., 2023). Prvi SRS upitnik konstruirao je Maher sa suradnicima 1999. godine, a kako se sastojao od 24 čestice nazvan je SRS – 24 i bio je podijeljen u dva dijela. Njime su se procjenjivali parametri boli, funkcioniranja, percepcije vlastitog izgleda tijela i zadovoljstva liječenjem prije i nakon kirurškog liječenja (Han i sur., 2015; Alamrani i sur., 2023). Poslije je SRS upitnik modificiran te se sastoji od 22 čestice (Alamrani i sur., 2021a). SRS-22 (*skraćeno od:*

liosis, the parameters of general health, functioning, pain, and treatment satisfaction are most commonly considered. Most questionnaires used to evaluate the quality of life of adolescents with idiopathic scoliosis consist of parameters related to physiological functioning, physical pain, general health, mental health, and emotional functioning (Han et al., 2015). Some scoliosis-specific questionnaires for adolescents also include parameters such as body image perception, vitality, and school and social activity (Aulisa et al., 2010; Karatel, Yakut, and Yagci, 2024). Body dissatisfaction is one of the most documented parameters in research and is considered to be a highly significant factor in the disruption of quality of life due to its negative impact on the overall mental health of adolescents with idiopathic scoliosis. It is defined as a complex psychological construct related to the subjective experience of body appearance, which is intertwined with emotions, beliefs, and thoughts (Bertuccelli et al., 2023). Due to the negative effect of body dysmorphia on body image perception, parameters such as self-esteem and social adaptability are reduced, while concerns about social relationships with peers and mood swings are increased, significantly impairing the overall quality of life of adolescents with idiopathic scoliosis in the long term (Karatel et al., 2024).

1.3. SRS-22r Questionnaire and Croatian Translation

The questionnaires developed by the Scoliosis Research Society (SRS) are widely used to assess health-related quality of life in patients with spinal deformities, particularly adolescent idiopathic scoliosis (Babae et al., 2022; Zaina et al., 2023). The first SRS questionnaire was constructed by Maher and colleagues in 1999. Since it was comprised of 24 items, it was called SRS-24 and it was divided into two parts. It was used to assess parameters such as pain, functioning, body image perception, and satisfaction with treatment before and after surgical treatment (Han et al., 2015; Alamrani et al., 2023). Later, the SRS questionnaire was modified, and it now consists of 22 items (Alamrani et al., 2021a). The SRS-22 (short for Scoliosis Research Society-22 Questionnaire) is the most commonly used version for adolescents and adults, while the

Scoliosis Research Society – 22 Questionnaire) i najčešće je upotrebljavana verzija za adolescente i odrasle, dok se SRS - 30 upotrebljava za procjenu postkirurških ishoda u djece i adolescenata (Herdea i sur, 2022; Abdelaziz i sur, 2020). SRS -22 preveden je na više od 11 jezika (Alamrani i sur, 2021a), dok je prema autorima Alamrani i sur. (2023) revidirana verzija SRS upitnika (SRS – 22r) također prevedena na više od 10 jezika te je kulturološki adaptirana, pa se takva primjenjuje kao valjan alat za procjenu kvalitete života i dio je „Osnovnog skupa ishoda“ liječenja (eng. *Core Outcome Set*, skraćeno: *COS*). COS predstavlja konsenzusni minimum procjene i evaluacije ishoda određenog postupka za neko zdravstveno stanje, koje propagira konzorcij za „Osnovne mjere ishoda u ispitivanjima učinkovitosti“ (eng. *Core Outcome Measures in Effectiveness Trials*, skraćeno: *COMET*) s ciljem strukturiranja, standardizacije i procjene ishoda liječenja prema znanstveno utemeljenim principima (Gorst i sur., 2016). Iz tog je razloga Udruženje za istraživanje skolioze (Scoliosis Research Society) uklonilo SRS - 23, SRS - 24 i SRS - 30 sa SRS mrežne stranice. Svi bi zdravstveni djelatnici trebali upotrebljavati SRS - 22r i njegove različite prijevode, budući da je to najnovija i najpotvrđenija verzija SRS upitnika ishoda temeljenog na pacijentu. Povijesne verzije upitnika citirane su u bibliografiji i tako se mogu referencirati („srs.org“ bez dat.). Na hrvatski jezik navedenu je inačicu upitnika prevela, kulturološki adaptirala i validirala mag. physioth. Danijela Pavić u sklopu svog diplomskog rada pri Sveučilištu u Splitu, jer dotad nije postojala inačica SRS – 22r upitnika na hrvatskom jeziku (Pavić, 2021). Pouzdanost i validnost hrvatske inačice SRS – 22r upitnika statistički je ispitana i potvrđena te se može upotrebljavati kao dio službene zdravstvene dokumentacije u Republici Hrvatskoj (Pavić, 2021; Pavić i Vlak, 2022). SRS - 22r zauzima poziciju najčešćeg specifičnog upitnika za procjenu kvalitete života osoba s adolescentnom idiopatskom skoliozom (Alamrani i sur., 2023). Prema saznanjima autora ove studije, vrlo je izgledno da je ovo prva studija u kojoj se hrvatska inačica SRS – 22r upitnika upotrebljavala za procjenu kvalitete života adolescenata s idiopatskom

SRS-30 is used to assess postoperative outcomes in children and adolescents (Herdea et al., 2022; Abdelaziz et al., 2020). The SRS-22 has been translated into over 11 languages (Alamrani et al., 2021a), while the revised version of the SRS questionnaire (SRS-22r) has also been translated into more than 10 languages and culturally adapted. It is thus used as a valid tool for assessing quality of life and is part of the “Core Outcome Set” (COS) for treatment outcomes. COS represents the consensus minimum for the assessment and evaluation of outcomes of a particular procedure for a health condition, as promoted by the “Core Outcome Measures in Effectiveness Trials” (COMET) consortium, aimed at structuring, standardising, and assessing treatment outcomes based on scientifically established principles (Gorst et al., 2016). For this reason, the Scoliosis Research Society has removed SRS-23, SRS-24, and SRS-30 from the SRS website. All healthcare professionals should use the SRS-22r and its various translations, since this is the most current and validated version of the patient-reported outcome SRS questionnaire. Historical versions of the questionnaire are cited in the bibliography and can be referenced in that way (“srs.org” without a date). The Croatian version of the questionnaire was translated, culturally adapted, and validated by mag. physioth. Danijela Pavić as part of her master’s thesis at the University of Split, since there was no Croatian version of the SRS-22r questionnaire at that time (Pavić, 2021). The reliability and validity of the Croatian version of the SRS-22r questionnaire were statistically tested and confirmed, and it can be used as part of official healthcare documentation in the Republic of Croatia (Pavić, 2021; Pavić and Vlak, 2022). The SRS-22r occupies the position of the most commonly used specific questionnaire for assessing quality of life in individuals with adolescent idiopathic scoliosis (Alamrani et al., 2023). According to the findings of the present study, it is highly likely that this is the first study in which the Croatian version of the SRS-22r questionnaire was used to assess the quality of life of adolescents with idiopathic scoliosis from the Republic of Croatia, after it was included on the Scoliosis Research So-

skoliozom s područja Republike Hrvatske, nakon što je uvrštena na mrežnu stranicu „Scoliosis Research Society“ organizacije, te je javno dostupna, besplatna i slobodna za upotrebu.

2. CILJ ISTRAŽIVANJA I HIPOTEZE

2.1. Cilj istraživanja

Primarni je cilj ovog istraživanja ispitati kvalitetu života adolescenata s idiopatskom skoliozom s obzirom na dob, spol, školu koju pohađaju, bavljenje rekreacijom, mjesto stanovanja i upotrebu ortoze.

2.2. Hipoteze

Prema navedenim ciljevima postavljene su sljedeće hipoteze:

H1: Nema statistički značajne razlike u ukupnoj kvaliteti života s obzirom na dob.

H2: Nema statistički značajne razlike u ukupnoj kvaliteti života s obzirom na spol.

