

FIZIČKA AKTIVNOST KAO DETERMINANTA ZADOVOLJSTVA ŽIVOTOM KOD FUDBALERA KADETA ¹

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Apstrakt: Cilj ovog transversalnog istraživanja bio je da se ispita mogućnost predikcije varijabli fizičkih aktivnosti, kvaliteta života u interakciji sa zdravljem, telesnog samopoimanja, telesnog funkcionisanja u objašnjenju kriterijuma zadovoljstva životom kod fudbalera kadeta. Prigodni uzorak je činilo 160 ispitanika ($AS_{starost} = 15.74$; $SD = 1.49$). Za prikupljanje podataka korišćeni su Skala zadovoljstva životom – SWLS, Međunarodni upitnik o fizičkoj aktivnosti-kratka verzija (IPAQ-S), Upitnik telesnog samoopisivanja – PSDQ i Upitnik zdravstvenog statusa (SF-36). Nalazi hijerarhijske regresione analize pokazali su da značajni prediktori – indeks telesne mase, fizičko vežbanje, kao segment slike tela, i telesno funkcionisanje ukupno predviđaju 20% varijanse zadovoljstva životom ($p \leq .05$). To sugerise da je za percepciju *zadovoljstvo životom* kod adolescenata relevantnije za bavljenje fizičkim aktivnostima nego nivo njihovih fizičkih aktivnosti. Takođe, varijable indeks telesne mase, fizičko vežbanje, uz samopoimanje fizičkog izgleda i telesno funkcionisanje značajni su medijatori u objašnjavanju konstrukta zadovoljstva životom, pa tako mogu biti smernice za identifikaciju percipiranog nivoa ove zavisne varijable u sportskoj adolescentskoj populaciji u Republici Srbiji. Teorijski doprinosi i praktične implikacije interpretirane su u skladu sa korelacionim i multiple linearnim regresionim rezultatima prethodnih empirijskih studija.

Ključne reči: *adolescencija, fudbaleri, telesno samoopisivanje, zdravstveni status*

UVOD

Aerobna i anaerobna *fizička aktivnost*, npr. hodanje, plivanje, vožnja bicikla, motoričke igre, planinarenje, kućni poslovi i telovežba podrazumeva pokretanje tela pomoću poprečno-prugaste muskulature i skeleta, uz potrošnju energije veću od one u mirovanju, radi pravilnog rasta i telesnog razvoja, pozitivnog uticaja na telesno i mentalno zdravlje i poboljšanja ili održavanja funkcionalnih, morfoloških, kognitivnih i konativnih karakteristika i motoričkih sposobnosti (Ivanović i Ivanović, 2019). Pomenuti autori smatraju da fizičke aktivnosti imaju mnogobrojne dobrobiti za čoveka, te ih treba redovno i postupno upražnjavati u ritmu koji odgovara organizmu, kako bi se podstaklo snaženje organizma i realizacija željenog cilja. Pored toga, fizička aktivnost smanjuje simptome depresije, anksioznosti, stresa i rizik od prerane smrtnosti, povećava stepen samopoštovanja i intelektualne funkcije u svakodnevним zadacima (Przybylska et al., 2024). Svetska zdravstvena organizacija preporučuje deci ispod 17

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godina starosti da najmanje tri puta sedmično upražnjavaju aktivnosti: trčanje, preskakanje konopca, gimnastiku i kolektivne sportove, npr. fudbal, odbojku i košarku, jer je u tom uzrasnom periodu značajno da se ojačaju i pravilno razvijaju kosti i skeletna muskulatura (World Health Organisation, 2021). Nažalost, te standardne savete ostvaruje u proseku samo oko 20% dece i mladih u svetu. Intenzitet vežbanja se deli na apsolutni ili relativni. Apsolutni intenzitet se izražava preko metaboličkog ekvivalenta (MET), potrošnje kiseonika i potrošnje kalorija, a označava količinu energije potrošenu prilikom aktivnosti. Niski intenzitet se odnosi na rad do 2.9 MET-a, umerene aktivnosti su u rasponu od 3.0 do 5.9 MET-a, dok visoke aktivnosti podrazumevaju potrošnju energije preko 6.0 MET-a. Na primer, hodanje brzinom od 5 km/h zahteva potrošnju 4 MET-a, dok trčanje brzinom od 12 km/hima potrošnju 12 MET-a (Hrvatski zavod za javno zdravstvo, 2022). Relativni intenzitet podrazumeva napor nužan za sprovođenje fizičke aktivnosti, a opisuje se fiziološkim parametrima kao što je procenat maksimalne srčane frekvencije ili procenat maksimalne potrošnje kiseonika.

Multidimenzionalni konstrukt *zadovoljstvo životom* predstavlja subjektivni nivo do koje pojedinac pozitivno percipira telesni, mentalni i socijalni kvalitet vlastitog života (Parsakia et al., 2024). Niz faktora doprinosi životnom zadovoljstvu osobe. Na primer: podržavajući i moderatorski odnosi, hobiji, kreativno radno mesto, pozitivna emocionalna iskustva i dr. Naprotiv, stres, loše zdravstveno stanje, finansijske teškoće i negativne emocije smanjuju nivo zadovoljstva životom. Istraživanje (Zhai et al., 2024) je pokazalo da zadovoljstvo životom adolescenata, koji više vremena provode baveći se fizičkom aktivnošću, pozitivno utiče na njihovo zadovoljstvo školom. Zato je važno da adolescenti uživaju u nastavi i da svoje učestvovanje u rešavanju zadataka percipiraju pozitivno i zadovoljavajuće.

Bitan pojam u psihološkim analizama adolescenata je *slika tela*, tj. sopstveno *samopoimanje* (engl. *self-concept*) svog telesnog izgleda, zadovoljstvo telom – engl. *body satisfaction*. Doživljaj poimanja svog telesnog izgleda pretpostavlja skup predstava, fantazija, emocija, stavova i značenja koji se odnose na telo i pojedine delove čoveka (Rojas-Padilla et al., 2024). Slika tela može da se shvati i kao mentalno samoopisivanje sopstvenog tela, stava prema telesnom izgledu, stanju zdravlja, pri čemu vrednosni stavovi nastaju u kontekstu vere kulture i tradicije (Berengüi et al., 2023). Doživljaj slike tela utiče na perceptivne, kognitivne, emocionalne i bihevioralne funkcije pojedinca tokom njegovog rasta i telesnog razvoja. Ona nije statična već dinamična i zavisi od spoljašnjih (socijalnih i kulturalnih), te unutrašnjih (bioloških i psiholoških) faktora koji se menjaju, održavaju i razvijaju. Slika tela/vlastito samopoimanje svog fizičkog izgleda, uključuje sveukupnost doživljaja koje pojedinac ima o sebi i svom identitetu, načinu na koji sebe vidi u različitim dimenzijama života, te u odnosu na vlastitu okolinu. Ona, kao centralni fenomen ovog modela, podrazumeva stavove i sheme o svom fizičkom izgledu, na koju utiču faktori kulturološke socijalizacije, interpersonalna iskustva, telesne karakteristike i dimenzije ličnosti (Burgon et al., 2023). Navedeni autori veruju da su adolescenti koji ranije fiziološki sazrevaju obično popularniji u društvu, na vodećim su društvenim pozicijama, neretko su i sportske zvezde, što generiše veća zadovoljstva sobom i njihovu pozitivniju sliku tela.

U poslednjih deset godina empirijska istraživanja naglašavaju relevantnost *zdravstvenog statusa* koji obuhvata potpunu funkciju ili efikasnost tela i uma, te socijalnu adaptaciju (Ivanović i Ivanović, 2018). U skladu s navedenom definicijom može da se proceni koliko je u životu jedne osobe blagostanje narušeno u domenu telesnog, psihičkog i socijalnog zdravlja. Istraživanje autora (Chapa et al., 2022) skreću pažnju na štetne efekte tehnologije i sve veći broj gojaznih adolescenata među školskom populacijom, kao i povećanu zloupotrebu alkohola i droga kod srednjoškolaca. Pomenuti autori tvrde da fizičko vežbanje tokom adolescencije predstavlja važan moderatorski faktor zdravlja mladih osoba, te da prediktori kao što su: fizička neaktivnost, prekomerna telesna masa i ograničenja zbog telesnih teškoća predstavljaju značajne negativne determinate zdravstvenog statusa u doba puberteta. Suprotno tome, fizički aktivniji adolescenti s normalnom telesnom masom imaju bolje zdravlje (Faroughi et al., 2024).

Budući da primenljivost korišćenih mernih instrumenata u ovom radu nije dosad ispitana na srpskom uzorku, dok u drugim studijama rezultati nisu konzistentni, *cilj* ovog kvantitativnog istraživanja je ispitivanje relacija fizičkih aktivnosti, kvaliteta života povezanog sa zdravljem, telesnog samopoimanja, telesnog funkcionisanja i zadovoljstva životom fudbalera u kadetskom uzrastu. S obzirom na rezultate dosadašnjih istraživanja, pretpostavlja se da će se na uzorku fudbalera adolescenata potvrditi pozitivna interakcija fizičke aktivnosti i zadovoljstva životom (H_1). Takođe, očekuje se da će statistički značajni prediktori zadovoljstva životom kod mladih igrača od 14 do 16 godina života biti indeks telesne mase, nivo intenziteta fizičke aktivnosti, samoprocena fizičke aktivnosti i kvalitet života povezan sa njihovim zdravljem (H_2).

