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Research Article / Araştırma Makalesi

The impacts of the COVID-19 pandemic in swimmers: a comparison of daily life activities in pre-restriction and during restriction

Yüzücülerde COVID-19 pandemisinin etkileri: kısıtlama öncesi ve sürecindeki günlük yaşam aktivitelerinin karşılaştırılması

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ABSTRACT

Objective: The study aims to compare swimmers' daily sport life changes caused by the COVID-19 pandemic in the pre-restriction restriction periods.

Material and methods: Two hundred fifty-one competitive swimmers participated in this study (117 females), aged 12-33 years, who had at least 3-year sport experience. Data were collected via a Google Forms survey. Statistically, before using a parametric test, the assumption of normality was verified using the Shapiro-Wilk test. A paired t-test was performed for one variable. Variables were presented as frequencies and percentages, according to feedbacks received. The Chi-square test was used to compare variables.

Results: There were no significant differences related to the changes caused by COVID-19 between genders (p>0.05). Statistically significant increase in training frequency, decrease in swimming training sessions, increase in dry-land training sessions, and changes of daily training time periods occurred during restriction compared with the pre-restriction period.

Conclusions: Findings of this study reveal that the swimmers' athletic lives were negatively affected during the restriction period due to COVID-19.

Keywords: *COVID-19, swimmer, daily life*

ÖZ

Amaç: Bu çalışma, yüzücülerde kısıtlama öncesi ve esnasında COVID-19 pandemisinin neden olduğu günlük sportif yaşam değişikliklerini karşılaştırmayı amaçlamaktadır.

Gereç ve Yöntemler: Bu araştırmaya en az üç yıllık spor yaşamı bulunan, 12-33 yaş aralığında, toplam 251 yüzücü (Kadın: n=117) katıldı. Veriler Google Forms kullanılarak anket yolu ile elde edildi. İstatistiksel analiz olarak, parametrik test kullanılmadan önce normal dağılım varsayımı Shapiro-Wilk test ile doğrulandı. Bir değişken için paired t-test uygulandı. Değişkenler frekans ve yüzde olarak sunuldu ve karşılaştırılmalarında Chi-square test tekniği kullanıldı.

Bulgular: COVID-19 pandemisinin neden olduğu değişiklikler için her iki cinsiyet arasında anlamlı düzeyde farklılık saptanmadı (p>0.05). Kısıtlama öncesi ve sırasında istatistiksel açıdan anlamlı düzeyde olmak üzere haftalık antrenman frekanslarında artma, yüzme seanslarında azalma, kara antrenman seanslarında artma ve günlük antrenman saatleri arasında değişimler olduğu belirlendi (p<0.05).

Sonuç: Araştırma bulguları, COVİD-19'dan dolayı kısıtlama sürecinde yüzücülerin spor yaşamının olumsuz etkilendiğini ortaya koymaktadır.

Anahtar Sözcükler: *COVID-19, yüzücü, günlük yaşam*

INTRODUCTION

The Coronavirus Disease (COVID-19) has spread worldwide in early 2020 and is a respiratory illness, declared a pandemic by the World Health Organization (1). Although the pandemic is primarily a health issue, its outcome has reached almost every aspect of life. Social activities were restricted tremendously because of the health risk, and the rapid spreading of the virus among people. Elite and amateur sports were extremely affected by COVID-19 (2,3). All sport championships were suspended due to COVID-19 in early March 2020. Together with the postponed local, national and international competitions, any organized trainings and practices were banned in sports clubs or fitness cen-

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ters. Most athletes were forced to stay at home, on their own and mostly unsupervised. Some sports clubs provided athletes with home-based training programs, and/or organized video conferences for online training sessions led by trainers (4).