H3: Nema statistički značajne razlike s obzirom na školu koju pohađaju.

H4: Postoji statistički značajna razlika u ukupnoj kvaliteti života, subskale mentalnog zdravlja i subskale *self imagea* s obzirom na bavljenje rekreacijom.

H5: Nema statistički značajne razlike u ukupnoj kvaliteti života adolescenata s idiopatskom skoliozom s obzirom na mjesta stanovanja.

H6: Postoji statistički značajna razlika u ukupnoj skali kvalitete života s obzirom na nošenje ortoze.

3. METODE RADA

3.1. Ustroj studije

Studija je ustrojena kao presječna.

3.2. Ispitanici

Istraživanje je provedeno u periodu od listopada 2022. godine do ožujka 2024. Svi ispitanici uključeni u istraživanje imali su potvrđenu dija-

ciety website and became publicly available, free, and open for use.

2. AIM OF THE STUDY AND HYPOTHESES

2.1. Aim of the Study

The primary aim of this study is to examine the quality of life of adolescents with idiopathic scoliosis in relation to age, gender, the school they attend, participation in recreational activities, place of residence, and use of orthotics.

2.2. Hypotheses

Based on the stated objectives, the following hypotheses have been formulated:

H1: There is no statistically significant difference in overall quality of life based on age.

H2: There is no statistically significant difference in the overall quality of life based on gender.

H3: There is no statistically significant difference in outcomes based on the school participants attend.

H4: There is a statistically significant difference in the overall quality of life, mental health subscale, and self-image subscale based on participation in recreational activities.

H5: There is no statistically significant difference in the overall quality of life of adolescents with idiopathic scoliosis based on their place of residence.

H6: There is a statistically significant difference in the overall quality of life score based on the use of an orthotic device.

3. RESEARCH METHODS

3.1. Study Design

The study is designed as a cross-sectional study.

3.2. Participants

The research was conducted from October 2022 to March 2024. A total of 119 participants, aged 10 to 18 years, who attend primary and secondary schools, took part in the study. All partici-

gnozu strukturalne adolescentne idiopatske skolioze. U istraživanju je sudjelovalo 119 ispitanika, od kojih su 22 (19 %) muškog spola te 97 (81 %) ženskog spola. Medijan dobi ispitanika iznosio je 14 (interkvartilnog raspona od 13 do 16 godina) u rasponu od 10 do 18 godina. Prema mjestu stanovanja u gradu živi 70 (59 %) ispitanika, a na selu živi njih 49 (41 %). Osnovnu školu pohađa 60 (51 %) ispitanika, a srednju školu pohađa 59 (49 %) ispitanika. Rekreacijom se bavi 62 (52 %) ispitanika, dok se njih 57 (48 %) ne bavi nikakvom rekreacijom. Ortozu nosi 41 (35 %) ispitanik, a njih 75 (63 %) ne nosi ortožu (Tablica 1).

pants had a confirmed diagnosis of structural adolescent idiopathic scoliosis. The study included 119 participants, of whom 22 (19%) were male and 97 (81%) were female. The median age of participants was 14 years (interquartile range = 13-16 years), with ages ranging from 10 to 18 years. In terms of residence, 70 (59%) participants lived in urban areas, while 49 (41%) lived in rural areas. A total of 60 (51%) participants attended primary school, while 59 (49%) attended secondary school. While 62 (52%) participants reported engaging in recreational activities, 57 (48%) did not participate in any such activities. A total of 41 (35%) participants used orthotic devices, whereas 75 (63%) did not use any orthotic support (Table 1).

Tablica 1. Osobitosti ispitanika / Table 1. Participant characteristics

Characteristic		Number of participants (%)
Gender	Male	22 (19)
	Female	97 (81)
Age (years)	10 – 12	24 (20)
	13 – 15	55 (46)
	16 – 18	40 (34)
Place of residence	Rural	49 (41)
	Urban	70 (59)
Education level	Primary School	60 (51)
	Secondary School	59 (49)
Engagement in recreational activities	Yes	62 (52)
	No	57 (48)
Use of Orthotic device	Yes	41 (35)
	No	75 (63)
	Unknown	3 (2)
Total		119 (100)

3.3. Postupak

Tijekom provedbe istraživanja, ispitanici su bili u postupku konzervativnog liječenja, a svi su dolazili s područja Osječko-baranjske županije. Svi ispitanici dobrovoljno su pristali sudjelovati u istraživanju. Za maloljetne ispitanike zatraženo je dodatno pisano dopuštenje roditelja ili zakonskog skrbnika. Ispitanici su imali mogućnost odustajanja od sudjelovanja u bilo kojem trenutku, a anonimnost prikupljenih podataka bila im je zajamčena. Sudjelovanje u istraživanju usklađeno je s redoslijedom dolaska na liječenje prema unaprijed dogovorenim terminima. Istraživanje je provedeno u dvjema ustanovama koje se bave konzervativnim

3.3. Research procedure

During the course of the study, participants were undergoing conservative treatment and they were all residents of the Osijek-Baranja County. Participation in the study was entirely voluntary. For underage participants, additional written consent was obtained from a parent or a legal guardian. Participants were informed that they could withdraw from the study at any time, and the anonymity of the collected data was guaranteed. Participation was organised according to the order of arrival for treatment, based on pre-arranged appointments. The study was conducted in two institutions specialising in the conservative treatment of adoles-

liječenjem adolescenata s idiopatskom skoliozom: Studio Korektiv i Poliklinika Otos Vita. Za provedbu istraživanja u Poliklinici Otos Vita zatraženo je i odobrenje etičkog povjerenstva, koje je sa stajališta etike istraživanje proglasilo valjanim (datum odobrenja: 15.11.2023.), dok se u ustanovi Studio Korektiv za svakog maloljetnog ispitanika tražilo pisano dopuštenje roditelja ili skrbnika. Istraživanje je provedeno u skladu sa smjernicama za sigurnost sudionika, uključujući Helsinšku deklaraciju.

3.4. Mjerni instrument

U ovom istraživanju upotrebljavala se hrvatska inačica SRS – 22r upitnika koji je javno dostupan te za njegovu upotrebu nije potrebno dopuštenje autora ili organizacije (Scoliosis Research Society, bez dat.). Za prikupljanje sociodemografskih podataka ispitanika samostalno je konstruiran kratki upitnik s četiri pitanja o osnovnim sociodemografskim podacima koji se odnose na bavljenje rekreacijom, veličinu mjesta u kojem ispitanici žive (u urbanoj ili ruralnoj sredini), korištenje ortoze, te pohađaju li osnovnu ili srednju školu. Informacije o dobi i spolu dobivene su iz uvodnog dijela SRS – 22r upitnika, koji se sastoji od šest domena kojima se procjenjuje kvaliteta života adolescenata s idiopatskom skoliozom: bol, mentalno zdravlje, slika o sebi, funkcionalnost, aktivnost i zadovoljstvo liječenjem. Odgovor na svako pojedinačno pitanje ocjenjuje se na ljestvici ocjenom od 1 do 5, pri čemu veći broj bodova označava bolju kvalitetu života. Raspon bodova kreće se od minimalnih 22, što označava najnižu kvalitetu života, do maksimalnih 110 bodova, što predstavlja najvišu kvalitetu života mjerenu ovim instrumentom.

Za svaku domenu izračunava se prosječan rezultat dijeljenjem ukupnog broja bodova s brojem odgovorenih pitanja u pojedinačnoj domeni. Rezultat kvalitete života izražava se kao prosjek svih domena. U slučajevima kada ispitanici na neka pitanja nisu odgovorili, ukupan broj pitanja u domeni se smanjuje, a rezultat se sukladno tome prilagođava.

Autorica Pavić, 2021. u svom radu utvrdila je da subskale bol, mentalno zdravlje, slika o sebi i aktivnost imaju zadovoljavajuću unutarnju kon-

cents with idiopathic scoliosis: Studio Korektiv and Polyclinic Otos Vita. Ethical approval for the study was obtained from the Ethics Committee of Polyclinic Otos Vita, which deemed the study ethically valid (approval date: 15 November 2023). In the case of Studio Korektiv, written parental or guardian consent was obtained for each underage participant. The study was conducted in accordance with participant safety guidelines, including the Declaration of Helsinki.