METOD

Ispitanici i procedura istraživanja

Istraživanje je realizovano u Kolubarskom okrugu na prigodnom uzorku od 160 fudbalera kadeta iz tri va-
ljevska kluba: FK „Budućnost“ (Srpska liga Zapad), FK „Radnički“ (Kolubarsko-mačvanska zona) i FK „ZSK“
(Kolubarsko okružna liga). Prosečna starost ispitanika iznosila je ($AS = 15.74_{\text{godina}}$, $SD = 1.19$). Svi ispitanici imali su
najmanje dve godine sistematskog i organizovanog treninga, u trajanju od najmanje tri puta sedmično. Prikupljanje
podataka je sprovedeno tokom oktobra 2025. godine.

Primena mernih instrumenata obavljena je grupno, u klupskim prostorijama, u okviru redovnih treninga
fudbalera, pri čemu je svaki ispitanik testiran individualno metodom papir-olovka. Pre testiranja ispitanicima je ob-
jašnjen cilj istraživanja, te im je zagarantovana anonimnost, uz uputstva o ispunjavanju upitnika i skale. Predviđeno
vreme testiranja, uz prisustvo ispitivača, bilo je oko 20 minuta, gde je svaki ispitanik mogao odustati od ispitivanja u
svakom trenutku, bez navođenja razloga i bez ikakvih posledica. Tri ispitanika sa značajnim Mahalanobis distanca-
ma na nivou $p \leq .01$, isključena su kao multivarijantni autlejeri (Tabachnik & Fidell, 2013). Istraživanje su odobrili
roditelji fudbalera i treneri pomenutih klubova, kao i Naučni savet Srpske akademije inovacionih nauka u Beogradu
u skladu s preporukama Helsinške deklaracije.

Merni instrumenti

Indeks telesne mase – ITM

Tokom merenja vrednosti antropometrijskih parametara telesne mase i visine tela, korišćen je Internacional-
ni biološki program (Weiner & Lourie, 1969). Telesna masa ispitanika izmerena je medicinskom vagom, s precizno-
šću merenja od 0,1 kg, a visina tela visinometrom u stojećem stavu, sa preciznošću merenja od 0,1 cm, pri čemu su
ispitanici bili u laganoj odeći bez cipela. Step en uhranjenosti ispitanika izražen je preko indeksa telesne mase – ITM
(engl. *Body mass index*, BMI) koji predstavlja odnos telesne mase u kilogramima i kvadrata visine tela u metrima.
ITM se računa tako da se telesna masa ispitanika u kilogramima podeli s kvadratom visine tela u metrima po stan-
dardnoj formuli: $ITM (kg/m^2) = \text{telesna masa (kg)} / \{\text{visina}^2 (m)\}$. Prema preporuci Svetske zdravstvene organizacije
– SZO uhranjenost je klasifikovana u kategorije na osnovu sledećih dobijenih vrednosti ITM: a) *pothranjenost* –
vrednosti manje od 18,5 kg/m², b) *normalna telesna masa* – vrednosti od 18,6 – 24,9 kg/m², c) *prekomerna telesna*
masa – vrednosti od 25 – 29,9 kg/m² i d) *gojaznost* – vrednosti od 30 i više kg/m² (World Health Organisation,
2021). Granična vrednost za prekomernu telesnu masu i gojaznost bio je $ITM \geq 25 \text{ kg/m}^2$.

U Tabeli 1 prikazane su kategorije indeksa telesne mase, tj. samoprocena uhranjenosti ispitanika.

Tabela 1. Kategorije indeksa telesne mase – ITM ($N = 160$)

ITM	f	%
Nedovoljna telesna masa (pothranjenost)	1	.7
Normalna telesna masa	95	59.37
Prekomerna telesna masa	59	36.9
Gojaznost	5	3.1

Napomena: ITM = indeks telesne mase; f = frekvencija; % = procenat

Uvidom u matricu podataka uočava se da najviše ispitanika ima normalnu telesnu masu (od 18,6 do 24,9 kkg/
m²) i prekomernu telesnu masu (od 25 do 29,9 kg/m²), a najmanje – samo jedan adolescent koji je pothranjen, dok je
njih pet gojazno, tj. sa preko 30 i više kg/m²).

Skala zadovoljstva životom – SWLS

SWLS (engl. *Satisfaction with Life Scale*; Lukaski & Raymond-Pope, 2021) ispituje globalnu sveukupnu pro-
cenu zadovoljstva životom, a sastoji se od pet ajtema. Ispitanici imaju zadatak da tvrdnje procenjuju na 7-stepenoj

skali Likertovog tipa (od 1 = *Uopšte se ne slažem* do 7 = *U potpunosti se slažem*). Na primer: „*Moji životni uslovi su izvrsni*“, „*Zadovoljan sam svojim životom*“. Ukupan skor izračunava se sabiranjem rezultata svih stavki, pri čemu veći skor ukazuje na veće zadovoljstvo životom. Pouzdanost tipa interne konzistencije merena Cronbach alfa koeficijentom u ovom istraživanju iznosi ($\alpha = .85$).

Upitnik fizičkog samoopisivanja – PSDQ-S

PSDQ-S (engl. *The Physical Self-Description Questionnaire-Short Form (PSDQ-S)*; Marsh et al., 2010) obuhvata devet specifičnih i dve opšte subskale. Za potrebe ovog istraživanja korišćena je subskala kojom se ispituje fizičko samoopisivanje vlastitog telesnog izgleda ispitanika koji samoprocene daju na 5-stepenoj Likertovoj skali, od nivoa 1 (*netačno*) do 6 (*tačno*). U ovom istraživanju koeficijent interne konzistencije pouzdanosti (*Chrobach's*) za korišćeni upitnik iznosi ($\alpha = .78$).

Upitnik zdravstvenog statusa - SF-36

SF-36 (engl. *The short form-36 Health Survey*; Ware et al., 2000) obuhvata dve skale: telesno funkcionisanje i ograničenja zbog telesnih teškoća pomoću kojih se procenjuje kvalitet života i telesno i psihičko zdravlje ispitanika. Upitnik sadrži 36 ajtema koji podrazumevaju osam zdravstvenih domena: telesno funkcionisanje (10 ajtema), ograničenja zbog telesnih poteškoća (4 ajtema), telesni bolovi (2 ajtema), vitalnost (4 ajtema), opšta percepcija zdravlja (5 ajtema), socijalno funkcionisanje (2 ajtema), ograničenja zbog emocionalnih poteškoća (3 ajtema) i mentalno zdravlje (5 ajtema). Teorijski raspon se kreće od 0 do 100 bodova, gde 0 bodova predstavlja maksimalno ograničenje zdravlja, dok 100 bodova predstavlja veoma pozitivan odgovor i sugerise na nepostojanje zdravstvenih ograničenja. Koeficijenti pouzdanost (*Cronbach's alpha*) na ovom uzorku iznose ($\alpha = .87$) za subskalu telesnog funkcionisanja i ($\alpha = .83$) za subskalu ograničenja zbog telesnih teškoća.

Međunarodni upitnik o fizičkoj aktivnosti – kratka verzija - IPAQ-S

IPAQ-S (eng. *The International Physical Activity Questionnaires*, Craig et al., 2003) ispituje intenzitet fizičke aktivnosti koje se svakodnevno sprovode. Upitnik obuhvata 27 ajtema: frekvenciju i trajanje fizičkih aktivnosti provedenih u hodanju, aktivnosti umerenog i visokog intenziteta i vreme provedeno u sedećem ili ležećem položaju, koje su se dogodile u proteklih sedam dana. Umerene aktivnosti podrazumevaju aktivnosti u kojima je disanje brže od uobičajenog, dok se aktivnosti visokog intenziteta odnose na one u kojima je disanje brže od umerenog. Ispitanik ima zadatak da zaokruži broj dana u sedmici (od 1 do 7) koje je proveo obavljajući naročito naporene fizičke aktivnosti, te ispod toga da napiše koliko je vremena proveo radeći fizičke aktivnosti koje se odnose na učestalost, vreme trajanja i intenzitet fizičke aktivnosti u četiri domena života: posao, prevoz, domaćinstvo i slobodno vreme. Rezultat se prikazuje kao kontinuirane varijable izražene u MET-ima ili kategoričke varijable u tri kategorije (niska fizička aktivnost, umerena i visoka fizička aktivnost. Sumiranjem vrednosti nivoa fizičke aktivnosti u četiri pomenuta domena izračunava se ukupan nivo fizičke aktivnosti. Na osnovu parametara intenziteta, frekvencije i trajanja fizičke aktivnosti, koji su deo IPAQ upitnika, procenjuje se energetska potrošnja korelirana s fizičkom aktivnošću, izražena u metaboličkim jedinicama (MET-ima). Budući da su odgovori ispitanika većinom iskazani u minutima provedenim u pojedinoj fizičkoj aktivnosti, skor fizičke aktivnosti se izražava u MET minutima se dobija množenjem MET minuta provedenih u pojedinoj fizičkoj aktivnosti i MET skorova. Vrednost MET-minute je jednaka po vrednosti potrošenim kilokalorijama. Dobijeni koeficijenti *Cronbach's alpha* za varijable fizičke aktivnosti po domenama, kao i varijable ukupne fizičke aktivnosti u ovom istraživanju kreću se od $\alpha = .73$ do $\alpha = .79$.

