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Obligatory exercise in young adults – effects of gender, group of exercisers, and supplements

Ovisnost o vježbanju mladih odraslih – učinak spola, skupine vježbača i dodataka

Ivana Duvnjak, Josip Cvenić, Iva Šklempe Kokić*

Summary

Introduction: Physical activity and exercise have numerous physical and psychological benefits. However, some individuals persevere in exercise despite the various problems it causes – physical, emotional, social and psychological.

Aim: The present study aimed to explore the effects of gender, group of exercisers and supplements on the occurrence of obligatory exercise in young adults. Another aim was to explore and present psychometric characteristics and factor structure of the Croatian version of The Obligatory Exercise Questionnaire (OEQ).

Methods: The study included 124 kinesiology students and 109 recreational exercisers (107 males and 126 females) in early adulthood engaged in some kind of physical activity. The participants provided information about sociodemographic characteristics and completed The Obligatory Exercise Questionnaire.

Results: Analysis of the factor structure of the Obligatory Exercise Questionnaire revealed three factors: exercise frequency and commitment, exercise preoccupation and intensity, and exercise emotionality. Obtained findings correspond to the previous modified and reduced versions of the instrument. The results of the research indicate that male participants and kinesiology students exercise more often and are more committed than females and recreational exercisers. Participants using vitamin and nutritional supplements exercise more often, are more committed and more preoccupied and exercise more intensely than those who are not using any supplements. Likewise, male students using vitamin and nutritional supplements show the highest levels of exercise emotionality.

Conclusion: The results suggest that the male gender, kinesiology students, and those who use the supplements may be riskier for obligatory exercise development.

Key words: compulsive exercise, young adult, sex characteristics, dietary supplements, students

Sažetak

Uvod: Redovita tjelovježba i vježbanje omogućuju ljudima fizičku i psihološku dobrobit. No dio ljudi ustraje u vježbanju i više no što je to preporučeno, te u situacijama kada vježbanje dovodi do različitih tjelesnih, emocionalnih, socijalnim i psiholoških problema.

Cilj: Cilj ovoga istraživanja bio je ispitati učinak spola, skupine vježbača i dodataka na pojavu ovisnosti o vježbanju kod mladih odraslih ljudi. Također se željela provjeriti faktorska struktura i prikazati psihometrijske karakteristike Upitnika ovisnosti o vježbanju.

Metode: U istraživanju je sudjelovalo 124 studenta kineziologije i 109 rekreativaca (107 muških i 126 ženskih sudionika) u ranoj odrasloj dobi koji su uključeni u neki oblik tjelesne aktivnosti. Sudionici su dali sociodemografske podatke i ispunili Upitnik ovisnosti o vježbanju.

Rezultati: Analizom varijance potvrđena je trofaktorska struktura Upitnika ovisnosti o vježbanju: učestalost i posvećenost vježbanju, usredotočenost i intenzitet vježbanja i emocionalnost povezana s vježbanjem. Dobiveni nalazi u skladu su s prethodnim modificiranim i skraćenim verzijama upitnika. Rezultati istraživanja ukazuju na to da muški sudionici i studenti kineziologije vježbaju češće i da su posvećeniji vježbanju, nego ženski sudionici i rekreativci. Sudionici koji koriste vitaminske i prehrambene dodatke češće vježbaju, posvećeniji su i usredotočeniji na vježbanje, te intenzivnije vježbaju nego sudionici

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koji ne koriste dodatke. Nadalje, muški studenti koji koriste vitaminske i prehrambene dodatke iskazuju najviše razine emocionalnosti povezane s vježbanjem.

Zaključak: Dobiveni rezultati upućuju na to da su muškarci, studenti kineziologije i oni koji koriste dodatke, rizičniji za razvoj ovisnosti o vježbanju.

Ključne riječi: kompulzivno vježbanje, mladi odrasli, spol, dodaci, studenti

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Introduction

With a change in people's lifestyles and contemporary society, there has been a decrease in physical activity. People are increasingly living a sedentary lifestyle. Therefore, the benefits of regular exercise are promoted more often. Global recommendations for physical activity of adults are at least 150 to 300 minutes a week of moderate-intensity physical activity or at least 75 to 150 minutes a week of vigorous-intensity activity. Three out of four meet these recommended levels of physical activity.[1] Generally, regular exercise and physical activity have numerous benefits for people's physical and mental health.[2] Physical activity improves psychological well-being and quality of life.[3] However, some exercise much more frequently than recommended, which can lead to a problem related to physical activity.