3.4. Measuring instrument

This study used the Croatian version of the SRS-22r questionnaire: this questionnaire is publicly available, and hence, there is no need to obtain permission from the authors or the organisation (Scoliosis Research Society, n.d.) before it is used. To gather sociodemographic data, a short questionnaire was independently developed, consisting of four questions addressing basic sociodemographic information, including participation in recreational activities, the size of their place of residence (urban or rural areas), the use of an orthotic device, and whether they are enrolled in primary or secondary school. Information on age and gender was obtained from the introductory section of the SRS-22r questionnaire, which includes six domains assessing the quality of life of adolescents with idiopathic scoliosis: pain, mental health, self-image, functionality, activity, and treatment satisfaction. Responses to each item are rated on a scale from 1 to 5, with higher scores indicating better quality of life. The total score ranges from a minimum of 22 reflecting the lowest quality of life, to a maximum of 110 representing the highest quality of life as measured by this instrument.

For each domain, the average score is calculated by dividing the total number of points by the number of answered items within that domain. The final quality of life score is expressed as the average of all domains. In cases where participants did not answer certain questions, the total number of items in the domain is reduced, and the score is adjusted accordingly.

In a study conducted in 2021, Pavić and Vlak found that the subscales for pain, mental health,

zistenciju (Cronbachova alfa: 0,736 – 0,819). U subskali funkcionalnosti pojedine čestice imale su nisku korelaciju s ukupnim rezultatom (0,28 i 0,3779), ali njihovo uklanjanje smanjilo bi pouzdanost, pa ih stoga nije bilo preporučljivo izostaviti. Subskala zadovoljstvo/nezadovoljstvo liječenjem pokazala je nisku unutarnju konzistenciju (Cronbachova alfa = 0,558), zbog čega autorica sugerira da bi rezultati ove domene trebali biti isključeni iz daljnje analize uz provedbu budućih istraživanja kojima bi se dodatno ispitala njezinu pouzdanost (Pavić i Vlak, 2022). Međutim, za potrebe ovog istraživanja izračunata je ukupna pouzdanost upitnika te je Cronbach alfa iznosio 0,770.

3.5. Statističke metode

Kategorijski podaci predstavljani su apsolutnim i relativnim frekvencijama. Numerički podaci opisani su aritmetičkom sredinom i standardnom devijacijom, te medijanom i granicama interkvartilnog raspona. Normalnost raspodjele numeričkih varijabli testirana je Kolmogorov-Smirnovljevim testom. Zbog odstupanja od normalne raspodjele, numeričke varijable između dviju nezavisnih skupina testirane su Mann-Whitneyevim U testom. Numeričke varijable u slučaju triju i više nezavisnih skupina zbog odstupanja od normalne raspodjele testirane su Kruskal-Wallisovim testom. Sve su p vrijednosti dvostrane. Razina značajnosti postavljena je na $\alpha = 0,05$. Pouzdanost upitnika izražena je Cronbachovom alfom. Za statističku upotrebljavao se statistički program SPSS (inačica 22.0, SPSS Inc., Chicago, IL, SAD).

4. REZULTATI

Tablica 2. prikazuje kvalitetu života adolescenata s idiopatskom skoliozom ispitanu pomoću SRS-22r upitnika. Vidljivo je kako su ispitanici najzadovoljniji funkcijom, aritmetička sredina podskale iznosi 4,47 (SD = 0,487), potom slijedi podskala bolova, aritmetičke sredine 4,26 (SD = 0,752), dok je na trećem mjestu zadovoljstvo, zadovoljstvo ukupnom skalom, aritmetičke sredine 4,10 (SD = 0,438). Ispitanici su najnezadovoljniji slikom o sebi, aritmetička sredina zbroja podskale iznosi 3,7 (SD = 0,642) te mentalnim zdravljem, aritmetičke sredine 3,84 (SD = 0,823).

self-image, and activity demonstrated satisfactory internal consistency (Cronbach's alpha = 0.736-0.819). In the functionality subscale, certain items had low correlations with the overall score (0.28 and 0.3779), but their removal would reduce reliability, so it was not recommended to exclude them. The treatment satisfaction/dissatisfaction subscale showed low internal consistency (Cronbach's alpha = 0.558), prompting the authors to suggest that the results from this domain should be excluded from further analysis and that future research must examine its reliability (Pavić & Vlak, 2022). However, for the purposes of the present study, the overall reliability of the questionnaire was calculated and Cronbach's alpha was 0.770.

3.5. Statistical methods

Categorical data are presented as absolute and relative frequencies. Numerical data are described using arithmetic mean, standard deviation, median, and interquartile range. The normality of the distribution of numerical variables was tested using the Kolmogorov-Smirnov test. Due to deviations from a normal distribution, numerical variables between two independent groups were tested using the Mann-Whitney U test. For numerical variables with three or more independent groups, due to deviations from normal distribution, the Kruskal-Wallis test was used. All p-values are two-tailed and the significance level was set at $\alpha = 0.05$. The reliability of the questionnaire was expressed using Cronbach's alpha. Statistical analysis was performed using SPSS (version 22.0, SPSS Inc., Chicago, IL, USA).

4. RESULTS

Table 2 shows the quality of life of adolescents with idiopathic scoliosis as assessed using the SRS-22r questionnaire. It is evident that the participants were most satisfied with function, with a mean subscale score of 4.47 (SD = 0.487), followed by the pain subscale, with a mean score of 4.26 (SD = 0.752), and overall satisfaction, with a mean score of 4.10 (SD = 0.438). The participants were least satisfied with self-image, with a mean score of 3.7 (SD = 0.642), and mental health, with a mean score of 3.84 (SD = 0.823).

Tablica 2. Kvaliteta života adolescenata s idiopatskom skoliozom SRS – 22r / **Table 2.** Quality of life in adolescents with idiopathic scoliosis measured using SRS-22r (N = 119)

Subscale	Mean (SD)	Median (IQR)	Min-Max
Total scale score	4.10 (0.438)	4.2 (3.9-4.5)	2.7-4.8
Function	4.47 (0.487)	4.6 (4.2-5)	2.4-5
Pain	4.26 (0.752)	4.4 (3.8-5)	1.5-5
Self-image	3.7 (0.642)	3.6 (3.4-4.2)	1-5
Mental health	3.84 (0.823)	4 (3.4-4.4)	0-5
(Dis)satisfaction with treatment	4.2 (0.733)	4 (4-5)	0-5

IQR, interquartile range; SD, standard deviation

Kruskal-Wallisovim testom utvrđeno je kako nema značajne razlike u kvaliteti života adolescenata s idiopatskom skoliozom s obzirom na dob. (Tablica 3).

There is no significant difference in the quality of life of adolescents with idiopathic scoliosis based on age (Table 3).

Tablica 3. Kvaliteta života adolescenata s idiopatskom skoliozom SRS – 22r s obzirom na dob / **Table 3.** Quality of life of adolescents with idiopathic scoliosis, as measured by the SRS-22r, in relation to age (N = 119)

Subscale	Median (Interquartile range)			χ^2	p*
	10 – 12 years	13 – 15 years	16 – 18 years		
Total score	4.2 (3.75-4.57)	4.2 (4-4.4)	4.05 (3.8-4.5)	0.882	0.64
Function	4.6 (4.05-4.4)	4.6 (4.2-5)	4.4 (4.2-4.8)	3.132	0.21
Pain	4.4 (3.6-4.95)	4.4 (3.8-5)	4.4 (3.8-4.8)	0.280	0.87
Self-image	3.4 (3.4-4.35)	3.7 (3.4-4)	3.7 (3.2-4.2)	0.048	0.98
Mental health	4.2 (3.6-4.8)	4 (3.55-4.4)	3.8 (3.25-4.4)	4.141	0.13
(Dis)satisfaction with treatment	4 (3.7-4.57)	4.25 (4-5)	4 (4-5)	0.460	0.79

*Kruskal-Wallis test

Nema značajne razlike u kvaliteti života adolescenata s idiopatskom skoliozom s obzirom na spol (Tablica 4). Vrijednost ukupnog zbroj skale iznosila je (U = 844,500, z = -1,529, p = 0,12), funkcije (U = 979,000, z = -0,611 p = 0,54), bolova (U = 890,000, z = -1,226, p = 0,22), slike o sebi (U = 975,000, z = -0,634, p = 0,53), mentalnog zdravlje (U = 836,000, z = -1,587, p = 0,11) te (ne)zadovoljstvo liječenjem (U = 8977,500, z = -0,560, p = 0,58).