Statistička obrada podataka

Osnovnom deskriptivnom statistikom i merama asimetričnosti i spljoštenosti ili zaobljenosti – koeficijentima skjunisa i kurtozisa, izračunate su vrednosti varijabli za proveru normalnosti distribucija. Za definisanje psihometrijskih karakteristika instrumenata primenjena je analiza pouzdanosti (*Cronbachov* α -koeficijent). Izračunati su i Pirsonovi koeficijenti korelacija, radi definisanja odnosa među ispitivanim varijablama, dok je multipla hijerarhijska regresiona analiza sprovedena u cilju definisanja parcijalnih relativnih doprinosa prediktora u objašnjavanju varijanse zadovoljstva životom. Kao nivo značajnosti korišćena je vrednost od ($p \leq .05$ ili $p \leq .01$). Statistička obrada podataka realizovana je u softverskom programu *Statistical Package IBM-SPSS*, verzija 26.0.

REZULTATI

U Tabeli 2 prikazani su osnovni deskriptivni parametri merenih varijabli: indeks telesne mase, fizička aktivnost visokog i umerenog intenziteta, hodanje, ukupna fizička aktivnost, sedenje, fizičke aktivnosti, zadovoljstvo životom i telesno funkcionisanje kao indikator kvaliteta života i zdravlja.

Tabela 2. Deskriptivni parametri analiziranih varijabli ($N = 160$)

Varijabla	Min	Max	AS	SD	SE	Sk	Ku
Indeks telesne mase (ITM) – kg/m^2	13.96	29.63	19.46	2,47	.18	.15	.48
IPAQ-TA visokog intenziteta (MET-min/sedmično)	.00	100	29.05	2.06	.44	.68	.40
TA umerenog intenziteta (MET-min/sedmično)	.00	500	20.01	1.12	.35	.79	-.07
Hodanje (MET-min/sedmično)	.00	39	15.35	1.03	.29	.77	-.52
Ukupno TA (MET-min/sedmično)	.00	166	70.02	2.14	.16	.19	.53
Sedenje -časova	.46	23	4.76	2.17	.52	.83	.90
PSDQ-S Telesna aktivnost	2.41	7.05	5.01	.87	.36	.49	.53
SWLS Zadovoljstvo životom	1.36	6.52	4.88	1.36	.49	-.57	-.09
SF-36 Telesno funkcionisanje	.00	100	68.23	2.74	.64	.87	.82
Ograničenje zbog telesnih teškoća	.00	100	77.26	1.56	.70	-.92	.87

Legenda: Min = minimalni rezultat, Max = maksimalni rezultat, AS = aritmetička sredina, SD = standardna devijacija, SG = standardna greška aritmetičke sredine, Sk = koeficijent asimetričnosti, Ku = koeficijent spljoštenosti/zaobljenosti

Normalnost distribucija korišćenih varijabli na statističkom skupu ispitanika testirana je koeficijentima asimetričnosti – Sk (engl. Skewness) i spljoštenosti Ku (engl. Kurtosis) na nivou greške zaključivanja ($p \leq .05$). Izračunate vrednosti Sk i Ku kreću se u rasponu od ± 1.96 , što ukazuje na normalnu – Gausovu verovatnoću distribucije podataka i dalju primenu parametrijskih metoda u statističkoj analizi podataka (Haqiqatkah et al., 2023).

U cilju provere povezanosti između fizičke aktivnosti, zadovoljstva životom i kvaliteta životom u koheziji sa zdravljem adolescenata sprovedena je korelaciona analiza (Tabela 3).

Tabela 3. Interkorelacije (Pearsonov koeficijent r) između ispitivanih varijabli u istraživanju ($N = 160$)

Varijable	1	2	3	4	5	6	7	8
1. ITM	–	-.05	-.15	-.12	-.09	-.30**	-.07	-.11
2. TA visokog intenziteta		–	.67*	.01	-.32*	.26**	.32**	.05
3. TA umerenog intenziteta			–	.55**	.03	-.07	.09	-.01
4. Hodanje				–	.06	.02	-.10	-.04
5. Sedenje					–	-.05	-.08	
6. TA (PSDAPQ-S)						–		.22**
7. Ograničenja zbog telesnih poteškoća (SF-36)							–	.15*
8. Zadovoljstvo životom								–

Napomena: * $p \leq .05$; ** $p \leq .01$

Pregledom matrice korelacija upotrebljenih mernih instrumenata uočava se statistički značajna niska negativna uzajamna zavisnost između indeksa telesne mase i telesnog funkcionisanja kao jednog od indikatora kvaliteta života koji se odnosi na zdravlje. To sugeriše da ispitanici koji imaju manji indeks telesne mase percipiraju svoje telesno funkcionisanje boljim. Istovremeno nađen je pozitivan međusobni odnos između fizičke aktivnosti visokog i fizičke aktivnosti umerenog intenziteta i negativan suodnos korelata fizičke aktivnosti visokog intenziteta i sedenja. Takođe, zapaža se osrednji stepen pozitivne interakcije fizičke aktivnosti umerenog intenziteta između sedmične fizičke aktivnosti (TA) visokog intenziteta i varijable hodanja. Uz to, kod relacija različitih intenziteta fizičke aktivnosti, kao segmenta slike tela ispitanika, manifestovala se jedino značajna interkorelacija s fizičkom aktivnosti visokog intenziteta. To pokazuje da adolescenti koji su uključeni u fizičke aktivnosti visokog intenziteta relevantno pozitivnije doživljavaju svoju sliku tela. Osim toga, fizička aktivnost visokog intenziteta, takođe je, u signifikantnoj niskoj pozitivnoj zavisnosti s varijablom koja podrazumeva kvalitet života u interakciji sa zdravljem – ograničenja zbog telesnih teškoća, što upućuje na to da ispitanici koji sprovode fizičku aktivnost visokog intenziteta percipiraju da imaju značajno manje ograničenja usled telesnih teškoća. Dobijen je značajan pozitivan međusobni uticaj između varijabli zadovoljstvo životom i fizičke aktivnosti kao segmenta samoopisivanja telesnog izgleda. Sa druge strane, nije utvrđena korelacija između varijabli: nivoi fizičke aktivnosti (visoki, umereni intenzitet, hodanje, sedenje) i zadovoljstvo životom. Definitivno, u ovom istraživanju, aspekti kvaliteta života statistički značajno su pozitivno povezani sa zadovoljstvom životom. Dakle, u skladu s pretpostavljenim moderatorskim efektima greške predikcije – reziduala (Kennedy et al., 2022) dobijeni korelacioni rezultati u ovom istraživanju potvrdili su testiranu prvu radnu hipotezu (H1), tj. pozitivnu interakciju fizičke aktivnosti i zadovoljstva životom.

Zaključno, treba napomenuti da korelacija između varijabli: fizičkih aktivnosti visokog i umerenog intenziteta hodanja, sedenja, samopoimanja i indeksa telesne mase nije bila signifikantna, a da se u hijerarhijskoj regresionoj analizi visinsko-težinski indikator uhranjenosti izdvojio kao statistički značajan prediktor zadovoljstva životom, što ukazuje na to da je došlo do supresijskog efekta (Tabachnick & Fidell, 2013) na uzorku mladih fudbalera u dobu duševnog i telesnog razvoja između puberteta i zrelosti.

U cilju provere doprinosa prediktorskih varijabli: intenziteta fizičke aktivnosti, percepcije fizičke aktivnosti kao segmenta samopoimanja adolescenata i aspekta fizičkog funkcionisanja kao moderatora, u objašnjenju kriterijumske varijable – zadovoljstvo životom, sprovedena je hijerarhijska regresiona analiza u tri modela regresione jednačine (Tabela 4).