There are various terms signifying increase and obligatory exercise amount. Exercise addiction, obligatory exercise, exercise dependence, excessive exercise, compulsive, abusive, positive addiction are used interchangeably. Nevertheless, all the above terms signify the same psychological condition.[4] Obligatory exercise is considered a major condition that can deteriorate psychological functioning.[5] It is evolving from the recreative pleasant activity for purpose of weight reduction, health improvement or fit and lean appearance. Lichtenstein and Hinze[6] explain the development of exercise addiction. Over time, it comes to the point that exercise become the most important aspect of life, and more important than family, friends or life commitments. A sense of euphoria replaces the initial purpose of the exercise and an increasing amount of exercise occurs. When not exercising, distress can occur. Ultimately, an attempt to reduce the amount of exercise can result in overuse. Such changes in behaviour meet the six criteria of addictive exercise patterns – salience, conflict, mood modification, tolerance, withdrawal symptoms and relapse.[7] Obligatory or addictive exercise is not considered a mental disorder. Earlier diagnostic criteria were based on the alcohol addiction symptoms[8] which were later replaced by theories of behavioural addictions, such as gaming and video games addiction.[9,10]

Depending on various measuring instruments for exercise risk assessment, the prevalence of obligatory exercise varied. Some systematic reviews estimated the prevalence of exercise addiction varies from three to over 14% in different populations.[11] Recent findings indicate a prevalence of about 8% among general exercisers, 5.5% among university students, and 5% among competitive amateur athletes.[12] Also, in some studies, more than 50% of the participants express symptoms of obligatory exercise.[13] Another reason for such great differences lies in a comparison of behavioural and psychological features of the nature of selective groups – marathoners, gender, individuals with eating disorders, elite athletes, and cultural differences. However, there is greater susceptibility for kinesiology students to develop exercise addiction than exercisers more generally.[14] Regarding gender, a systematic review consistently shows that men express more exercise addiction than women.[15] One of the symptoms that may indicate a risk may also be the use of vitamin and nutritional supplements. Some individuals use various supplements to improve their exercise results.[16]

Considering the previous inconsistency of the factor structure of The Obligatory Exercise Questionnaire (OEQ), the present study aims to examine the factor structure and validate the Croatian version of the OEQ. Also, we wanted to explore the differences in obligatory exercise regarding gender, group – recreational exercisers and kinesiology students and taking vitamins and nutritional supplements.

Participants and methods

Participants

Data were collected on a sample of 233 young adults comprising of 124 kinesiology students (from the Faculties of kinesiology) (53.2%) and 109 recreational exercisers (46.8%). There were 107 males (45.9%) and 126 females (54.1%). The age range was 18-38 years (M = 22.2, SD = 3.34). Regarding gender, there were 44.4% female students and 55.6% female recreational exercisers. All participants were engaged in some type of physical activity. Of all respondents, 123 took some vitamin and nutritional supplements.

Instruments

Major sociodemographic information (age, gender, group – students and recreational exercisers) and information regarding vitamins and nutritional supplements were collected.

The Obligatory Exercise Questionnaire (OEQ)[17] is a general standardised measure of exercise activity and is an adaption of the Blumenthal, O'Toole, and Chang[18] Obligatory Running Questionnaire. The OEQ consists of 20 items and was translated via a standard forward-backwards translation procedure. Respondents rate their exercise behaviour (e.g. "If I miss a planned workout, I attempt to make up for it the next day") on a 4-point Likert scale (from 1-never to 4-always). The scores ranged from 20 to 80, with higher scores indicating higher engagement in obligatory exercise. Previous researches have shown internal consistency coefficients above 0.9,[7,17,] and in the Croatian sample of athletes and exercisers 0.86.[19] No consistent factor structure was shown – one-factor,[20] three-factor,[21,22,23] and four-factor structure,[19] hence the factor structure was examined in this study.

Procedure

Data were collected via the internet. The survey was administered in an online form via Google documents. Participants were informed about the purpose of the research, and that participation is anonymous and voluntarily. The survey took approximately 10 to 15 minutes to complete.

Statistical Analyses

Descriptive statistical parameters were displayed, factor analysis, reliability tests with Cronbach's alpha, and ANOVAs were conducted for data analysing. Data were analysed by the Statistical Package for Social Sciences (SPSS version 25.0, IBM Corp. Released 2017). Analysis of Moment Structures (AMOS) was used to run confirmatory factor analysis.

Results

Exploratory factor analysis

To examine the metric characteristics of the OEQ on our sample, exploratory factor analysis was conducted with 20 items from the original OEQ. First, it was determined that there were several recognised criteria for factor analysis. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.83, above the recommended value of KMO $\geq$ 0.5. Likewise, Bartlett's test of sphericity was significant (χ^2 (190) = 1118.31; df = 190, $p < 0.01$). Therefore, the requirements indicated that factor analysis was appropriate for this data set.

To examine whether the obtained results corresponded to the factor structure of the original questionnaire, exploratory factor analysis was conducted. Principal component analysis with Varimax rotation indicated a six factors solution, with eigen values greater than 1. However, eigen values for the last three factors were slightly higher than 1. Therefore, in order to accurately determine the number of factors to retain, a parallel analysis was performed.[24,25] The parallel analysis indicates that three components should be retained. Then we conducted a new analysis with three factors.