There is no significant difference in the quality of life of adolescents with idiopathic scoliosis based on gender (Table 4). The total score of the scale was (U = 844,500, z = -1.529, p = 0.12), function (U = 979,000, z = -0.611, p = 0.54), pain (U = 890,000, z = -1.226, p = 0.22), self-image (U = 975,000, z = -0.634, p = 0.53), mental health (U = 836,000, z = -1.587, p = 0.11), and (dis)satisfaction with treatment (U = 8977,500, z = -0.560, p = 0.58).

Tablica 4. Kvaliteta života adolescenata s idiopatskom skoliozom SRS – 22r s obzirom na spol (N = 119) / **Table 4.** Quality of life of adolescents with idiopathic scoliosis, as measured by the SRS-22r, in relation to gender (N = 119)

Subscale	Median (Interquartile range)		p*
	Male	Female	
Total score	4.25 (4-4.5)	4.1 (3.8-4.5)	0.12
Function	4.6 (4.4-4.85)	4.6 (4.2-5)	0.54
Pain	4.5 (4.15-5)	4.4 (3.6-4.95)	0.22
Self-image	3.8 (3.4-4.2)	3.6 (3.4-4.2)	0.53
Mental health	4.1 (3.75-4.6)	3.8 (3.4-4.4)	0.11
(Dis)satisfaction with treatment	4.25 (4-5)	4 (4-5)	0.58

*p-values calculated using the Mann-Whitney U test

Ispitanici koji pohađaju osnovnu školu imaju značajno bolju funkciju za razliku od ispitanika koji pohađaju srednju školu (Mann-Whitney U test, $U = 1383,50$, $z = -2,085$, $p = 0,04$). Nije utvrđena statistički značajna razlika u ukupnom broju skale ($U = 1622,50$, $z = -0,787$, $p = 0,43$), u bolovima ($U = 1652,500$, $z = -0,632$, $p = 0,53$), slici o sebi ($U = 1707,500$, $z = -0,33$, $p = 0,74$), mentalnom zdravlju ($U = 1627$, $z = -0,763$, $p = 0,45$) te u (ne)zadovoljstvu liječenjem ($U = 1800,500$, $z = 0,333$, $p = 0,74$) s obzirom na školu koju ispitanici pohađaju (Tablica 5).

Participants attending primary school showed significantly better function compared to those attending secondary school (Mann-Whitney U test, $U = 1383.50$, $z = -2.085$, $p = 0.04$). There were no significant differences in the total score of the scale ($U = 1622.50$, $z = -0.787$, $p = 0.43$), pain ($U = 1652.50$, $z = -0.632$, $p = 0.53$), self-image ($U = 1707.50$, $z = -0.33$, $p = 0.74$), mental health ($U = 1627$, $z = -0.763$, $p = 0.45$), or (dis)satisfaction with treatment ($U = 1800.50$, $z = 0.333$, $p = 0.74$) based on the school attended by the participants (Table 5).

Tablica 5. Kvaliteta života adolescenata s idiopatskom skoliozom SRS – 22r s obzirom na školu koju pohađaju / **Table 5.** Quality of life of adolescents with idiopathic scoliosis, as measured by the SRS-22r, in relation to the school they attend ($N = 119$)

Subscale	Median (Interquartile range)		p*
	Primary school	Secondary school	
Total scale score	4.2 (3.9-4.5)	4.1 (3.8-4.5)	0.43
Function	4.6 (4.2-5)	4.4 (4.2-4.8)	0.04
Pain	4.4 (4-5)	4.4 (3.8-5)	0.53
Self-image	3.8 (3.4-4.2)	3.6 (3.4-4.2)	0.74
Mental health	4 (3.4-4.6)	3.8 (3.4-4.4)	0.45
(Dis)satisfaction with treatment	4 (4-5)	4 (4-5)	0.74

*p-values calculated using the Mann-Whitney U test

Ispitanici koji se bave rekreacijom imaju značajno bolju ukupnu kvalitetu života (Mann-Whitney U test, $U = 1309,500$, $z = -2,443$, $p = 0,01$), imaju značajno bolju funkciju (Mann-Whitney U test, $U = 1379$, $z = -2,095$, $p = 0,04$) te sliku o sebi (Mann-Whitney U test, $U = 1390$, $z = -2,018$, $p = 0,04$) i zadovoljniji su liječenjem (Mann-Whitney U test, $U = 1354$, $z = -2,136$, $p = 0,03$), za razliku od ispitanika koji se ne bave rekreacijom (Tablica 6).

Participants who engage in recreational activities showed significantly better overall quality of life (Mann-Whitney U test, $U = 1309.50$, $z = -2.443$, $p = 0.01$), significantly better function (Mann-Whitney U test, $U = 1379$, $z = -2.095$, $p = 0.04$), better self-image (Mann-Whitney U test, $U = 1390$, $z = -2.018$, $p = 0.04$), and greater satisfaction with treatment (Mann-Whitney U test, $U = 1354$, $z = -2.136$, $p = 0.03$) compared to participants who did not engage in recreational activities (Table 6).

Tablica 6. Kvaliteta života adolescenata s idiopatskom skoliozom SRS – 22r s obzirom na bavljenje rekreacijom / **Table 6.** Quality of life of adolescents with idiopathic scoliosis in relation to participation in recreational activities ($N = 119$)

Subscale	Median (Interquartile range)		p*
	Recreational activity	No recreational activity	
Total scale score	4.2 (3.9-4.5)	4 (3.75-4.3)	0.01
Function	4.6 (4.2-5)	4.4 (4-4.7)	0.04
Pain	4.6 (3.9-5)	4.4 (3.6-4.8)	0.21
Self-image	3.8 (3.4-4.2)	3.6 (3.2-4)	0.04
Mental health	4 (3.6-4.6)	3.8 (3.4-4.4)	0.08
(Dis)satisfaction with treatment	4.5 (4-5)	4 (3.5-4.5)	0.03

*p-values calculated using the Mann-Whitney U test

Ispitanici koji žive u gradu imaju značajno bolju ukupnu kvalitetu života (Mann-Whitney U test, $U = 2199,50$, $z = 2,626$, $p = 0,009$), značajno bolju funkciju (Mann-Whitney U test, $U = 2225$, $z = 2,795$, $p = 0,005$), manje osjećaju bolove (Mann-Whitney U test, $U = 2123,50$, $z = 2,232$, $p = 0,03$), imaju značajno bolju sliku o sebi (Mann-Whitney U test, $U = 2096,50$, $z = 2,072$, $p = 0,04$) te su značajno zadovoljniji liječenjem (Mann-Whitney U test, $U = 2045$, $z = 1,997$, $p = 0,05$) za razliku od ispitanika koji žive na selu (Tablica 7).

Participants residing in the urban areas have significantly better overall quality of life (Mann-Whitney U test, $U = 2199.50$, $z = 2.626$, $p = 0.009$), significantly better function (Mann-Whitney U test, $U = 2225$, $z = 2.795$, $p = 0.005$), experience less pain (Mann-Whitney U test, $U = 2123.50$, $z = 2.232$, $p = 0.03$), have significantly better self-image (Mann-Whitney U test, $U = 2096.50$, $z = 2.072$, $p = 0.04$), and are significantly more satisfied with treatment (Mann-Whitney U test, $U = 2045$, $z = 1.997$, $p = 0.05$) compared to participants living in rural areas (Table 7).