Tabela 4. Rezultati hijerarhijskih regresionih analiza sa zadovoljstvom životom kao kriterijском varijablom ($N = 160$)

Prediktori	Model I		Model II		Model III	
	β	SE β	β	SE β	β	SE β
ITM	-.20**	.11	-.20** .43	.09	-.15	.34
TA visokog intenziteta			-.01	.42	-.10	.25
TA umerenog intenziteta			-.05	.37	-.02	.43
Hodanje			-.04	.25	-.03	.29
Sedenje			-.01			
TA (PSDQ-S)			.23**	.56	.15*	.10
Telesno funkcionisanje (SF-36)					.19*	
Ograničenja zbog telesnih teškoća (SF-36)					.12	.58
ΔR^2	.05*		.04*		.09**	
R ²	.05		.09		.20	

Napomena: β = standardizovani regresioni beta-koeficijent; SE β = standardna greška beta-koeficijenta; R^2 = koeficijent multiple determinacije; ΔR^2 = korigovani koeficijent multiple determinacije - ukupni doprinos pojedine grupe prediktora objašnjenju varijansi; ** $p \leq .01$, * $p \leq .05$

Pre sprovođenja hijerarhijske regresione analize Durbin-Watsonovim testom proverene su autokorelacije linearnih modela, odnosno nezavisnost reziduala u modelu. Kolinearnost je testirana vrednostima linearnog odnosa (engl. *variance inflation factors*; VIF) i recipročnom vrednošću (engl. *Tolerance*). Izračunate vrednosti Durbin-Watsonovog testa, VIF i *Tolerance* u skladu su s preporučenim vrednostima, te se zaključuje da reziduali nisu u korelaciji, odnosno u modelu ne postoji fenomen multikolinearnosti između prediktorskih varijabli, te da je ispunjen uslov za primenu regresije (Senaviratna & Cooray, 2019).

U prvi blok varijabli hijerarhijske linearne regresije moderatorskog efekta uključen je ITM kao prediktorska varijabla, u drugi blok varijabli nivo intenziteta fizičke aktivnosti i slika tela, a u treći blok varijabli uvedeni su aspekti telesnog funkcionisanja (kao indikatori kvaliteta života). Na ovaj način omogućeno je identifikovanje parcijalnih relativnih doprinosa pojedinih prediktora u objašnjenju ukupnog varijabiliteta zadovoljstva životom.

Nalazi regresije signalizirali su da je u 1. početnom setu nezavisnih varijabli *indeks telesne mase* statistički značajan negativan prediktor koji objašnjava 5% ukupne varijanse kriterijuma. Negativan predznak ukazuje na to da su ispitanici koji imaju manji indeks telesne mase zadovoljniji svojim životom, i obrnuto, veći visinsko-težinski pokazatelj uhranjenosti pojedinca je osnova očekivanju da će stepen njihovog zadovoljstva životom biti niži. U 2. regresionom modelu prediktivni rezultati merenih nezavisnih varijabli (različiti intenziteti fizičke aktivnosti) pokazuju da nisu imali statistički značajne interakcije sa ishodom kriterijumske varijable, odnosno njihovi moderatorski efekti nisu bili signifikantni, što upućuje na zaključak da korelacije različitog intenziteta fizičke aktivnosti ne zavise od analizirane odrednice zadovoljstva životom.

Međutim, u ovom modelu parcijalni nivo signifikantnosti manifestovala je jedino varijabla fizičko vežbanje kao segment *samopoimanja telesnog izgleda* ($\beta = .23$, $p \leq .05$), koja dodatno s 4% parcijalno doprinosi tumačenju varijabiliteta kriterijuma zadovoljstva životom. Preciznije, ovo znači da su ispitanici koji percipiraju pozitivnije telesno samopoimanje – verovatno zadovoljniji svojim životom. U 3. poslednji regresioni model korišćenih mernih instrumenata uključen je pozitivan prediktor *telesno funkcionisanje*, koji statistički značajno povećava koeficijent multiple korelacije, pri čemu dodatno predviđa 9% ukupne varijanse kriterijuma, što sugerise da su životom zadovoljniji mladi koji svoje telesno funkcionisanje percipiraju što boljim. Definitivno, regresiona jednačina u poslednjem Modelu III pokazuje da je ovim skupom statistički značajnih prediktorskih varijabli (intenzitet fizičke aktivnosti, percepcija fizičke aktivnosti kao segmenta slike tela i aspektom fizičkog funkcionisanja) moguće da se predvidi 20% ukupnog varijabiliteta zavisne varijable zadovoljstva životom. To sugerise na zaključak da je opravdana primena predloženog multivarijantnog modela regresije (Hair et al., 2024), tj. da je na uzorku mladih fudbalera potvrđena radna hipoteza (H_2), odnosno očekivanje da će statistički značajni prediktori zadovoljstva životom u doba mladih igrača od 14 do 16 godina biti indeks telesne mase, nivo intenziteta fizičke aktivnosti, samoprocena fizičke aktivnosti i kvalitet života povezan sa zdravljem.

DISKUSIJA

Cilj ove studije poprečnog preseka bio je da se ispituju relacije fizičkih aktivnosti, kvaliteta života u interakciji sa zdravstvenim statusom, telesnog samopoimanja, telesnog funkcionisanja i zadovoljstva životom kod fudbalera kadeta.

Telesni sastav (engl. *body composition*) podrazumeva odnos mišićne mase (mišići, skelet, organi) prema masnoj masi u telu, a u antropološkim i medicinskim istraživanjima procenjuje se pomoću indeksa telesne mase, koji je izmislio matematičar Adophe Quetelet u XIX veku, s namerom da se brzo i efikasno dijagnostikuje gojaznost (Korzonek-Szlacheta et al., 2024). Izbalansiran telesni sastav je u korelaciji s poboljšanim celokupnim zdravljem i umanjenim rizikom od hroničnih bolesti (Moreno-Díaz et al., 2024). Međutim, indeks telesne mase može dati netačne informacije u različitim uzrasnim periodima, npr. kod odojčadi i vojnika pošto ne može egzaktno da se proceni sastav tela, odnosno učešće telesne masti koja predstavlja najveći problem kod sportista s prekomernom telesnom masom (Anam et al., 2024). Pomenuta suspektnost delimično se podudara i s rezultatima indeksa telesne mase i u ovom istraživanju gde je ITM varirao od 15.26 do 30.85 kg/m². Samim tim, konstatuje se da se ITM može opravdano koristiti u procene telesnog sastava na srpskoj sportskoj populaciji, pri čemu treba biti oprezan u interpretaciji budući na njegove nedostatke i limite.

Definisanje intenziteta fizičke aktivnosti (FA) veoma je važno kod njenog sprovođenja. Pri tome je bitno da se tokom fizičkog vežbanja shvate kategorije intenziteta fizičke aktivnosti (FA niskog, umerenog i FA visokog inten-

zitetu), te se njegov intenzitet prilagodi organizmu svakog sportiste. S obzirom na to da su u ovom istraživanju učestvovali mladi fudbaleri, nalazi o nivou visokog intenziteta fizičke aktivnosti su očekivani jer se većina ispitanika i u slobodno vreme pojedinačno bavi i nekim dopunskim sportom, što podrazumeva značajno veću frekvenciju otkucaja srca, disanja i znojenja. Jednostavan metod da se definiše kategorija visokog intenziteta fizičke aktivnosti obavlja se pomoću testa razgovora. Ukoliko tokom sprovođenja fizičke aktivnosti može odjednom da se izgovori par reči, a ne cela rečenica, to pokazuje da se ispitanik nalazi u kategoriji visokog intenziteta fizičke aktivnosti (Subbarayalu et al., 2024). U istraživanju (Boat et al., 2024) se preporučuje da ljudi redovno treba da sprovedu fizičke aktivnosti visokog intenziteta u vremenu od 75 do 150 minuta, radi redukcije sedećih navika i unapređenja zdravlja. Osim toga, adolescenti koji upražnjavaju fizičke aktivnosti visokog intenziteta realizuju bolji uspeh u školi.

Sklop cilja u ovom istraživanju odnosio se i na ispitivanje interakcija fizičke aktivnosti, zadovoljstva životom i kvaliteta života povezanog sa zdravljem kod fudbalera u doba adolescencije. Pokazalo se da fudbaleri koji su zadovoljniji životom relevantno više misle da se bave fizičkom aktivnošću ako se ona meri kao segment samopoimanja njihove slike tela. Pritom, zadovoljstvo životom nije u koheziji s nivoom fizičke aktivnosti. Neki nalazi ukazuju da su pojedinci koji se bave fizičkim aktivnostima visokog i umerenog intenziteta zadovoljniji životom i srećniji od onih koji se bave fizičkim aktivnostima niskog intenziteta (Ahsan & Ali, 2023). Ali, postojeći nalazi nisu logički povezani u relacijama različitih intenziteta fizičke aktivnosti i subjektivnog blagostanja. Na primer, u studiji (Liu et al., 2023) je utvrđeno da je umeren do visok nivo fizičke aktivnosti u korelaciji s većim kvalitetom života, te da je najveće subjektivno samopoimanje fizičkog izgleda kod ispitanika koji upražnjavaju fizičke aktivnosti niskog intenziteta. Takođe, empirijski nalazi u studiji (Parsakia et al., 2024) potvrđuju da se zadovoljstvo životom povećava ukoliko pojedinac svakodnevno upražnjava fizičke aktivnosti. Adolescenti koji su zadovoljniji životom naglašavaju veći značaj boljeg kvaliteta života, tj. njegovog segmenta telesnog funkcionisanja uz manja ograničenja zbog telesnih teškoća. Uzajamno dejstvo između fizičke aktivnosti i kvaliteta života dokazana je i u studiji (Yang et al., 2024), gde je konstatovano da fizičke aktivnosti visokog intenziteta doprinose kvalitetu života koreliranog sa zdravljem, što generalno povećava zadovoljstvo životom u adolescenciji.