One item, "My best friend likes to exercise" has extremely low extracted communality (0.13), so this item was eliminated. Of all items, only this one refered to another person (friend). Items 9 (If I miss a planned workout, I attempt to make up for it the next day") and 16 ("I keep a record of my exercise performance, such as how long I work out, how far or fast I run") also have low extracted communalities about 0.2, so they were omitted. We also eliminated items 11 and 20 because they had nearly equal factor loadings on two or three factors, so it was not possible to determine which factor they belonged to. Then we made a new analysis with the remaining 15 items, with three factors explaining 48.64% of the variance. Factor loadings for items subdivided into three factors are presented in Table 1.

The first factor, "Exercise frequency" and commitment contains five items, the second factor refers to "Exercise preoccupation and intensity" and contains four items, and the third factor has six items that address "Exercise emotionality". Internal reliability was examined for each subscale. Cronbach's alpha coefficients for all three subscales were moderate: .76, .67, and .68, respectively. The internal reliability of the whole scale (k = 15) is $\alpha = .79$ (Table 2). The correlation between Exercise frequency and commitment and Exercise preoccupation and intensity was .32, between Exercise frequency and commitment and Exercise emotionality was .30, and between Exercise preoccupation and intensity and Exercise emotionality was .39. Correlation were significant at $p < .01$.

Table 1 Factor loadings on 15 remaining OEQ items
Tablica 1. Faktorska opterećenja 15 preostalih čestica OEQ upitnika

Item number *Broj čestice*	Questionnaire items *Čestice upitnika*	Factor / *Faktor* 1	2	3
3	I exercise more than three days per week. *Vježbam više od tri dana u tjednu.*	.84		
1	I engage in physical exercise on a daily basis. *Svakodnevno vježbam.*	.83		
2	I engage in one/more of the following forms of exercise: walking, jogging/running or weightlifting. *Bavim se jednom/više od sljedećih oblika tjelovježbe: hodanje, trčanje ili dizanje utega.*	.64		
10	I may miss a day of exercise for no good reason. *Mogu propustiti dan vježbanja bez dobrog razloga.*	.61		
8	If I have planned to exercise at a particular time and something unexpected comes up (like an old friend comes to visit or I have some work to do that needs immediate attention) I will usually skip my exercise for that day. *Ako sam planirao/la vježbati u određeno vrijeme, a nešto neočekivano iskrsne (posjet starog prijatelja ili obaveza koju moram odmah obaviti), obično ću preskočiti vježbati taj dan.*	.54		
17	I have experienced a feeling of euphoria or a high during or after an exercise session. *Doživio/la sam osjećaj euforije tijekom ili nakon vježbanja.*		.75	
15	I have had daydreams about exercising. *Sanjario/la sam o vježbanju.*		.73	
14	Sometimes, I find that my mind wanders to thoughts about exercising. *Ponekad shvatim da su mi misli odlutale na vježbanje.*		.62	
18	I frequently push myself to the limits. *Često se natjeram vježbati do krajnjih granica.*		.58	
4	When I don't exercise I feel guilty. *Osjećam krivnju kada ne vježbam.*			.71
7	When I miss an exercise session, I feel concerned about my body possibly getting out of shape. *Kada propustim trening, zabrinut/a sam da neću biti u formi.*			.67
12	If I feel I have overeaten, I will try to make up for it by increasing the amount I exercise. *Ako osjetim da sam se prejeo/la, pokušat ću to nadoknaditi s više vježbanja.*			.65
5	I sometimes feel like I don't want to exercise, but I go ahead and push myself anyway. *Ponekad osjećam kako ne želim vježbati, ali se svejedno natjeram.*			.54
13	When I miss a scheduled exercise session I may feel tense, irritable or depressed. *Kada propustim planirani trening osjećam se napeto, razdražljivo ili depresivno.*			.51
19	I have exercised when advised against such activity (i.e. by a doctor, friend, etc.) *Vježbao/la sam iako mi je savjetovano suprotno (npr. liječnik, prijatelj, itd.).*			.40
	Percentage of variance explained *Postotak objašnjene varijance*	17.96	15.60	15.08
	Average correlation among items *Prosječna korelacija između čestica*	.39	.34	.26

Table 2 Results of descriptive statistics for the Exercise frequency and commitment, Exercise preoccupation and intensity and Exercise emotionality
Tablica 2. Deskriptivni podaci za Učestalost i posvećenost vježbanju, Usredotočenost i intenzitet vježbanja i Emocionalnost povezana s vježbanjem