Postponed national or international sports organizations may have been disappointing for many athletes. Structured training for six to 16 years seems a requirement to succeed at high level competitions such as the Olympics and international sports events (5). Having the ability to exert force in water is a determinant factor to reach swimming success; therefore, strength and muscular power are some of the most important factors in swimming (6). Besides in-water training, dry-land conditioning programs also contribute to swimming performance (6-8). The reversibility principle is known as one of the training principles governing detraining, which means stopping or markedly reducing training practice, leads to the reversal of developed performance components (9-11).

In Turkey, restriction measures were strictly enforced from 16 March to 01 Jun (12 weeks). Only essential activities were allowed, including travel and shopping for some age groups, and all organized and social gatherings (including sports events, trainings and open-air exercise) were banned. According to scientific literature, these restriction measures have limited competitive swimmers' sport life (12). This study aims to determine how COVID-19 has affected athletic life of competitive swimmers, during the restriction period compared with pre-restriction. It was hypothesized that swimmers were affected negatively in terms of conditions that relate to daily athletic life such as training schedule, training applications, facility usage, and eating habits during the COVID-19 pandemic.

MATERIALS and METHODS

Participants

Two hundred seventy competitive swimmers who had at least three years of training experience from 38 swimming clubs were reached in this study, but after evaluation of collected data, 19 were excluded because of missing data, and 251 (female: n= 117, male: n=134) survey forms were accepted for assessment. The study was approved by the ethics committee of Hitit University, conform to the Declaration of Helsinki for research involving human participants (Decision no: 2020-64).

Design and Procedures

The study was designed based on input from the swimmers, regarding the challenges they experienced during the restriction period, and the conditions before restriction. The Google Forms based survey consisted of 58 questions, in three sections. The first section included personal information such as age, height, pre-post body weight, sport experience. The second section included questions referring to the number of training days, training times, the number of swimming training sessions, the number of dry-land training sessions. The last section included questions presented in Tables 2-4, such as training preferences, nutrition, sleeping, equipment, support, and goals during the restriction.

In addition, on the first page of the survey, informed consent form was provided via a link for both ≥18 and <18 age participants, with parental informed consent to be approved for the latter. Coaches distributed the survey's online Google Form link via WhatsApp to their swimmers, who were asked to read the description and requirements, and then to click on the link to proceed after giving consent. After official ending of the restriction on June 1st, 2020, the surveys were spreaded, and collected via Google Forms. The survey was kept live for 96 hours from 15 to 18th June 2020, and took 10-15 min to complete. Data collected from Google Forms was exported to an excel file, then processed to SPSS for analysis.

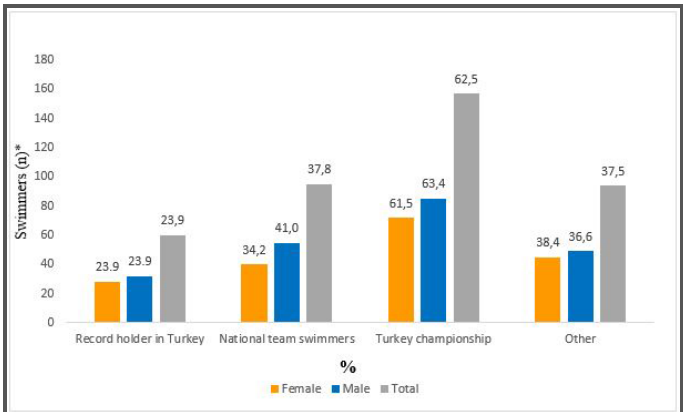

Figure 1. Distribution of swimmers as frequency (n) and percentage

National team swimmers: *represented in international tournaments;* **Championships:** *Swimmers had at least in first three sequence in national championship.* **Others:** *Swimmers participated championships regularly, and have at least three years of experiences. Every columnis seprated according to the genders and total swimmers number.*

Statistical Analyses

Descriptive statistics consisted of mean ± standard deviation, based on normality and homogeneity of variance forquantitative variables. Before using a parametric test, the assumption of normality was verified using the Shapiro-Wilk test. A paired t-test was performed for one variable in Table 1. Variables are presented as frequencies and percentages of feedback received. Chi-square test was used to compare variable rates. All the analyses were performed with SPSS

(version 22.0; SPSS Inc, Chicago, IL), and the level of significance was set at p<0.05 for all tests.