Ispitivanjem međusobnog uticaja fizičke aktivnosti, telesnog funkcionisanja i zadovoljstva životom, dobijene su relevantne determinate koje predviđaju konstrukt zadovoljstvo životom. Empirijski nalazi na ispitivanom uzorku, uz oko 1/5 varijabiliteta sugerišu da su zadovoljniji životom fudbaleri kadeti s manjim indeksom telesne mase, višim nivoom fizičke aktivnosti kao segmenta samopoimanja, kao i oni koji percipiraju svoje telesno funkcionisanje boljim. Međutim, iako su testirane prediktorske varijable uspešno objasnile značajan procenat zadovoljstva životom, vidljivo je znatan deo varijanse (oko 80%) ostao neobjašnjen, što ukazuje na to da se radi o kompleksnom konceptu koji objašnjavaju brojni drugi neispitivani faktori. Takođe, istraživanje autora (Parsakia et al., 2024) upućuje na to da su sportisti zadovoljniji životom u komparaciji sa sportistkinjama identičnog uzrasta. Istovremeno veći indeks telesne mase sportista negativno utiče na kvalitet života povezanog sa njihovim zdravstvenim statusom (Faroughi et al., 2024). Osim toga, fizička aktivnost sportista je u signifikantnoj interakciji sa zadovoljstvom životom u doba adolescencije (Ault et al., 2024; Predoiu et al., 2024).

Prilikom interpretacije rezultata ovog transverzalnog istraživanja važno je da se uzmu u obzir njegova metodološka ograničenja. Prvo ograničenje se odnosi na prigodni uzorak koji je tom trenutku bio dostupan za istraživanje. Bilo bi poželjno da je broj ispitanika veći te da su učestvovali fudbaleri iz većeg broja klubova sa cele teritorije Srbije. Nedostatak ovog istraživanja može da bude davanje socijalno poželjnih odgovora koji su verovatno rezultat ispunjavanja instrumenata u grupama zbog straha da su ostalim ispitanicima u grupi dostupni, tj. vidljivi njihovi odgovori. Takođe, metod prikupljanja podataka putem samoiskaza zbog tendencije davanja socijalno poželjnih odgovora, dovodi u pitanje iskrenost takvih odgovora. Ovakav nedostatak može da se reši korišćenjem neke druge mere, npr. procene vršnjaka i trenera radi dobijanja iskrenijih odgovora. Poslednje ograničenje odnosi se na iscrpljivanje ispitanika. S obzirom na antropometrijska merenja (telesna masa i visina tela) i velikog broja datih ajtema postoji mogućnost da je došlo do umora ispitanika i njihove smanjene motivacije, što može da utiče na rezultate istraživanja. Takođe, s obzirom na korelacioni nacrt istraživanja i dobijenu nisku povezanost između varijabli nužan je oprez kod interpretacije jer nije moguće zaključivati o uzročno-posledničnim vezama. Stoga na budućem reprezentativnom uzorku svih takmičarskih kategorija fudbalera, oba pola, treba uključiti neke varijable kao što su stil života, socijalno okruženje, vrednosti i stavovi te uticaj vršnjaka i trenera radi potvrđivanja naših zaključaka o smeru interakcija zadovoljstva životom, fizičke aktivnosti kao segmenta slike tela, fizičke aktivnosti visokog intenziteta i kvaliteta života povezanog sa zdravljem aktivnih sportista.

Uprkos pomenutim nedostacima, nalazi ovog istraživanja doprinose boljem razumevanju latentnih faktora koji predviđaju zadovoljstvo životom kod srpskih fudbalera u kadetskoj kategoriji. Međutim, naredna istraživanja (eksperimentalnog i longitudinalnog dizajna) na reprezentativnom uzorku svih takmičarskih kategorija fudbalera, oba pola, treba da se usmere na ispitivanje smernica za poboljšanje zadovoljstva životom fudbalera. Svi prediktivni faktori ne mogu biti otklonjeni, ali je bitno da se preduzmu preventivne mere kako bi se smanjili oni koje je moguće smanjiti. Fudbaleri u kadetskom uzrastu edukacijom, znanjima i veštinama kao što je komunikacija s vršnjacima i trenerima, organizovanje slobodnog vremena, fizička aktivnost, mogu da omoguće postizanje većeg zadovoljstva životom u fudbalskoj adolescentskoj populaciji.

ZAKLJUČAK

Rezultati ovog istraživanja ukazuju na korelaciju zadovoljstva životom i fizičke aktivnosti kao dela samopoznavanja svog fizičkog izgleda, kao i na interakciju fizičke aktivnosti visokog intenziteta i kvaliteta života povezanog sa zdravljem fudbalera kadetskog uzrasta, tj. gledišta nedovoljnosti zbog njihovih telesnih teškoća. Dakle, za konstrukt zadovoljstvo životom nije relevantan nivo fizičke aktivnosti, nego generalno percepcija mladih sportista kod upražnjavanja fizičkih aktivnosti. Fudbaleri u dobi između 14 i 16 godina koji imaju manji indeks telesne mase, viši nivo fizičke aktivnosti kao segmenta slike tela, samopoznavanja i oni koji procenjuju svoje fizičko funkcionisanje boljim, zadovoljniji su životom. Budući na dobijene regresione nalaze istraživanja, tj. koeficijent nedeterminacije, koji pokazuje uticaj ostalih neispitivanih prediktorskih varijabli na varijansu kriterijuma zadovoljstva životom, neophodne su naredne empirijske studije radi potpunijeg shvatanja kohezije fizičke aktivnosti i drugih gledišta zadovoljstva životom. Nalazi ovog istraživanja nude praktične implikacije za uvođenje dodatnih prediktorskih varijabli prilikom testiranja kriterijuma zadovoljstva životom. Rezultati u ovoj studiji mogu da budu podsticaj za detaljnija ispitivanja relacija fizičke aktivnosti i zadovoljstva životom, naročito zbog aktuelne tendencije sedećeg načina života i njegovih nepovoljnih posledica za kvalitet života i zdravlje na uzorku sportista u doba adolescencije.

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PHYSICAL ACTIVITY AS DETERMINANT OF SATISFACTION WITH LIFE AMONG CADET FOOTBALL PLAYERS ¹

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Abstract: The aim of this transversal research was to examine the possibility of predicting the variables of physical activities, and quality of life in interaction with health, physical self-concept, and physical functioning in the context of explaining the criteria of satisfaction with life in cadet football players. The pertinent sample consisted of 160 participants ($M_{age} = 15.74$; $SD = 1.49$). The Satisfaction with Life Scale – SWLS, the International Physical Activity Questionnaire – IPAQ-S, the Physical Self-Description Questionnaire – PSDQ, and the Short Form-36 Health Survey (SF-36) were used to collect data. The findings of the hierarchical regression analysis showed that significant predictors – body mass index, physical exercise, as a segment of body image, and physical functioning predict 20% of the variance of satisfaction with life ($p \leq .05$). This suggests that the perception of satisfaction with life in adolescents is more relevant for engaging in physical activities than the level of their physical activities. Also, the variables such as body mass index, physical exercise, along with self-concept of physical appearance and physical functioning are important mediators in explaining the construct of satisfaction with life, so they can be guidelines for identifying the perceived level of this dependent variable in the adolescent sport population in the Republic of Serbia. Theoretical contributions and practical implications are interpreted in accordance with the correlational and multiple linear regression findings of previous empirical studies.

Keywords: *adolescence, football players, physical self-concept, health status*

INTRODUCTION

Aerobic and anaerobic *physical activity*, e.g. walking, swimming, cycling, motor games, hiking, housework and physical exercise means moving the body using the skeletal musculature and the skeleton, with energy consumption greater than that during the resting phase, for proper growth and physical development, positive impact on physical and mental health and improvement or maintenance of functional, morphological, cognitive and conative characteristics and motor skills (Ivanović & Ivanović, 2019). The aforementioned authors believe that physical activities have many benefits for people, and they should be exercised regularly and gradually in a rhythm that suits the body, in order to encourage the strengthening of the body and the realization of the desired goal. In addition, physical activity reduces symptoms of depression, anxiety, stress and the risk of premature mortality, increases

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self-esteem and intellectual functions in everyday tasks (Przybylska et al., 2024). The World Health Organization recommends that children under the age of 17 do at least three activities a week: running, skipping rope, gymnastics and team sports, e.g. football, volleyball and basketball, because this is the age when it is important to strengthen and properly develop bones and skeletal muscles (World Health Organization, 2022). Unfortunately, only about 20% of children and young people in the world achieve these advised standards. The intensity of exercise is divided into absolute or relative. Absolute intensity is expressed through metabolic equivalent (MET), oxygen consumption and calorie consumption, and indicates the amount of energy spent during the activity. Low intensity refers to the activity of up to 2.9 METs, moderate activities are in the range of 3.0 – 5.9 METs, while high activities imply energy consumption of over 6.0 METs. For example, walking at a speed of 5 km/h requires consumption of 4 METs, while running at a speed of 12 km/h has a consumption of 12 METs (Croatian Institute of Public Health, 2022). Relative intensity implies the effort necessary to carry out a physical activity and is described by physiological parameters such as the percentage of maximum heart rate or the percentage of maximum oxygen consumption.