			EFC	EPI	EE
Gender *Spol*	Group *Grupa*	Supplements *Suplementi*	*M (SD)*	*M (SD)*	*M (SD)*
Male *Muško*	Students/*Studenti*	Yes/ *Da*	16.97 (2.22)	9.79 (1.85)	13.05 (3.04)
		No/*Ne*	15.33 (2.59)	8.53 (1.43)	11.16 (2.98)
		Total/*Ukupno*	16.25 (2.51)	9.24 (1.77)	12.22 (3.14)
	Recreational exercisers/*Rekreativci*	Yes/ *Da*	15.69 (2.52)	9.51 (2.58)	12.34 (2.49)
		No/*Ne*	14.10 (2.13)	8.10 (1.66)	14.00 (3.39)
		Total/*Ukupno*	15.28 (2.50)	9.15 (2.44)	12.76 (2.80)
	Total/*Ukupno*	Yes/ *Da*	16.42 (2.43)	9.67 (2.18)	12.75 (2.82)
		No/*Ne*	15.03 (2.52)	8.43 (1.48)	11.87 (3.29)
		Total/*Ukupno*	15.90 (2.54)	9.21 (2.03)	12.42 (3.02)
Female *Žensko*	Students/*Studenti*	Yes/ *Da*	16.42 (2.53)	9.79 (2.55)	12.41 (2.63)
		No/*Ne*	14.41 (2.56)	8.25 (2.19)	12.56 (2.83)
		Total/*Ukupno*	15.27 (2.72)	8.91 (2.45)	12.50 (2.73)
	Recreational exercisers/*Rekreativci*	Yes/ *Da*	14.50 (3.04)	8.53 (2.47)	12.40 (2.96)
		No/*Ne*	13.66 (2.59)	8.00 (2.04)	11.78 (3.15)
		Total/*Ukupno*	14.04 (2.82)	8.24 (2.24)	12.07 (3.06)
	Total/*Ukupno*	Yes/ *Da*	15.32 (2.97)	9.07 (2.56)	12.41 (2.80)
		No/*Ne*	14.00 (2.58)	8.11 (2.10)	12.14 (3.01)
		Total/*Ukupno*	14.58 (2.82)	8.53 (2.35)	12.26 (2.91)
Total *Ukupno*	Students/*Studenti*	Yes/ *Da*	16.76 (2.34)	9.79 (2.12)	12.81 (2.89)
		No/*Ne*	14.85 (2.59)	8.38 (1.85)	11.88 (2.97)
		Total/*Ukupno*	15.81 (2.64)	9.09 (2.11)	12.35 (2.95)
	Recreational exercisers/*Rekreativci*	Yes/ *Da*	15.06 (2.84)	9.00 (2.55)	12.37 (2.72)
		No/*Ne*	13.75 (2.48)	8.02 (1.95)	12.25 (3.29)
		Total/*Ukupno*	14.48 (2.76)	8.56 (2.35)	12.32 (2.97)
	Total/*Ukupno*	Yes/ *Da*	15.92 (2.72)	9.39 (2.37)	12.59 (2.80)
		No/*Ne*	14.37 (2.59)	8.22 (1.89)	12.04 (3.10)
		Total/*Ukupno*	15.19 (2.77)	8.84 (2.23)	12.33 (2.95)

Legend: EFC – Exercise frequency and commitment; EPI – Exercise preoccupation and intensity; EE – Exercise emotionality
Legenda: EFC – Učestalost i posvećenost vježbanju; EPI – Usredotočenost i intenzitet vježbanja; EE – Emocionalnost povezana s vježbanjem

Confirmatory factor analysis

Confirmatory factor analysis was conducted to validate the measurement model after conducting exploratory factor analysis. Figure 1 shows the measurement model of obligatory exercise. Inspection of factor loadings indicates slightly lower values than recommended.[26] Nevertheless, the covariance between factors indicates a good discriminant validity.[27] For validation of model suitability, additional fit indices were taken into account, as recommended (Chi-square, χ^2; comparative fit index, CFI; root mean square error of approximation, RMSEA).[28] Results have shown good model fit, and the values of these indices (χ^2 = 1.93, df = 87, $p < .001$; CFI = 0.89; RMSEA = 0.06; AIC = 264.14) meet respective cut-off point requirements.

Gender, group and supplements effects on Exercise frequency and commitment, Exercise preoccupation and intensity and Exercise emotionality

Descriptive statistics for gender, group and supplements for factors Exercise frequency and commitment, Exercise preoccupation and intensity and Exercise emotionality are shown in Table 2. The results of three three-way ANOVAs are shown in Table 3.