Tablica 7. Kvaliteta života adolescenata s idiopatskom skoliozom SRS – 22r s obzirom na mjesto stanovanja / **Table 7.** Quality of life of adolescents with idiopathic scoliosis, as measured by SRS-22r, in relation to area of residence ($N = 119$)

Subscale	Median (Interquartile range)		p*
	Rural area	Urban area	
Total scale score	4 (3.65-4.3)	4.2 (3.95-4.5)	0.009
Function	4.4 (4-4.8)	4.6 (4.4-5)	0.005
Pain	4.4 (3.6-4.8)	4.6 (4-5)	0.03
Self-image	3.6 (3.2-4)	3.8 (3.4-4.2)	0.04
Mental health	3.8 (3.4-4.3)	4 (3.6-4.6)	0.08
(Dis)satisfaction with treatment	4 (3.5-4.5)	4.5 (4-5)	0.05

*p-values calculated using the Mann-Whitney U test

Mann-Whitneyjevim U testom nije utvrđena statistički značajna razlika u kvaliteti života adolescenata s idiopatskom skoliozom s obzirom na nošenje ortoze. Ukupni zbroj skale ($U = 1620,50$, $u = 0,121$, $p = 0,90$), funkcija ($U = 1481$, $z = -0,670$, $p = 0,50$), bolovi ($U = 1575$, $z = -0,136$, $p = 0,89$), slika o sebi ($U = 1803,50$, $z = 1,150$, $p = 0,25$), mentalno zdravlje ($U = 1755$, $z = 0,875$, $p = 0,38$) te (ne)zadovoljstvo liječenjem ($U = 1535,50$, $z = -0,251$, $p = 0,80$) (Tablica 8).

The Mann-Whitney U test revealed that there was no statistically significant difference in the quality of life of adolescents with idiopathic scoliosis with regard to the use of orthotics (braces). This was true for the total scale score ($U = 1620.50$, $z = 0.121$, $p = 0.90$), function ($U = 1481$, $z = -0.670$, $p = 0.50$), pain ($U = 1575$, $z = -0.136$, $p = 0.89$), self-image ($U = 1803.50$, $z = 1.150$, $p = 0.25$), mental health ($U = 1755$, $z = 0.875$, $p = 0.38$), and (dis)satisfaction with treatment ($U = 1535.50$, $z = -0.251$, $p = 0.80$) (Table 8).

Tablica 8. Kvaliteta života adolescenata s idiopatskom skoliozom SRS – 22r s obzirom na nošenje ortoze / **Table 8.** Quality of life of adolescents with idiopathic scoliosis, as measured by SRS-22r, in relation to use of orthotics ($N = 119$)

Subscale	Median (Interquartile range)		p*
	Use of orthotics	No orthotics	
Total scale score	4.2 (3.75-4.5)	4.15 (3.9-4.5)	0.77
Function	4.6 (4.2-5)	4.6 (4.2-4.85)	0.73
Pain	4.4 (3.9-4.9)	4.4 (3.8-5)	0.87
Self-image	3.6 (3.2-4.1)	3.8 (3.4-4.2)	0.46
Mental health	3.8 (3.4-4.4)	3.9 (3.4-4.6)	0.40
(Dis)satisfaction with treatment	4 (4-5)	4 (3.9-5)	0.94

*p-values calculated using the Mann-Whitney U test

5. RASPRAVA

U ovome istraživanju medijan dobi ispitanika iznosio je 14 godina. Sličnu dob ispitanika uočili su autori Abdelaziz i sur. (2020), tj. prosječna dob ispitanika iznosila je 14.7 ± 1.7 godina, dok su autori Cheung, Wong i Cheung (2019) u retrospektivnoj analizi uključili ispitanike čiji je prosjek godina bio 12 ± 1.5 godina. Autori Karatel i sur. (2024) u svome istraživanju također su uključivali ispitanike prosječne dobi 14.1 ± 2 godine, što je u skladu i s ovim istraživanjem za područje istočne Hrvatske. Navedene dobi ispitanika objašnjavaju činjenicu da je stupanj progresivnosti i kliničke vidljivosti adolescentne idiopatske skolioze najintenzivniji u periodu zamaha rasta, koji se prema autorima Ghanem i Rizkallah (2020) odvija u dvije faze koje se nazivaju fazama akceleracije i deceleracije. Sukladno navedenom, period akceleracije koštanog rasta najčešće se odvija između 11. i 13. godine života i traje oko dvije godine, te se u tom periodu 90 % progresije idiopatske skolioze događa kod većine adolescenata. Statistički značajne razlike u kvaliteti života adolescenata prema dobi u ovom istraživanju nisu utvrđene, stoga se prva hipoteza (H1) prihvaća. Autori Kincl i sur. (2021) također nisu utvrdili razlike u kvaliteti života s obzirom na dob između dviju skupina ispitanica, (mlađih od 13 godina i starijih od 13 godina). Uz poljsku inačicu SRS-22r upitnika upotrebljavali su i poljsku inačicu ISYQOL upitnika, čime su dodatno potvrdili dobivene rezultate. Nadalje, pomoću korejske inačice upitnika, autori Lee i sur. (2016) u svom su istraživanju utvrdili razlike u ukupnoj kvaliteti života prema SRS-22r upitniku s obzirom na dob pri postavljanju dijagnoze. Utvrdili su da su adolescenti, kojima je idiopatska skolioza dijagnosticirana u dobi od 9 do 12 godina, postigli značajno više rezultate na SRS-22r upitniku u usporedbi s adolescentima kojima je dijagnoza postavljena kasnije (13–15 godina), što nije u skladu s dobivenim rezultatima ovog istraživanja.

U istraživanje je uključeno 119 ispitanika, od kojih je manje od 20 % muškog spola, što potvrđuje prethodna istraživanja da se adolescentna idiopatska skolioza češće pojavljuje u ženskog spola. Ovakva zastupljenost ispitanica ženskog spola u istraživanju je u skladu i sa zastupljenošću ženskog

5. DISCUSSION

In the present study, the median age of participants was 14 years, consistent with Abdelaziz et al. (2020) (mean age 14.7 ± 1.7 years) and Cheung, Wong, and Cheung (2018) who included participants with a mean age of 12 ± 1.5 years. Karatel et al. (2024) also included participants with an average age of 14.1 ± 2 years, consistent with the present study's region of Eastern Croatia. The ages reported reflect the period of peak progression in adolescent idiopathic scoliosis, which according to Ghanem and Rizkallah (2020) occurs in two growth spurts that are termed the acceleration and deceleration phases. The acceleration phase typically occurs between ages 11 and 13, lasting around two years, during which 90% of adolescent idiopathic scoliosis progression occurs. In the present study, there were no statistically significant differences in the quality of life based on the age of participants; therefore, the first hypothesis (H1) is accepted. Similarly, Kincl et al. (2021) also reported no differences in quality of life between two age groups of female participants (those younger than 13 years and those older than 13 years). In their study, the authors used both the Polish version of the SRS-22r questionnaire and the Polish version of the ISYQOL questionnaire, which further supported their findings. In contrast, using the Korean version of the SRS-22r questionnaire, Lee et al. (2016) identified differences in the overall quality of life based on age at the time of diagnosis. Their results showed that adolescents diagnosed with idiopathic scoliosis between the ages of 9 and 12 years scored significantly higher on the SRS-22r than those diagnosed later (aged 13–15 years), which is not consistent with the findings of the present study.