RESULTS

Table 1 presents participants' characteristics by gender. Accordingly, there were significant differences between the pre-bodymass (pre-BM), and post-bodymass (post-BM), in both genders (p=0.004 for male, p=0.009 for female).

Figure 1 displays the distribution of participants in frequency and percentage according to the four categories, including national record-holders, national team swimmers, Turkey champion swimmers, and others. The first three categories are defined as national swimmers, the last one as regional. At the same time, 23.9% and 37.8% of Turkey champion swimmers included both record-holders and national team swimmers respectively.

Table 1. Characteristics of participants according to gender

Variables	Female (n=117)		Male (n=134)	
	Mean±SD	Min-Max	Mean±SD	Min-Max
Age (yr)	16.1±3.1	12-29	17.0±4.0	13-33
Height (cm)	163.8±8.1	130-180	174.8±15.6	152-203
Post-BM (kg)	55.0±7.9*	34-75	69.6±12.8*	41-100
Pre-BM (kg)	53.2±8.3*	34-70	67.2±13.5*	40-99
SE (yr)	9.0±3.9	3-22	9.7±4.3	3-25

*: p<0.05; BM: body mass, SE: sport experience

Table 2 presents answers to nine questions, with no statistically significant differences between genders for all questions except 'competition categories' (p=0.006).

Table 2. Behaviours of swimmers during the restriction according to gender

Questions	Answers	Female	Male	Total	p
Did you train?	Yes	99 (84.6)	115 (85.8)	214 (85.3)	0.859
	No	18 (15.4)	19 (14.2)	37 (14.7)	
Where did you train?	Home	68 (68.7)	96 (83.5)	164 (65.3)	0.069
	Swimming pool	3 (3.0)	1 (0.9)	4 (1.6)	
	Home and outdoor	21 (21.2)	14 (12.2)	35 (13.9)	
	Home-pool-outdoor	2 (2.0)	0 (0.0)	2 (0.8)	
	Home-pool	5 (5.1)	4 (3.5)	9 (3.6)	
Trainingintensity	High	44 (44.4)	57 (49.6)	101 (47.2)	0.587
	Moderate	48 (48.5)	53 (46.1)	101 (47.2)	
	Low	7 (7.1)	5 (4.3)	12 (5.6)	
Competition category	Short-distance	42 (35.9)	71 (53.0)	113 (45.0)	**0.006***
	Middle-distance	19 (16.2)	18 (13.4)	37 (14.7)	
	Long-distance	11 (9.4)	5 (3.7)	16 (6.4)	
	Short- and middle-distance	17 (14.5)	27 (20.1)	44 (17.5)	
	Middle- and long-distance	12 (10.3)	5 (3.7)	17 (6.8)	
	Short-, middle- and long-distance	16 (13.7)	8 (6.0)	24 (9.6)	
Did you benefit from any support?	Yes	70 (59.8)	83 (61.9)	153 (61.0)	0.938
	No	29 (24.8)	32 (23.9)	61 (24.3)	
Did you purchase the training equipment?	Yes	66 (66.7)	67 (58.3)	133 (62.1)	0.258
	No	33 (33.3)	48 (41.7)	81 (37.9)	
Did you take support for the training equipment?	Yes	15 (15.2)	19 (16.5)	34 (15.9)	0.340
	No	51 (51.5)	48 (41.7)	99 (46.3)	
Equipment purchase preference	Free weights	1 (1.6)	6 (9.5)	7 (5.6)	0.214
	Resistance elastic band	9 (14.3)	6 (9.5)	15 (11.9)	
	Medicine ball	1 (1.6)	1 (1.6)	2 (1.6)	
	More than one equipment	52 (82.5)	50 (79.4)	102 (81.0)	
Criteria considered in exercising	To enhance swimming performance	1 (1.0)	2 (1.8)	3 (1.4)	0.426
	To enhance general performance	4 (4.1)	6 (5.3)	10 (4.7)	
	To maintain performance	15 (15.3)	27 (23.7)	42 (19.8)	
	Adapt to environment/equipment	1 (1.0)	3 (2.6)	4 (1.9)	
	To maintain health	6 (6.1)	3 (2.6)	9 (4.2)	
	More than one aim	71 (72.4)	73 (64.0)	144 (67.9)	