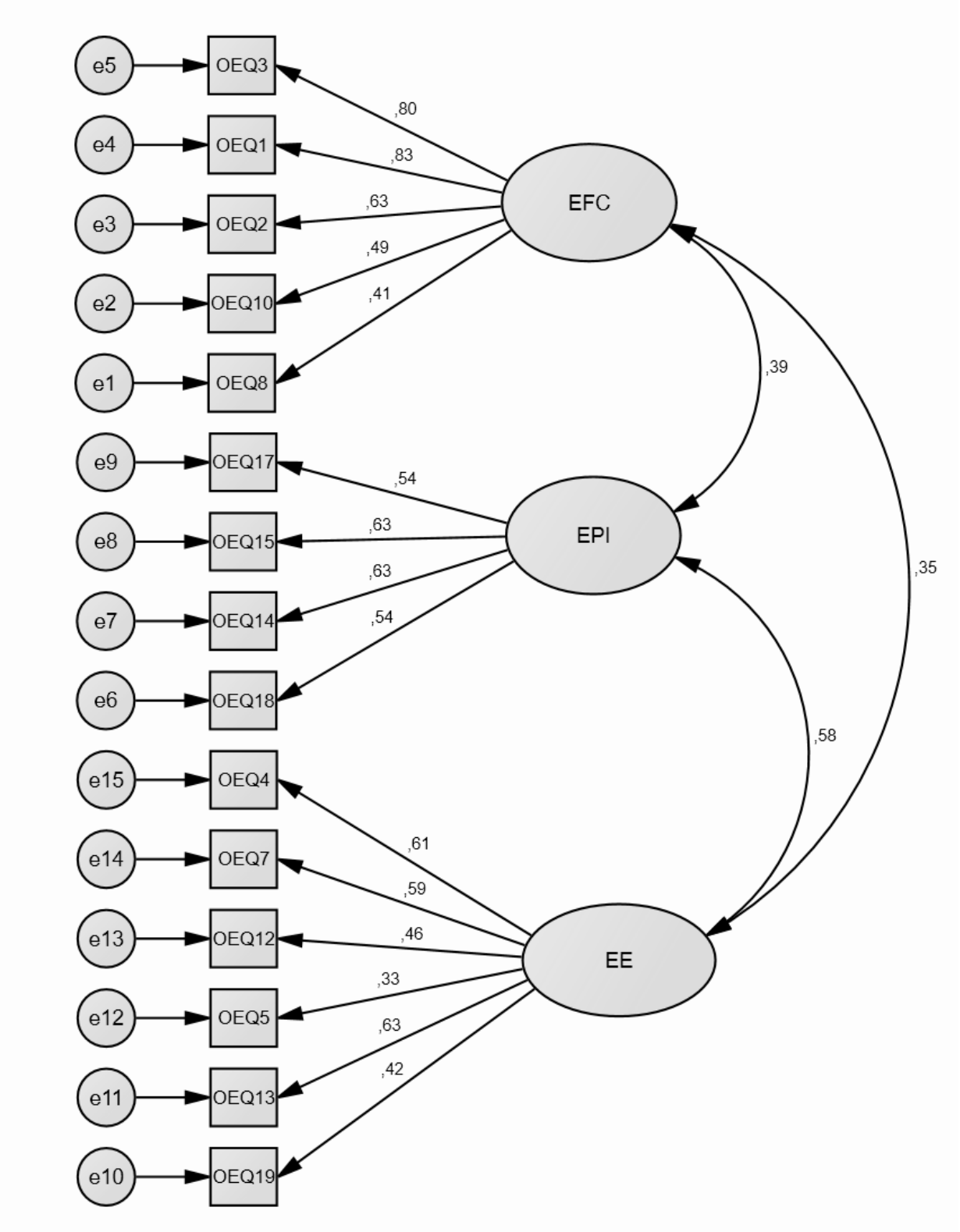

Figure 1 Confirmatory factor analysis of The Obligatory Exercise Questionnaire
Slika 1. Konfirmatorna faktorska analiza Upitnika ovisnosti o vježbanju

Legend: EFC - Exercise frequency and commitment; EPI - Exercise preoccupation and intensity; EE - Exercise emotionality
Legenda: EFC - Učestalost i posvećenost vježbanju; EPI - Usredotočenost i intenzitet vježbanja; EE - Emocionalnost povezana s vježbanjem

Table 3 Results of ANOVAs for the Exercise frequency and commitment, Exercise preoccupation and intensity and Exercise emotionality
Tablica 3. Rezultati analiza varijance za Učestalost i posvećenost vježbanju, Usredotočenost i intenzitet vježbanja i Emocionalnost povezana s vježbanjem

	Exercise frequency and commitment (EFC) *Učestalost i posvećenost vježbanju*			Exercise preoccupation and intensity (EPI) *Usredotočenost i intenzitet vježbanja*			Exercise emotionality (EE) *Emocionalnost povezana s vježbanjem*		
	F	*p*	η^2	*F*	*p*	η^2	*F*	*p*	η^2
Gender *Spol*	4.54	.03	.020	1.24	.27	.005	0.69	.41	.003
Group *Grupa*	12.55	< .01	.053	3.27	.07	.014	0.65	.42	.003
Supplements *Suplementi*	17.29	< .01	.071	14.98	< .01	.062	0.18	.68	.001
Gender x Group *Spol x Grupa*	0.10	.92	.000	0.43	.51	.002	3.04	.08	.013
Gender x Supplements *Spol x Suplementi*	0.07	.80	.000	0.24	.63	.001	0.02	.89	.000
Group x Supplements *Grupa x Suplementi*	0.79	.41	.003	0.48	.49	.002	2.77	.09	.012
Gender x Group x Supplements *Spol x Grupa x Suplementi*	0.58	.45	.003	0.91	.34	.004	6.65	< .01	.029