The present study involved 119 participants, with fewer than 20% male participants, confirming previous findings that adolescent idiopathic scoliosis is more common among females. This distribution aligns with Abdelaziz et al. (2020), where over 80% of participants were female. Similarly, Cheshire et al. (2017) reported that female participants made up 90% of adolescents with idiopathic scoliosis, while Rainoldi et al. (2015) reported

spola u radu autora Abdelaziz i sur. (2020) u kojem je također više od 80% ispitanika pripadalo ženskoj populaciji. Kod autora Cheshire i sur. (2017) broj ženskih ispitanika bio je viši od 90 %, dok su autori Rainoldi i sur. (2015) u svom radu imali više od 70 % ispitanica s postavljenom dijagnozom adolescentne idiopatske skolioze. Autori Shreiber i sur. (2016) također navode visoku predominaciju adolescentne idiopatske skolioze u ženskog spola, čija se zastupljenost u navedenoj populaciji povećava u skladu s povećanjem deformiteta. Razlike u ukupnoj kvaliteti života s obzirom na spol u ovom istraživanju nisu utvrđene, stoga je druga hipoteza (H2) prihvaćena. Autori Aulisa i sur. (2010) utvrdili su da su ispitanici muškog spola pokazali bolju razinu kvalitete života u odnosu na ženski spol, što nije u skladu s rezultatima ovog istraživanja, a važno je naglasiti da su isti autori upotrebljavali još dodatna dva standardizirana upitnika za procjenu kvalitete života te su uz sva tri upitnika došli do istih rezultata u raspodjeli s obzirom na spol. Nadalje, autori Diarbakerli i sur. (2019) također su utvrdili da ispitanici muškog spola imaju veću kvalitetu života u odnosu na ispitanice ženskog spola, što također nije u skladu s rezultatima ovog istraživanja. Oni su utvrdili da u usporedbi sa ženama, muški ispitanici s idiopatskom skoliozom obično imaju nešto bolje rezultate na SRS – 22r upitniku, dok se kvaliteta života evaluirana generičkim upitnikom pod nazivom EQ–5D, općenito ne razlikuje između muškaraca i žena u liječenju i dobnim skupinama, ali je ipak smanjena kada se uspoređi s općom populacijom. Razlika prema spolu uočena je i prema starijim verzijama SRS upitnika. Naime, autori Roberts i suradnici (2011) upotrebljavali su tadašnju verziju SRS – 30 upitnika, te su također došli do zaključka da muškarci imaju bolje parametre percepcije vlastitog izgleda, mentalnog zdravlja prije operativnog zahvata, kao i manju razinu postoperativne boli.

Kako nije utvrđena statistički značajna razlika ukupnog rezultata SRS -22r upitnika s obzirom na školu koju ispitanici pohađaju, treća je hipoteza (H3) potvrđena. Kada se promatra raspodjela ispitanika prema školi koju pohađaju, vidljivo je da je raspodjela ispitanika u uzorku približno polovična. Vidljiva je i statistički značajna razlika

more than 70% of female participants. Schreiber et al. (2016) also noted a high predominance of adolescent idiopathic scoliosis in females, increasing with deformity severity. No differences in overall quality of life with regard to gender were found in the present study; therefore, the second hypothesis (H2) is accepted. Aulisa et al. (2010), however, reported that male participants demonstrated a higher quality of life compared to females, which is not consistent with the findings of the present study. It is important to note that these authors used two additional standardised questionnaires for assessing quality of life and reached the same conclusion across all three instruments regarding gender-based differences. Similarly, Diarbakerli et al. (2019) also found that male participants reported a higher quality of life than their female counterparts. According to their findings, individuals identifying as male with idiopathic scoliosis generally achieved slightly better scores on the SRS-22r questionnaire compared to those identifying as female. However, quality of life as measured by the generic EQ-5D questionnaire did not differ significantly between genders across treatment and age groups, although it was generally lower when compared to the general population. Gender-based differences were also observed with earlier versions of the SRS questionnaire. For instance, Roberts et al. (2011) used the SRS-30 version and concluded that male patients reported more favourable perceptions of self-image and mental health prior to surgery, as well as lower levels of postoperative pain.

Since there was no statistically significant difference in the overall SRS-22r score with regard to the type of school attended by the participants, the third hypothesis (H3) is confirmed. When examining the distribution of participants according to the school they attend, it is evident that the sample is approximately evenly split. A statistically significant difference was observed in the function subscale in favour of primary school pupils, suggesting the assumption that attending secondary school may lead to substantial changes for adolescents with idiopathic scoliosis, which could act as stressors affecting functional capacity. These observed changes include meeting new peers and the

u subskali funkcije u korist osnovnoškolaca, što sugerira pretpostavku da pohađanje srednje škole za adolescente s idiopatskom skoliozom dovodi do drastičnih promjena koje mogu biti stresor za funkcioniranje. Uočene promjene uključuju: upoznavanje novih vršnjaka te želja za integriranjem u novo društvo, veći broj školskih obaveza, putovanje u udaljeno mjesto (najčešće gradove) u srednju školu, te ukupni manjak slobodnog vremena, za razliku od osnovnoškolaca koji osam godina (prema hrvatskom obrazovnom sustavu) imaju poznate, predvidljive i uhodane obrasce ponašanja i života. Iz tog razloga ovu pretpostavku potrebno je sveobuhvatnije istražiti kako bi se bolje razumio parametar funkcije kao dijela ukupne kvalitete života adolescenata s idiopatskom skoliozom. Literatura je o ovoj domeni nedostatna, a autori Alamrani i sur. (2021b) navode da mjerni instrumenti kojima bi se ona detaljnije mogla ispitati nisu pouzdani i preporučljivi populaciji adolescenata s idiopatskom skoliozom.

Kada govorimo o bavljenju rekreacijom, možemo uočiti da se tek nešto više od 50 % adolescenata bavi nekom vrstom rekreacije. U ovom istraživanju vidljiva je važnost rekreacije za populaciju adolescenata s idiopatskom skoliozom, s obzirom na to da ispitanici koji se bave rekreacijom imaju značajno bolju ukupnu kvalitetu života, značajno bolju funkciju te sliku o sebi, a zadovoljniji su i liječenjem, za razliku od ispitanika koji se ne bave rekreacijom. Zbog toga što nije utvrđena statistički značajna razlika u kategoriji mentalnog zdravlja, koja se temelji na ukupnom rezultatu upitnika i domeni percepcije izgleda, četvrta hipoteza (H4), koja je uključivala ovu kategoriju, može se smatrati djelomično potvrđenom. U randomiziranoj kliničkoj studiji koju su proveli autori Dos Santos Alves, Alves da Silva i Avanzi (2014) potvrđeno je da adolescenti s idiopatskom skoliozom koji imaju visoke stupnjeve deformiteta te indicirano operativno liječenje, imaju značajno veću kvalitetu života u svim njenim domenama ako se bave aerobikom četiri mjeseca prije operativnog zahvata, što je u skladu i s rezultatima ovog istraživanja. Nadalje, autori Segreto i sur. (2019) došli su također do zaključka da je za adolescente s idiopatskom skoliozom, koji imaju statistički sličan status deformiteta

desire to integrate into a new social environment, an increased academic workload, commuting to a distant location (most often urban centres) for secondary education, and an overall reduction in free time. In contrast, primary school pupils in the Croatian education system experience eight years of familiar, predictable, and well-established behavioural and lifestyle patterns. For this reason, the proposed assumption warrants more comprehensive investigation in order to better understand the function parameter as a component of overall quality of life in adolescents with idiopathic scoliosis. This hypothesis merits further research to clarify the function aspect as part of the quality of life of adolescents with idiopathic scoliosis. Literature on this topic is scarce, and Alamrani et al. (2021b) noted that tools measuring this function are not considered reliable for the adolescent idiopathic scoliosis population.