The multidimensional construct - *satisfaction with life* represents the subjective level at which an individual positively perceives the physical, mental and social quality of their own life (Parsakia et al., 2024). A number of factors contribute to a person's satisfaction with life. For example: supportive and moderating relationships, hobbies, creative workplace, positive emotional experiences, etc. On the other hand, stress, poor health, financial difficulties and negative emotions reduce the level of satisfaction with life. One study (Zhai et al., 2024) showed that satisfaction with life among adolescents, who spend more time engaging in physical activity, positively affects their satisfaction with school. That is why it is important that adolescents enjoy classes and that they perceive their participation in solving tasks as a positive and satisfactory thing.

An important concept in psychological analyses of adolescents is *body image*, i.e. the *self-concept* of one's physical appearance, *body satisfaction*. The experience of understanding one's physical appearance (self-concept) presupposes a set of representations, fantasies, emotions, attitudes and meanings related to the body and certain parts of a person (Rojas-Padilla et al., 2024). Body image can also be understood as a mental self-description of one's own body, the attitude towards physical appearance, the state of health, whereby the attitudes of value arise in the context of faith, culture and tradition (Berengüi et al., 2023). The experience of body image affects the perceptual, cognitive, emotional and behavioural functions of an individual during their growth and physical development. It is not static but dynamic and depends on external (social and cultural) and internal (biological and psychological) factors, which change, are maintained and developed. Body image/self-concept of one's physical appearance includes the totality of perception that an individual has about themselves and their identity, the way they see themselves in different dimensions of life, and in relation to their own environment. It, as the central phenomenon of this model, implies attitudes and schemes based on physical appearance, which are influenced by cultural socialization factors, interpersonal experiences, physical characteristics and personality dimensions (Burgon et al., 2023). The aforementioned authors believe that adolescents who physiologically mature earlier are usually more popular, occupy leading social positions, and are often sports stars, which generates greater self-satisfaction and a more positive body image.

In the past 10 years, empirical research has emphasized the relevance of *health status*, which includes full functioning or the efficiency of body and mind, and social adaptation (Ivanović & Ivanović, 2018). In accordance with this definition, it is possible to assess the extent to which a person's well-being is impaired in the field of physical, mental and social health. The author's research (Chapa et al., 2022) draws attention to the harmful effects of technology and the increasing number of obese adolescents among the school population, as well as the increase in the abuse of alcohol and drugs among high school students. The authors claim that physical exercise during adolescence is an important moderating factor for the health of young people, and that the predictors such as physical inactivity, excess body weight and restrictions due to physical limitations represent significant negative determinants of health status during puberty. On the other hand, more physically active adolescents with normal body mass enjoy better health (Faroughi et al., 2024).

Since the applicability of the measuring instruments used in this paper has not yet been tested on a Serbian sample, and while the other studies do not offer consistent results, the *aim* of this quantitative research is to examine the relationship between physical activities, health-related quality of life, physical self-concept, physical functioning and satisfaction with life of cadet football players. Considering the results of previous research, it is assumed that the positive interaction between physical activity and satisfaction with life will be confirmed in the sample of adolescent soccer players (H_1). It is also expected that statistically significant predictors of satisfaction with life among young players from 14 to 16 years of age will be body mass index, level of intensity of physical activity, self-assessment of physical activity and quality of life related to their health (H_2).

METHOD

Participants and research procedure

The research was carried out in the Kolubara district on a pertinent sample of 160 cadet football players from three clubs from Valjevo: FC “Budućnost” (Serbian League West), FC “Radnički” (Kolubara-Mačva Zone) and FC “ZSK” (Kolubara district League). The average age of the participants was ($M = 15.74_{\text{years}}$, $SD = 1.19$). All participants had undergone at least two years of systematic and organized training, at least three times a week. Data collection was carried out during October 2025.

The application of the measuring instruments was carried out in groups, at the club premises, as part of the regular training sessions of football players, where each subject was tested individually using the pen-and-paper method. Before testing, the objective of the research was explained to the participants and they were guaranteed anonymity, along with instructions on filling in the questionnaire and scale. The estimated time of the testing, in the presence of the examiner, was approximately 20 minutes, where each subject could withdraw from testing at any time, without giving reasons and without any consequences. Three subjects with significant Mahalanobis distances at the $p \leq .01$ level were excluded as multivariate outliers (Tabachnik & Fidell, 2013). The research was approved by the football players’ parents and coaches, as well as the Scientific Council of the Serbian Academy of Innovation Sciences from Belgrade, based on the Declaration of Helsinki.

Measuring instruments

Body Mass Index (BMI)

The International Biological Program was used for measuring anthropometric parameters of body mass and body height (Weiner & Lourie, 1969). The participants’ body mass was measured with a medical scale, with a measurement precision of 0.1 kg, and body height with a height meter in a standing position, with a measurement precision of 0.1 cm, while the subjects were in light clothes without shoes. The degree of nutrition of the participants is expressed through the body mass index (BMI), which represents the ratio of body mass in kilograms to the square of body height in meters. BMI is calculated by dividing the participant’s body mass in kilograms by the square of body height in meters according to the standard formula: $BMI (kg/m^2) = \text{body mass (kg)} / \{\text{height}^2 (m)\}$. According to the recommendation of the World Health Organization - WHO, nutrition is classified into categories based on the following obtained BMI values: a) malnutrition - values less than 18.5 kg/m², b) normal body mass - values from 18.6 to 24.9 kg/m², c) excess body mass (overweight) - values of 25 to 29.9 kg/m² and d) obesity - values of 30 and more kg/m² (World Health Organization, 2021). The threshold value for overweight and obesity was $BMI \geq 25 \text{ kg/m}^2$.

Table 1 shows the categories of body mass index, i.e. the self-assessment of the participants’ nutrition.

Table 1. *Body mass index categories – BMI (N = 160)*

BMI	f	%
Insufficient body mass (malnutrition)	1	.7
Normal body mass	95	59.37
Excess body mass (overweight)	59	36.9
Obesity	5	3.1

Annotation: BMI = body mass index; f = frequency; % = percentage

By looking into the the data matrix, it can be seen that the most participants have a normal body mass (from 18.6 - 24.9 kg/m²) and an excessive body mass (from 25 - 29.9 kg/m²), while there is only one adolescent who is malnourished, and five of them are obese, i.e. with over 30 kg/m²).

Satisfaction with Life Scale (SWLS)

SWLS (Satisfaction with Life Scale; Lukaski & Raymond-Pope, 2021) examines the global overall assessment of satisfaction with life and consists of five items. Participants’ task is to evaluate the statements on a 7-point

Likert-type scale (from 1 = *I do not agree at all* to 7 = *I completely agree*). For example: “*My living conditions are excellent*”, “*I am satisfied with my life*”. The total score is calculated by adding up the results of all items, with a higher score indicating greater satisfaction with life. The reliability of the internal consistency type is measured by Cronbach’s alpha coefficient and in this research amounts to ($\alpha = .85$).

The Physical Self-Description Questionnaire-Short Form (PSDQ-S)

PSDQ-S (The Physical Self-Description Questionnaire-Short Form; Marsh et al., 2010) includes nine specific and two general subscales. For the purposes of this research, a subscale was used that examines the physical self-description of the participants' own physical appearance, who then provide self-assessments on a 5-point Likert-type scale, from 1 (*incorrect*) to 6 (*correct*). In this research, the coefficient of the internal consistency of reliability (Cronbach's) for the used questionnaire is ($\alpha = .78$).

The Short Form-36 Health Survey (SF-36)

SF-36 (the Short Form-36 Health Survey; Ware et al., 2010) includes two scales: physical functioning and restrictions due to physical limitations, which are used to assess the quality of life and physical and mental health of the participants. The questionnaire contains 36 items covering eight health domains: physical functioning (10 items), restrictions due to physical limitations (4 items), physical pain (2 items), vitality (4 items), general perception of health (5 items), social functioning (2 items), limitations due to emotional difficulties (3 items) and mental health (5 items). The theoretical range goes from 0 to 100 points, where 0 points represent the maximum health limitation, while 100 points represents a very positive response and suggests no health limitations. The reliability coefficients (Cronbach's alpha) in this sample are ($\alpha = .87$) for the subscale of physical functioning and ($\alpha = .83$) for the subscale of restrictions due to physical limitations.