Legend: η^2 *– partial Eta squared / Legenda:* η^2 – parcijalna kvadrirana eta

Analysis of variance showed the main effect of gender ($F(1, 225) = 4.54$, $p = .03$, $\eta^2 = .020$), group ($F(1, 225) = 12.55$, $p < .01$, $\eta^2 = .053$), and supplements ($F(1, 225) = 17.29$, $p < .01$, $\eta^2 = .071$) for Exercise frequency and commitment. The main effect of supplements ($F(1, 225) = 14.98$, $p < .01$, $\eta^2 = .062$) was also found for Exercise preoccupation and intensity. Three-way interaction was significant only for Exercise emotionality ($F(1, 225) = 6.65$, $p < .01$, $\eta^2 = .029$). The sizes of partial Eta squared indicate a small effect size for the main effect of gender, group and three-way interaction. However, a medium effect ($\eta^2 = .06$) was found for main effect of supplements for Exercise frequency and commitment and Exercise preoccupation and intensity.

The gender main effect suggests that males ($M_M = 15.90$, $SD_M = 2.54$) exercise more often and are more committed than females ($M_F = 14.58$, $SD_F = 2.82$). There are no gender differences in Exercise preoccupation and intensity and Exercise emotionality. The main effect of the group was found for Exercise frequency and commitment – kinesiology students ($M_{ST}= 15.81$, $SD_{ST} = 2.64$) exercise more often and are more committed than recreational exercisers ($M_{RA}= 14.48$, $SD_{RA} = 2.76$).

The main effect of supplements was found for Exercise frequency and commitment and Exercise preoccupation and intensity. Subjects using vitamin and nutritional supplements (Exercise frequency and commitment $M_S = 15.92$, $SD_S = 2.72$; Exercise preoccupation and intensity $M_S = 9.39$, $SD_S = 2.37$) exercise more often, are more committed, but also more preoccupied and exercise more intensely than those who are not using any supplements (Exercise frequency and commitment $M_S = 14.37$, $SD_S = 2.59$; Exercise preoccupation and intensity $M_S = 8.22$, $SD_S = 1.89$).

A significant three-way interaction of gender, group and supplements on Exercise emotionality was obtained. As shown in Picture 2 male students using vitamin and nutritional supplements showed the highest levels of exercise emotionality compared to female students and recreational exercisers who used supplements. However, male recreational exercisers who were not using any supplements showed the highest rates of exercise emotionality in regards to female recreational exercisers and students.

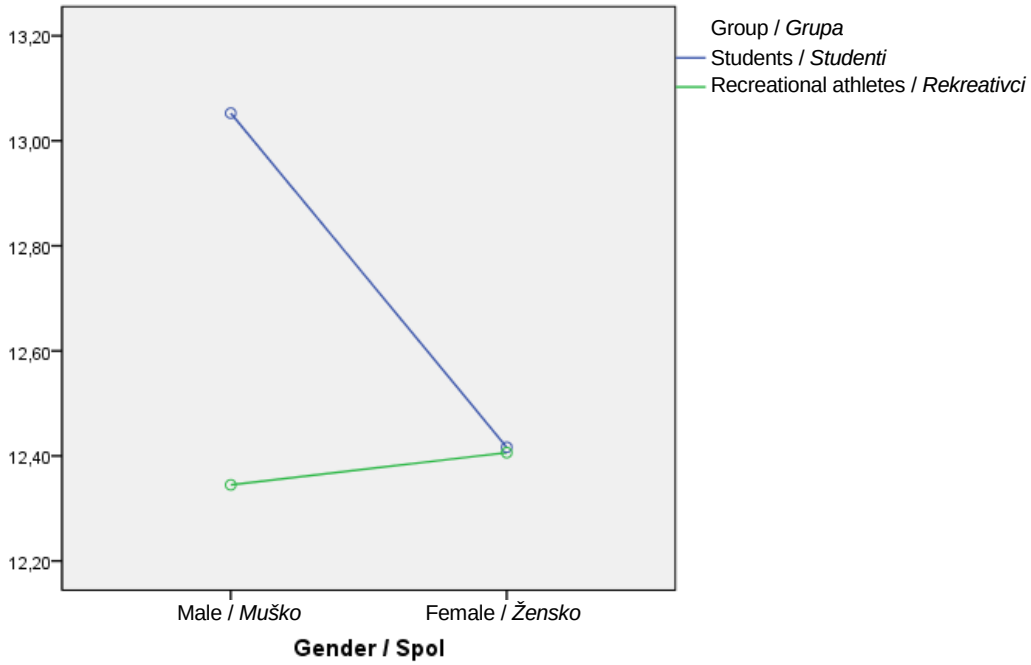

Figure 2 Gender and group interaction on Exercise emotionality for subjects who are using vitamin and nutritional supplements

Slika 2. Interakcija spola i grupe za Emocionalnost povezana s vježbanjem za sudionike koji koriste vitaminske ili prehrambene dodatke