Regarding recreational activities, just over 50% of participants engaged in such activities. The present study highlights the importance of recreational activity for adolescents with idiopathic scoliosis, as participants who engaged in recreation reported significantly better overall quality of life, notably improved function and self-image, and greater satisfaction with treatment compared to those who did not participate in recreational activities. Given the absence of statistically significant differences in mental health and self-image, which are part of the study's fourth hypothesis, this hypothesis (H4) is partially supported. A randomised clinical study by Dos Santos Alves et al. (2014) confirmed that adolescents with adolescent idiopathic scoliosis with high degrees of curvature who engaged in aerobics for four months prior to surgery experienced significantly improved quality of life across domains, consistent with the findings of the present study. Segreto et al. (2019) also concluded that adolescents with idiopathic scoliosis with similar deformity and bracing status who participated in sports improved their functionality, self-image, expectations, and parental perception of deformity, indicating that moderate physical activity positively impacts treatment outcomes. Youssef et al. (2021) reported that larger spinal curvatures ($\geq 45^\circ$) typically reduce both the

i ortoze, a koji su se bavili sportom, značajnije poboljšana funkcionalnost, slika o sebi, vlastita očekivanja i roditeljska percepcija deformiteta. To sve sugerira da umjereno bavljenje tjelesnom aktivnošću može značajno utjecati na ishode liječenja. Nadalje, autori Youssef i suradnici (2021) navode da krivine veće veličine ($\geq 45^\circ$) obično rezultiraju smanjenom učestalošću i kvalitetom sudjelovanja u sportu, izraženijom kratkoćom daha i lošijim ishodima kvalitete života, što u slučaju ovog istraživanja može biti razlog zašto je tek 52 % ispitanika uključeno u rekreaciju. Kako u ovoj studiji nije bilo raspodjele prema veličini deformiteta i Cobbovom kutu, potrebno je provesti daljnja istraživanja kako bi se mogao izvesti valjan zaključak. Uspoređujući podatke ovog istraživanja s obuhvatnijim podacima koje su objavili autori Glavaš i sur. (2023b) za Republiku Hrvatsku, njihovo presječno istraživanje na 18.216 hrvatskih učenika pokazuje slične rezultate u vezi sa zastupljenošću tjelesne aktivnosti. Autori su utvrdili da je 23,5 % djece bilo neaktivno, 27,0 % sudjelovalo u rekreativnim aktivnostima, a 49,5 % u organiziranom sportu, pri čemu su uočili veću prevalenciju pretpostavljene skolioze kod učenika koje se ne bave sportom ili se bave rekreativnim sportom. Najmanja prevalencija bila je među učenicama koje se bave organiziranim sportom, uz statistički značajnu razliku. Istraživanje navedenih autora ukazuje na porast prevalencije pretpostavljene skolioze, osobito među neaktivnim učenicima i djevojčicama, ali nije pronađena korelacija između vrste tjelesne aktivnosti i skolioze. Stoga bi bavljenje sportom, uz početnu procjenu i kontinuirano praćenje, trebalo biti uključeno u preventivne strategije školske medicine, osobito za djecu sa skoliozom, kao alternativa pasivnom vremenu pred ekranima.

U ovom istraživanju više od polovice ispitanika živi u većoj sredini, odnosno gradu, dok manje od polovice ispitanika (41 %) živi u manjim mjestima (prigradskom naselju ili selu). Kada se promatra kvaliteta života adolescenata s idiopatskom skoliozom prema veličini mjesta u kojem žive uočava se značajno veća ukupna kvaliteta života ispitanika koji žive u gradovima u odnosu na one koji žive u ruralnim mjestima, stoga je peta hipoteza (H5) autora ove studije odbačena. Također se može uočiti

frequency and quality of participation in sports, contribute to shortness of breath, and lead to poorer quality-of-life outcomes, which could explain why only 52% of participants in the present study engaged in recreational activities. Further studies including measures of deformity severity and Cobb angle would be necessary to validate this interpretation. When comparing the data from the present study with the more comprehensive data published by Glavaš et al. (2023b) for the Republic of Croatia, we observed that their cross-sectional study involving 18,216 Croatian students showed similar results regarding the prevalence of physical activity. The authors found that 23.5% of children were inactive, 27.0% engaged in recreational activities, and 49.5% participated in organised sports, with a higher prevalence of suspected scoliosis observed among female students who did not participate in sports or engaged only in recreational sports. The lowest prevalence of suspected scoliosis was found among female students who participated in organised sports and this difference was statistically significant compared to female students who are inactive or engaged only in recreational activities. The authors went on to report an increase in the prevalence of suspected adolescent idiopathic scoliosis, particularly among inactive students and girls, although no correlation was found between the type of physical activity and scoliosis. Therefore, participation in sports, along with initial assessment and continuous monitoring, should be included in preventive strategies within school medicine, especially for children with scoliosis, and as an alternative to passive screen time.

In the present study, more than half of the participants live in larger cities, while less than half (41%) reside in smaller places (suburban areas or villages). When examining the quality of life of adolescents with idiopathic scoliosis according to the size of the place they live in, a significantly higher overall quality of life was observed among participants living in cities (urban areas) compared to those living in rural areas. Therefore, the fifth hypothesis (H5) of this study is rejected. It is also evident that participants living in cities report better function, a better self-image, and greater

da ispitanici koji žive u gradu imaju bolju funkciju i imaju bolju sliku o sebi te su zadovoljniji liječenjem. Autori Han i sur. (2015) u preglednom istraživanju koje se bavilo ispitivanjem rizičnih faktora koji narušavaju kvalitetu života utvrdili su da je zadovoljstvo liječenjem u gradovima veće, što je u skladu i s rezultatima ovog istraživanja, međutim, za domenu slike o sebi isti autori utvrdili su da osobe iz grada imaju lošiju sliku o sebi, što je oprečno rezultatima u ovom istraživanju. Razlike između kvalitete života prema mjestu življenja uočili su i autori Misterska i sur. (2012) upotrebljavajući stariju verziju SRS upitnika (SRS - 24), uočili su da adolescenti koji žive u ruralnim područjima nakon operacije idiopatske skolioze imaju značajnije bolju sliku o sebi u odnosu na ispitanike iz grada, što nije u skladu s rezultatima ovog istraživanja. Navedeni autori također navode da ispitanici iz urbanih sredina imaju bolje rezultate u domeni boli za razliku od ispitanika iz ruralnih sredina. Zbog navedenih evidentnih razlika u kvaliteti života između ispitanika sa sela i ispitanika iz grada, te razlika u rezultatima između ovog i prethodnih istraživanja drugih autora, nužno je provesti daljnja istraživanja kako bi se navedene razlike bolje razumjele. Važno je naglasiti da u ovom istraživanju nije bilo kontrolne skupine, te je zbog toga nepoznato bi li se rezultati upitnika o kvaliteti života između vršnjaka sa skoliozom i bez nje razlikovali za prethodno navedene kategorije.

Kada se promatra ukupna kvaliteta života ispitanika koji nose ortoza za korekciju idiopatske skolioze, u odnosu na ispitanike koji je ne nose, vidljivo je da statistički značajne razlike u rezultatima SRS – 22r upitnika nema; stoga je šesta hipoteza (H6) odbačena. Autori Pezham i sur. (2022) u svom su istraživanju koristeći se između ostalog i SRS – 22r upitnikom zaključili da osobe koje nose ortoza ipak imaju nižu kvalitetu života u odnosu na kontrolnu skupinu, ispitanika bez deformiteta, dok su autori Moradi i sur. (2022) najviše uočili nižu domenu socijalnog i emocionalnog funkcioniranja koristeći se i drugim specifičnim upitnicima. Oni pak nisu uočili razliku u kvaliteti života u odnosu na nošenje ortoze koristeći se perzijskom SRS – 22r inačicom upitnika, što je u skladu i s ovim istraživanjem na ispitanicima s područja istočne Hrvatske. Nadalje,

satisfaction with their treatment. In a review study on risk factors affecting quality of life, Han et al. (2015) found that satisfaction with treatment was higher in urban areas, which is consistent with the results of the present study. However, regarding self-image, the same authors found that individuals from cities have a poorer self-image, which contrasts with the findings of our study. Differences in quality of life based on place of residence were also noted by Misterska et al. (2012), who used an older version of the SRS questionnaire (SRS-24). They observed that adolescents living in rural areas had a significantly better self-image after surgery for idiopathic scoliosis compared to those from cities, which does not correspond to the results of the present study. These authors also reported that participants from urban areas had better pain scores compared to those from rural areas. Given the clear differences in quality of life between participants from rural and urban areas, as well as the discrepancies between different studies, further research is needed to better understand these differences. It is important to note that the present study did not include a control group, and therefore, it is unclear whether the results based on the quality of life questionnaire would differ between peers with and without scoliosis in the previously mentioned categories.