The International Physical Activity Questionnaire (IPAQ-S)

The IPAQ-S (The International Physical Activity Questionnaire, Craig et al., 2003) examines the intensity of physical activity that is carried out daily. The questionnaire includes 27 items: the frequency and duration of physical activities spent walking, activities of moderate and high intensity and time spent in a sitting or lying position, during the past seven days. Moderate activities include activities in which breathing is faster than usual, while high-intensity activities refer to those in which breathing is faster than moderate. The participant is tasked with selecting the number of days per week (from 1 to 7) that they spent performing particularly demanding physical activities, and below that to write how much time they spent doing physical activities related to the frequency, duration and intensity of physical activity in four domains of life: work, transport, household and free time. The result is presented as continuous variables expressed in METs or categorical variables in three categories (low intensity physical activity, moderate and high intensity physical activity). By summing up the values of the level of physical activity in the four mentioned domains, the total level of physical activity is calculated. Based on the parameters of intensity, frequency and duration of physical activity, which are part of the IPAQ questionnaire, energy consumption correlated with physical activity, expressed in metabolic units (MET), is estimated. Since participants' answers are mostly expressed in minutes spent doing a particular physical activity, the physical activity score is expressed in MET minutes and is obtained by multiplying MET minutes spent doing a particular physical activity and the MET scores. The value of MET-minute is equal to the value of consumed kilocalories. The obtained Cronbach's alpha coefficients for the variables of physical activity by domain, as well as the variables of total physical activity in this research range from $\alpha = .73$ to $\alpha = .79$.

Statistical data processing

Using basic descriptive statistics and measures of skewness and kurtosis coefficients, the values of the variables for checking the normality of the distributions were calculated. Reliability analysis (Cronbach's α -coefficient) was used to define the psychometric characteristics of the instruments. The Pearson correlation coefficients were also calculated, in order to define the relationship between the examined variables, while multiple hierarchical regression analysis was conducted in order to define the partial relative contributions of the predictors in explaining the variance of satisfaction with life. The value of ($p \leq .05$ or $p \leq .01$) was used as the level of significance. Statistical data processing was carried out in the software program Statistical Package IBM-SPSS, version 26.0.

RESULTS

Table 2 shows basic descriptive parameters of the measured variables: body mass index, physical activity of high and moderate intensity, walking, total physical activity, sitting, physical activities, satisfaction with life and physical functioning as an indicator of quality of life and health.

Table 2. *Descriptive parameters of analysed variables (N = 160)*

Variable	Min	Max	M	SD	SE	Sk	Ku
Body mass index (BMI) – kg/m ²	13.96	29.63	19.46	2.47	.18	.15	.48
IPAQ-S High-intensity PA (MET-min/weekly)	.00	100	29.05	2.06	.44	.68	.40
Moderate-intensity PA (MET-min/weekly)	.00	500	20.01	1.12	.35	.79	-.07
Walking (MET-min/weekly)	.00	39	15.35	1.03	.29	.77	-.52
Total PA (MET-min/weekly)	.00	166	70.02	2.14	.16	.19	.53
Sitting – hours	.46	23	4.76	2.17	.52	.83	.90
PSDQ-S							
Physical activity	2.41	7.05	5.01	.87	.36	.49	.53
SWLS Satisfaction with life scale	1.36	6.52	4.88	1.36	.49	-.57	-.09
SF-36 Physical functioning	.00	100	68.23	2.74	.64	.87	.82
Restrictions due to physical limitations	.00	100	77.26	1.56	.70	-.92	.87

Legend: **Min** = Minimum result, **Max** = Maximum result, **M** = Arithmetic mean, **SD** = Standard deviation, **SE** = Standard error of the arithmetic mean, **Sk** = Skewness, **Ku** = Kurtosis

The normality of the distributions of the used variables on the statistical set of participants was tested by the coefficients of Skewness and Kurtosis at the level of inference error ($p \leq .05$). The calculated values of Sk and Ku are in the range of ± 1.96 , which indicates a normal – Gaussian probability distribution of data and further application of parametric methods in statistical data analysis (Haqiqatkhah et al., 2023).

In order to verify the connection between physical activity, satisfaction with life and quality of life in cohesion with adolescent health, a correlation analysis was conducted (Table 3).

Table 3. *Intercorrelations (Pearson coefficient r) between examined variables in research (N = 160)*

Variable	1	2	3	4	5	6	7	8
1. BMI	–	-.05	-.15	-.12	-.09	-.30**	-.07	-.11
2. High-intensity PA		–	.67*	.01	-.32*	.26**	.32**	.05
3. Moderate-intensity PA			–	.55**	.03	-.07	.09	-.01
4. Walking				–	.06	.02	-.10	-.04
5. Sitting					–	-.05	-.08	
6. PA (PSDAQ-S)						–		.22**
7. Restrictions due to physical limitations (SF-36)							–	.15*
Satisfaction with life								–

Annotation: * $p \leq .05$; ** $p \leq .01$

A review of the matrix of correlations of the used measuring instruments shows a statistically significant low negative interdependence between body mass index and physical functioning as one of the indicators of the quality of life related to health. This suggests that participants who have lower body mass index perceive their physical functioning as better. At the same time, a positive correlation was found between high-intensity physical activity and moderate-intensity physical activity, and a negative correlation between high-intensity physical activity and sitting. Also, a moderate degree of positive interaction between physical activity of moderate intensity and walking is observed. In addition, in relation to different intensities of physical activity, the only significant intercorrelation with high-intensity physical activity was manifested as a segment of the body image of the subject. This shows that adolescents who are involved in high-intensity physical activities perceive their body image in a relevantly more positive way. In addition, high-intensity physical activity is also in a significantly low positive relationship with the variable that implies quality of life in interaction with health – restrictions due to physical limitations, which indicates that participants who perform high-intensity physical activity perceive that they have significantly fewer restrictions due to physical limitations. A significant mutually positive influence was obtained between the variables of satisfaction with life and physical activity as a segment of the self-assessment of physical appearance. On the other hand, no correlation was established between the variables: levels of physical activity (high, moderate-intensity, walking, sitting) and satisfaction with life. This research definitely indicates that aspects of quality of life are statistically significantly positively related to satisfaction with life. Therefore, in accordance with the assumed moderating effects of prediction error – residuals (Kennedy et al., 2022), the obtained correlation results in this research confirmed the firstly tested working hypothesis (H1), i.e. positive interaction of physical activity and satisfaction with life.

In conclusion, it should be noted that the correlation between the variables: physical activities of high and moderate intensity, walking, sitting, self-concept and body mass index, was not significant, and that in the hierarchical regression analysis the height-weight indicator of nutrition stood out as a statistically significant predictor of satisfaction with life, which indicates that there was a suppression effect (Tabachnick & Fidell, 2013) on a sample of young football players at the age of mental and physical development between puberty and maturity.

In order to check the contribution of the predictor variables: the intensity of physical activity, the perception of physical activity, as a segment of adolescent self-concept, and the aspect of physical functioning, as a moderator, in explaining the criterion variable – satisfaction with life, a hierarchical regression analysis was conducted in three models of the regression equation (Table 4).

Table 4. Results of hierarchical regression analysis with life satisfaction as criterion variable ($N = 160$)

Predictors	Model I		Model II		Model III	
	β	SE β	β	SE β	β	SE β
BMI	-.20**	.11	-.20** .43	.09	-.15	.34
High-intensity PA			-.01	.42	-.10	.25
Moderate-intensity PA			-.05	.37	-.02	.43
Walking			-.04	.25	-.03	.29
Sitting			-.01			
PA (PSDQ-S)			.23**	.56	.15*	.10
Physical functioning (SF-36)					.19*	
Restrictions due to physical limitations (SF-36)					.12	.58
ΔR^2	.05*		.04*		.09**	
R^2	.05		.09		.20	

Annotation: β = Standardized regression beta-coefficient; $SE \beta$ = Standard error of beta-coefficient; R^2 = Coefficient of multiple determination; ΔR^2 = Corrected coefficient of multiple determination - total contribution of individual group of predictors to explained variance ** $p \leq .01$, * $p \leq .05$

Before conducting the hierarchical regression analysis, the autocorrelations of the linear models, i.e. the independence of the residuals in the model, were checked using the Durbin-Watson test. Collinearity was tested with the values of the linear relationship (variance inflation factors; VIF) and the reciprocal value (Tolerance). The calculated values of the Durbin-Watson test, VIF and Tolerance are in accordance with the recommended values, and it is concluded that the residuals are not correlated, that is, there is no phenomenon of multicollinearity between the predictor variables in the model, and that the condition for the application of regression is met (Senaviratna & Cooray, 2019).

In the first block of variables of the hierarchical linear regression of the moderator effect, BMI was included as a predictor variable, in the second block of variables the level of intensity of physical activity and body image, and in the third block of variables aspects of physical functioning (as indicators of quality of life) were introduced. In this way, it was possible to identify partial relative contributions of individual predictors in explaining the overall variability of satisfaction with life.