Figures as n (%); *: p<0.01

Table 3 displays detailed information about exercise preferences, eating habits, goals, normalization processing, and sleeping quality during the restriction. There were no significant differences between genders in terms of the given answers (p>0.05), with the exception of the answer to the 'what kind of goal changes occurred because of not joining regular training?' question (p<0.024).

Table 4 presents some of the variables in assessing the potential differences between pre- restriction and during the restriction. Accordingly, there were significant differences in training days, training sessions, daily training periods, weekly swimming training sessions, and weekly dry-land training sessions (p<0.001).

Table 3. Responses to training, food intake, and sleeping quality questions during the restriction according to gender

Questions	Answers	Female	Male	Total	p
Exercise types performed at home	Elastic resistance	4 (4.0)	3 (2.6)	7 (3.3)	0.216
	Bodyweight resistance	9 (9.1)	21 (18.3)	30 (14.0)	
	Bicycle	1 (1.0)	1 (0.9)	2 (0.9)	
	Combined exercises	85 (85.9)	90 (78.3)	175 (81.8)	
Exercise types performed outdoors	Running	1 (1.6)	6 (10.2)	7 (5.7)	0.389
	Bicycle	4 (6.3)	4 (6.8)	8 (6.6)	
	Brisk walking	10 (15.9)	9 (15.3)	19 (15.6)	
	Bodyweight resistance	4 (6.3)	4 (6.8)	8 (6.6)	
	Free weights	1 (1.6)	0 (0.0)	1 (0.8)	
	Combined exercises	43 (68.3)	36 (61.0)	79 (64.8)	
Eating habit changes	Yes	85 (72.6)	92 (68.7)	177 (70.5)	0.579
	No	32 (27.4)	42 (31.3)	74 (29.5)	
Eating habit change type	One restriction method	85 (100)	92 (100)	177 (100)	-
Did inability of regular training lead to change in goals?	Yes	34 (29.1)	59 (44.0)	93 (37.1)	0.140
	No	83 (70.9)	75 (56.0)	158 (62.9)	
Goal change occurrence due to not joining regular training	Raised my goals	14 (41.2)	16 (27.1)	30 (32.3)	**0.024***
	Lowered my goals	16 (47.1)	42 (71.2)	58 (62.4)	
	Ended professional sports life	4 (11.8)	1 (1.7)	5 (5.4)	
Would you resume training, when returning to normal?	Yes	100 (85.5)	108 (80.6)	208 (82.9)	0.307
	No	17 (14.5)	26 (19.4)	43 (17.1)	
Reason for not resuming training during normalization	Fear of getting COVID-19	3 (17.6)	5 (19.2)	8 (18.6)	0.766
	Anxiety to perform well	9 (52.9)	16 (61.5)	25 (58.1)	
	Other	5 (29.4)	5 (19.2)	10 (23.3)	
Sleeping quality during restriction	Good	33 (28.2)	42 (31.3)	75 (29.9)	0.748
	Moderate	65 (55.6)	68 (50.7)	133 (53.0)	
	Bad	19 (16.2)	24 (17.9)	43 (17.1)	
Tiredness during restriction?	Yes	68 (58.1)	83 (61.9)	151 (60.2)	0.537
	No	49 (41.9)	51 (38.1)	100 (39.8)	

Figures as n (%); *: p<0.05

Table 4. Changes in training schedules between pre-restriction and during the restriction