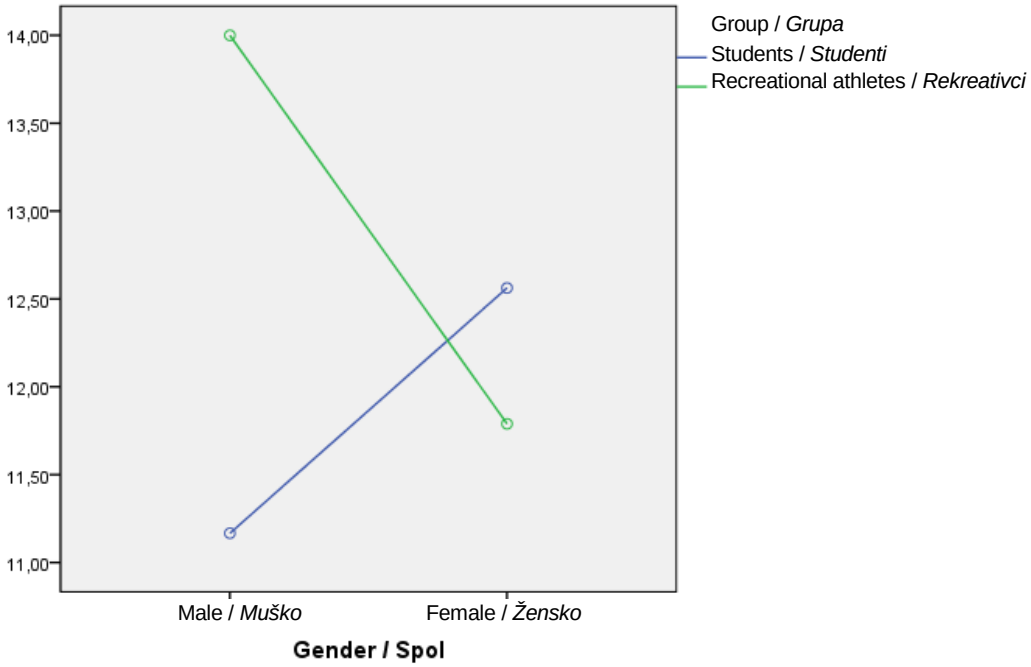

Figure 3 Gender and group interaction on Exercise emotionality for subjects who are not using any supplements

Slika 3. Interakcija spola i grupe za Emocionalnost povezana s vježbanjem za sudionike koji ne koriste nikakve dodatke

Discussion

Due to the large impact that excessive exercise has on people's physical and mental health, such studies are on the rise. Meta-analysis shows that those who are at risk for exercise addiction have decreased the quality of life, they are younger and more dedicated to physical exercise.[29] They also have lower levels of well-being and higher anxiety.[12] This kind of exercise may be maladaptive or pathological and there is a need to understand the factors that drive individuals to exercise.

One of the objectives of the current study was to examine the factor structure of the Croatian version of the OEQ. Despite that OEQ encompasses pathological exercise more like a compulsion than an addiction, it does not use this term. The OEQ is used to assess the psychological aspects of obligatory exercise. Previous studies confirm internal consistency, reliability and validity in various groups of respondents.[20,22] The obtained factor structure in the current study confirms the three-factor structure reduced versions of the OEQ.[21,22,23] Duncan, Hall, Fraser, Wilson, and Loitz[23] conducted the confirmatory factor analysis which showed that their model with three latent factors with ten manifest items and Steffen and Brehm's[21] three latent factors model with ten manifest items fit well with the data. Our factor structure also confirmed the three-factor structure which is similar to the mentioned models. Goodness-of-fit indices in our study also show a good model fit and correspond with the respective cut-off point. Our findings confirm once again that the OEQ is a multidimensional measure.

Some other measurement instruments provide criteria to identify those who are at risk for exercise addiction or exercise dependence. Although the initial version of the OEQ has some limitations regarding unidimensionality, the revised version shows that this questionnaire is justifiably multidimensional. The OEQ by itself does not have the cutoff value, but some authors used a relatively high cutoff of two standard deviations above the mean[11] or the middle of the total score[13,30] for identifying those at risk and obligatory exercisers. Further, this instrument is used for clustering groups of pathological obligatory exercisers and well-adjusted exercisers.[22] It can be concluded that the OEQ is not an adequate measure for identifying individuals with addictive exercise behaviours for clinical purposes, but it is a suitable measure for the practical assessment of symptoms for those who are at risk for obligatory exercise.

Additionally, in the current research, we examined the obligatory exercise in relation to the effects of gender, the group – recreational exercisers and kinesiology students and taking vitamin and nutritional supplements.