The regression findings indicated that in the 1st initial set of independent variables, *body mass index* is a statistically significant negative predictor that explains 5% of the total variance of the criteria. A negative sign indicates that participants who have a lower body mass index are more satisfied with their life, and vice versa, a higher height-weight indicator of an individual's nutrition is the basis for expecting that their level of satisfaction with life will be lower. In the 2nd regression model, the predictive results of the measured independent variables (different intensities of physical activity) show that they did not have statistically significant interactions with the outcome of the criterion variable, that is, their moderating effects were not significant, which points to the conclusion that the correlations of different intensities of physical activity do not depend on the analysed determinants of satisfaction with life.

However, in this model, only the variable physical exercise as a segment of self-concept of physical appearance manifested a partial level of significance ($\beta = .23, p \leq .05$), which additionally partially contributes with 4% to the interpretation of the variability of satisfaction with life criteria. More precisely, this means that participants who have a more positive body self-concept are probably more satisfied with their lives. In the 3rd last regression model of the used measuring instruments, a positive predictor *physical functioning* is included, which statistically significantly increases the coefficient of multiple correlation, while additionally predicting 9% of the total variance of the criteria, which suggests that young people who perceive their physical functioning to be as good as possible are more satisfied with life. The regression equation in the last Model III definitely shows that with this set of statistically significant predictor variables (the intensity of physical activity, the perception of physical activity as a segment of body image and an aspect of physical functioning) it is possible to predict 20% of the total variability of the dependent variable of satisfaction with life. This suggests the conclusion that the application of the proposed multivariate regression model (Hair et al. 2024) is justified, i.e. that the working hypothesis (H_1) was confirmed on the sample of young football players, i.e. the expectation that statistically significant predictors of satisfaction with life among young players aged 14 to 16 will be body mass index, level of intensity of physical activity, self-assessment of physical activity and health-related quality of life.

DISCUSSION

The aim of this cross-sectional study was to examine the relationship between physical activities, quality of life in interaction with health status, physical self-concept, physical functioning and satisfaction with life in cadet football players.

Body composition implies the ratio of muscle mass (muscles, skeleton, organs) to fat in the body, and in anthropological and medical research it is estimated using body mass index, which was invented by mathematician Adophe Quetelet in the 19th century, with an aim to quickly and efficiently diagnose obesity (Korzonek-Szlacheta et al., 2024). A balanced body composition is correlated with improved overall health and reduced risk of chronic diseases (Moreno-Díaz et al., 2024). However, body mass index can give incorrect information at different ages, e.g. in infants and soldiers since it is not possible to accurately assess body composition, i.e. the percentage of body fat, which is the biggest problem in athletes with excess weight (Anam et al., 2024). The aforementioned suspicion partially coincides with the results of body mass index in this study, where BMI varied from 15.26 to 30.85 kg/m².

Therefore, it can be concluded that BMI can be justifiably used in the evaluation of the body composition of Serbian sports population, while one should be careful in the interpretation due to its shortcomings and limitations.

Defining the intensity of physical activity (PA) is very important in its implementation. In doing so, it is important to understand the intensity categories of physical activity (low, moderate and high-intensity PA) during physical exercise, and to adapt its intensity to each athlete's organism. Given that young football players participated in this research, the findings at the level of high-intensity physical activity are expected because most of the participants also engage in some additional sport in their free time, which implies a significantly higher frequency of heart rate, breathing and sweating. A simple method to define the category of high-intensity physical activity is done using the conversation test. If during physical activity a string of words can be spoken, and not a whole sentence, it shows that the participants are in the category of high-intensity physical activity (Subbarayalu et al., 2024). In the research (Boat et al., 2024), it is recommended that people should regularly perform high-intensity physical activities for 75-150 minutes, in order to reduce sedentary habits and improve health. In addition, adolescents who do high-intensity physical activities achieve better success in school.

The aim set in this research also referred to the examination of the interactions of physical activity, satisfaction with life and health-related quality of life in football players during adolescence. It has been shown that football players who are more satisfied with life think significantly more that they engage in physical activity if it is measured as a segment of their body image self-concept. At the same time, satisfaction with life is not in cohesion with the level of physical activity. Some findings indicate that individuals who engage in physical activities of high and moderate intensity are more satisfied with life and happier than those who engage in physical activities of low intensity (Ahsan & Ali, 2023). However, the existing findings are not logically connected in the relations between different intensities of physical activity and subjective well-being. For example, in a study (Liu et al., 2023) it was determined that a moderate to high-level physical activity correlates with a greater quality of life, and that the highest subjective self-concept of physical appearance is among participants who engage in low-intensity physical activities. Also, empirical findings in another study (Parsakia et al., 2024) confirm that satisfaction with life increases if an individual engages in physical activities daily. Adolescents who are more satisfied with life emphasize greater importance of a better quality of life, i.e. of their physical functioning segment with fewer restrictions due to physical limitations. The mutual effect between physical activity and quality of life was also proven in a study (Yang et al., 2024), where it was stated that high-intensity physical activities contribute to the quality of life correlated with health, which generally increases satisfaction with life in adolescence.

By examining the mutual influence of physical activity, physical functioning and satisfaction with life, relevant determinants were obtained that predict the satisfaction with life construct. Empirical findings on the examined sample, with about 1/5 variability, suggest that cadet football players with a lower body mass index, a higher level of physical activity as a segment of self-concept, and those who perceive their physical functioning as better are more satisfied with life. However, although the tested predictor variables successfully explained a significant percentage of satisfaction with life, a significant part of the variance (about 80%) remained unexplained, which indicates that it is a complex concept explained by numerous other untested factors. Also, another author's research (Parsakia et al., 2024) indicates that male athletes are more satisfied with life compared to female athletes of the same age. At the same time, a higher body mass index in athletes negatively affects the quality of life associated with their health status (Faroughi et al., 2024). In addition, the physical activity of athletes is in a significant interaction with satisfaction with life during adolescence (Ault et al., 2024; Predoiu et al., 2024).

When interpreting the results of this cross-sectional study, it is important to take into account its methodological limitations. The first limitation refers to the pertinent sample that was available for research at that time. It would be better if the number of participants was greater and if football players from a larger number of clubs from the entire territory of Serbia participated. The limitations of this research may be in giving socially desirable answers, which are probably the result of filling out the instruments in groups due to the fear that their answers would be visible i.e. available to other participants in the group. Also, the method of collecting data through *self-assessments*, due to the tendency to give socially desirable answers, calls into question the sincerity of such answers. This can be solved by using some other measure, e.g. peer and coach assessments to get more honest answers. The last limitation concerns the attrition of subjects. Considering the anthropometric measurements (body weight and body height) and the large number of given items, there is a possibility that the subjects were tired and their motivation decreased, which may have affected the results of the research. Also, considering the correlational design of the research and the obtained low connection between the variables, caution is necessary in the interpretation

because it is not possible to conclude about causal relationships. Therefore, in the future representative sample of all competitive categories of football players, of both sexes, some variables such as lifestyle, social environment, values and attitudes, and the influence of peers and coaches should be included in order to confirm our conclusions about the direction of interactions between satisfaction with life and physical activity as a segment of body image, high-intensity physical activities and quality of life associated with the health of active athletes.

Despite the aforementioned limitations, the findings of this research contribute to a better understanding of the latent factors that predict satisfaction with life among Serbian cadet football players. However, future research (of experimental and longitudinal design) on a representative sample of all competitive categories of football players, of both sexes, should be directed at examining guidelines for improving football players' satisfaction with life. All predictive factors cannot be removed, but it is important to take preventative measures in order to reduce those that can be reduced. Through education, knowledge and skills such as communication with peers and coaches, organizing free time, physical activity, cadet football players can enable the achievement of greater satisfaction with life in the football adolescent population.

CONCLUSION

The results of this research indicate the correlation of satisfaction with life and physical activity as a part of the self-concept of one's physical appearance, as well as the interaction of high-intensity physical activity and the quality of life associated with the health of cadet football players, i.e. the views of difficulties due to their physical limitations. Therefore, the level of physical activity is not relevant for the construct satisfaction with life, but rather the general perception of young athletes when engaging in physical activities. Football players between the ages of 14 and 16 who have a lower body mass index, a higher level of physical activity as a segment of body image, self-concept and those who rate their physical functioning as better are more satisfied with life. Given the obtained regression research findings, i.e. the coefficient of indeterminacy, which show the influence of other untested predictor variables on the variance of satisfaction with life criteria, further empirical studies are necessary for a more complete understanding of the cohesion of physical activity and other aspects of satisfaction with life. The findings of this research offer practical implications for the introduction of additional predictor variables when testing satisfaction with life criteria. The results of this study can be an incentive for more detailed research on the relationship between physical activity and satisfaction with life, especially due to the current tendency of a sedentary lifestyle and its unfavourable consequences for the quality of life and health in a sample of athletes in adolescence.

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