A comparison of the overall quality of life between participants who use an orthotic device for the correction of adolescent idiopathic scoliosis and those who do not revealed no statistically significant differences in SRS-22r scores, leading to the rejection of the study's sixth hypothesis (H6). Pezham et al. (2022) found in their research, using the SRS-22r questionnaire, that orthosis users had a lower quality of life compared to a control group without deformities, while Moradi et al. (2022) observed lower social and emotional functioning scores among those who used orthotics based on other specific questionnaires. However, they did not observe a difference in quality of life using the Persian version of the SRS-22r questionnaire, which is consistent with the findings of the present study for participants from eastern Croatia. Furthermore, Wang et al. (2021) indicated in their literature review that adolescents treated conser-

autori Wang i sur. (2021) u svom pregledu literature navode da adolescenti koji su konzervativno liječeni ortozom ponajviše mogu imati snižene psihološke parametre kvalitete života, što sugerira potrebu za pronalaskom suportivnih načina očuvanja mentalnog zdravlja adolescenata s razvojnim deformitetima kralježnice, a to može pridonijeti većoj kvaliteti života u odrasloj dobi. Autori Diarbakerli i sur. (2018) navode u svom istraživanju da su neliječene odrasle osobe s idiopatskom skoliozom imale sličnu razinu kvalitete života povezanu sa zdravljem kao osobe koje su prethodno bile konzervativno liječene ortozom, a također su imale neznatno viši stupanj kvalitete života u usporedbi s osobama koje su operativno liječene, što je u skladu i s rezultatima ovog istraživanja. Stoga bi se i kirurško liječenje i ortotičko liječenje idiopatske skolioze moglo smatrati uspješnim iz perspektive kvalitete života povezane sa zdravljem u odrasloj dobi. Ograničenja su ovog istraživanja sljedeća: u ovom istraživanju nije provedena stratifikacija ispitanika prema stupnju zakrivljenosti kralježnice, što se može smatrati jednim od većih ograničenja, osobito s obzirom na potencijalni utjecaj težine deformacije na istraživane varijable. Jedan je dio uzorka ispitanika u istraživanju sudjelovao u periodu pandemije COVID-19, te je moguće da je to moglo utjecati na određen broj ispitanika prilikom ispunjavanja SRS – 22r upitnika i alterirati realnost odgovora, posebno u domeni funkcije, aktivnosti i mentalnog zdravlja. Nadalje, ispitanici su bili isključivo s područja jedne županije Republike Hrvatske, stoga je potrebno provesti daljnja istraživanja kako bi se utvrdile sličnosti i razlike među adolescentima s idiopatskom skoliozom iz različitih županija, čime bi se rezultati ovog istraživanja učinili usporedivima s podacima iz drugih dijelova Hrvatske. Također, u ovom istraživanju nije bila uključena kontrolna skupina adolescenata bez skolioze, što bi omogućilo usporedbu s zdravim vršnjacima i omogućilo statističku interpretaciju značajnih razlika u širem i realnijem kontekstu.

6. Zaključak

Provedenim istraživanjem i analizom prikupljenih podataka pomoću hrvatske verzije SRS – 22r upitnika, može se zaključiti da su adoles-

vativno s ortozom mogu imati snižene psihološke parametre kvalitete života, što sugerira potrebu za pronalaskom suportivnih načina očuvanja mentalnog zdravlja adolescenata s razvojnim deformitetima kralježnice, a to može pridonijeti većoj kvaliteti života u odrasloj dobi. Autori Diarbakerli et al. (2018) reported that untreated adults with idiopathic scoliosis showed similar levels of health-related quality of life as those who had previously undergone conservative treatment with orthosis, as well as slightly higher quality of life compared to those who had surgical treatment. This aligns with the findings of the present study. Thus, both surgical and orthotic treatment of idiopathic scoliosis could be considered effective from the perspective of health-related quality of life in adulthood. In our study, participants were not stratified according to the degree of spinal curvature, which could be considered a major limitation, particularly given the potential influence of deformity severity on the variables under investigation. A portion of the sample participated during the COVID-19 pandemic, which may have influenced the responses of some participants when completing the SRS-22r questionnaire, potentially altering the accuracy of responses, especially in the domains of function, activity, and mental health. Furthermore, all participants were recruited from a single county in the Republic of Croatia. Therefore, further research is needed to explore similarities and differences among adolescents with idiopathic scoliosis from different regions, which would enhance the comparability of the present findings with data from other parts of the country. Additionally, our study did not include a control group of adolescents without scoliosis, which would have allowed for comparisons with healthy peers and facilitated a more comprehensive and contextually relevant interpretation of statistically significant differences.

6. Conclusion

Based on the research conducted and the analysis of data collected using the Croatian version of the SRS-22r questionnaire, it can be concluded that adolescents with idiopathic scoliosis reported the highest levels of satisfaction in the domains of

centni s idiopatskom skoliozom najzadovoljniji domenom funkcije, bolova i ukupnom kvalitetom života, a najnezadovoljniji su domenom slike o sebi. Statistički značajne razlike utvrđene su u domeni funkcije SRS -22r upitnika kada se ispituje razlika između srednje i osnovne škole. Ispitanici koji pohađaju osnovnu školu imali su značajno bolji rezultat u domeni funkcije. Statistički značajni su i rezultati SRS – 22r upitnika s obzirom na mjesto stanovanja, iz čega se može zaključiti da osobe koje žive u urbanim sredinama imaju bolju ukupnu kvalitetu života, značajno manje osjećaju bolove, imaju značajno bolju sliku o sebi, te su značajno zadovoljniji liječenjem u odnosu na ispitanike iz ruralnih krajeva istočne Hrvatske. To je poticaj za provedbu daljnjih istraživanja kojima bi se ovakve razlike mogle bolje razumjeti kao i faktori koji na njih utječu. Također je važno naglasiti potrebu za snažnijim poticanjem rekreativnih aktivnosti kod adolescenata s idiopatskom skoliozom jer su u ovom istraživanju, prema rezultatima hrvatskog prijevoda SRS - 22r upitnika, značajno bolju ukupnu kvalitetu života, značajno bolju funkciju, sliku o sebi i zadovoljstvo liječenjem pokazali ispitanici koji se bave nekom rekreativnom sportskom aktivnošću, u odnosu na ispitanike koji se ne bave rekreacijom. Navedeno bi se svakako trebalo razmotriti u daljnjim istraživanjima kao važan dio edukacije pacijenata s idiopatskom skoliozom u sklopu konzervativnog zbrinjavanja. Statistički značajne razlike ispitanika s obzirom na dob, spol i nošenje ortoze nisu utvrđene.

function, pain, and overall quality of life, while the lowest levels of satisfaction were observed in the self-image domain. A statistically significant difference was found in the function domain of the SRS-22r questionnaire when comparing pupils in primary and secondary school. Participants attending primary school scored significantly higher in this domain. Statistically significant differences were also observed in relation to the participants' place of residence. The findings suggest that individuals living in urban areas reported a better overall quality of life, significantly less pain, a more positive self-image, and greater satisfaction with treatment compared to those living in rural areas of eastern Croatia. These findings highlight the need for further research to better understand such differences and the factors that influence them. It is also important to emphasise the need to actively promote recreational physical activity among adolescents with idiopathic scoliosis. In this study, participants who engaged in recreational sports demonstrated significantly better overall quality of life, improved function, a more positive self-image, and greater satisfaction with treatment, as measured by the Croatian version of the SRS-22r questionnaire, compared to their peers who did not participate in recreational activities. This should be considered in future research as a potentially important component of patient education within conservative scoliosis management. There were no differences between the participants with regard to age, gender, and the use of an orthotic device.

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