The gender main effect in this study shows that males exercise significantly more often and are more committed than females. As in this study, other authors also confirm the findings that young men express more obligatory exercise behaviour.[13] There are different reasons why men and women engage in obligatory exercise. Pritchard and Beaver[31] state that body tone improvement, enjoyment, and attractiveness were the main reasons predicting obligatory exercise for men. For women, reasons for engaging in obligatory exercise were improving body tone, mood enhancement, and fitness. An explanation for such findings can be found in gender differences, where the male perception of weight is related to body dissatisfaction and more obligatory exercise.[32] It seems that exercise frequency is more similar between elite male and female athletes in endurance sports compared to male and female recreational exercisers.[15] Some authors suggest that gender should be considered separately since there are important differences in physical activity-related behaviours.[33] Existing literature proposes two forms of exercise behaviour – primary and secondary exercise addiction. Primary refers to exercise per se, and secondary signifies exercise that is related to other behaviours, like eating disorders.[34] Recent findings show that individuals with eating disorders are three and a half times more likely to develop exercise addiction.[35] Some consider that secondary addiction, which is more compulsive is more common in women, and primary addiction is more likely in men.[11]

Kinesiology students are a specific group that is more likely to develop exercise addiction and obligatory exercise in comparison to general exercisers.[14] The same findings were obtained in the conducted research – kinesiology students exercise more often and are more committed than recreational exercisers. Through studying, theoretical and practical education kinesiology students are more involved in exercise and sport. Some findings show the prevalence of exercise addiction of almost 7% for sports students.[14]

Vitamin and nutritional supplements are often used for improving muscle volumes, strength, and quickness.[36] Part of the recreational exercisers uses some kind of sports nutrition supplements, even more than 43% of them.[37] There seems to be a two-way relation between obligatory exercise and supplement use. The use of supplements has been shown as an important indicator of excessive exercise.[38] However, recreative exercisers who show the symptoms of obligatory exercise use supplements more than other

exercisers.[39] The results of our study also confirmed that those who used vitamin and nutritional supplements exercise more often were more committed to exercise. Also, these respondents are more preoccupied and exercised more intensely in comparison to those who were not using supplements. Obligatory exercise is a significant predictor of nutritional supplement use, but also predicts positive attitudes about supplements.[40] The use of supplements is extremely widespread and young men are especially encouraged to take them.[41] Long-term usage of various supplements is associated with addictive mechanisms.[42]

Data from the current study are in accordance with the findings regarding the effects of gender, supplements and a group of exercisers – students and recreationalists on obligatory exercise. Nevertheless, findings from our study additionally showed a significant three-way interaction of gender, group and supplements on exercise emotionality. Negative emotionality refered to the degree of emotional distress in regards to missed exercise and serves as compensation for overeating.[22] Male students using vitamin and nutritional supplements in our study expressed the highest degree of emotionality regarding exercise and showed negative affects when missing the exercise. Kinesiology students are twice as likely to develop exercise addiction and display more symptoms of salience, mood modification and conflict than general exercisers.[14] Such a finding is comprehensible because students are involved in sports on a daily basis and exercise is a part of their personal and social lives. Also, the study of kinesiology requires a high level of physical competence. Due to physical stress, they use supplements more, which is a significant predictor of excessive exercise.[38] In male university students, sports supplements mediate the relation between exercise addiction and eating disorders.[41] Recreational exercisers also have a higher risk for exercise addiction if they are using supplements.[39] However, in our research we got slightly different findings – male recreational exercisers who are not using any supplements show the highest rates of exercise emotionality. Such findings could be explained by gender while male recreational exercisers also have higher levels of exercise dependence than females.[43] In future studies, it would be useful to examine the importance of individual predictors, to conclude about their importance regarding obligatory and exercise addiction.

There are still many conceptual and methodological limitations in the field of exercise addiction. The main weakness is the inconsistency in defining the concept of addictive exercise behaviour. Some authors[5] propose that measures that encompass the same constructs should be used for future comparison (e.g. Exercise Addiction Inventory or Exercise Dependence Scale). Berczik, Szabó, and Griffiths[44] suggest the use of the term exercise addiction because it encompasses the elements of compulsion and dependence. Others propose the use of in-depth interviews with those at risk for exercise addiction on quantitative measure instruments.[5] Since obligatory exercise is related to the phenomenon of appearance dissatisfaction and eating disorders, it would be useful to examine those relations, which are not included in the current study. Additional investigations should focus on finding the consistency in the factors used to assess the obligatory exercise. Also, there is a need for clearer theoretical and related multiple factors explanations underlying the obligatory exercise. Integrated comprehension would provide implications for the treatment of at-risk exercisers.

Conclusion

The topic of obligatory and exercise addiction is still insufficiently explored, and there is a considerable need to investigate it in the context of the negative effects. The results of this study may provide insights into the effects of gender, the group – kinesiology students and recreational exercisers, and supplements. The significant effects of gender, group and supplements on factors of obligatory exercise were found. The present study found that men exercise more often and are more committed to exercise. Physical and academic involvement in exercise has been shown as a risk factor of exercise frequency and commitment for kinesiology students. Also, the use of supplements has been shown as a risk factor for exercise frequency, commitment, preoccupation and intensity. Additionally, the use of supplements is especially related to the exercise emotionality of male students. Future research should focus on finding commonalities to describe obligatory and addictive exercise behaviour.

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