Questions	Pre-restriction Answers	Female	Male	Total	p	Restriction Female	Male	Total	p	Pre-post
Training days	2-day	-	-	-	0.538	5 (5.1)	6 (5.2)	11 (5.1)	**0.044***	**<0.001***
	3 day	12 (10.3)	8 (6.0)	20 (8.0)		6 (6.1)	13 (11.3)	19 (8.9)		
	4 day	9 (7.7)	7 (5.2)	16 (6.4)		5 (5.1)	20 (17.4)	25 (11.7)		
	5 day	4 (3.4)	3 (2.2)	7 (2.8)		14 (14.1)	10 (8.7)	24 (11.2)		
	6 day	82 (70.1)	106 (79.1)	188 (74.9)		13 (13.1)	14 (12.2)	27 (12.6)		
	7 day	10 (8.5)	10 (7.5)	20 (8.0)		56 (56.6)	52 (45.2)	108 (50.5)		
Training session times	One-session days: 91 (36.3)				0.515	One-session days: 174 (69.4)			0.395	**<0.001***
	05.00-10.00	3 (2.6)	4 (3.0)	7 (2.8)		3 (3.0)	2 (1.7)	5 (2.3)		
	10.00 14.00	2 (1.7)	2 (1.5)	4 (1.6)		21 (21.2)	25 (21.7)	46 (21.5)		
	14.00-18.00	11 (9.4)	7 (5.2)	18 (7.2)		27 (27.3)	23 (20.0)	50 (23.4)		
	18.00-22.00	28 (23.9)	34 (25.4)	62 (24.7)		25 (25.3)	41 (35.7)	66 (30.8)		
	22.00-24.00	-	-	-		4 (4.0)	3 (2.6)	7 (3.3)		
	Double-session days: 160 (63.7)					Double-session days: 40 (16.0)				
	05.00-10.00; 14.00-18.00	19 (16.2)	15 (11.2)	34 (13.5)		4 (4.0)	1 (0.9)	5 (2.3)		
	05.00-10.00; 18.00-22.00	51 (43.6)	71 (53.0)	122 (48.6)		6 (6.1)	5 (4.3)	11 (5.1)		
	10.00-14.00; 18.00-22.00	3 (2.6)	1 (0.7)	4 (1.6)		7 (7.1)	8 (7.0)	15 (7.0)		
	10.00-14.00; 14.00-18.00-	-	-	-		1 (1.0)	6 (4.5)	7 (3.3)		
	14.00-18.00; 18.00-22.00	-	-	-		1 (1.0)	1 (0.9)	2 (0.9)		
Weekly swimming training sessions	No sessions	-	-	-	0.622	88 (88.9)	105 (91.3)	193 (90.2)	0.889	**<0.001***
	1-6 session	49 (41.9)	49 (36.6)	98 (39.2)		9 (9.0)	10 (8.7)	19 (8.7)		
	7session	-	-	-		2 (2.0)	0 (0.0)	2 (1.0)		
	7-12 session	68 (58.2)	85 (63.2)	153 (61.2)		-	-	-		
Dry-land training sessions	1-6session	117 (100)	132 (98.6)	249 (99.3)	0.134	44 (44.5)	58 (50.4)	102 (47.6)	**0.035***	**<0.001***
	7session	0 (0.0)	2 (1.5)	2 (0.8)		-	-	-		
	7-12 session	-	-	-		55 (55.5)	57 (49.6)	112 (52.3)		

Figures as n (%); *: p<0.05 within period, p<0.001 between pre- post-restriction

DISCUSSION

To the best of our knowledge, studies investigating the effects COVID-19 has on swimmers' athletic life are scarce(12,13). Our study revealed that based on weekly training programs, a) increasing training frequency, b) decreasing swimming training sessions, c) increasing dry-land training sessions, and d) changes in daily training hours compared with pre-restriction (Table 4). The discussion section based on these findings will somewhat be limited because of lack in similar studies.

Most of the swimmers (female: 70.1%; male: 79.1%) reported participating in swimming training dominantly six-

days-a-week before the pandemic, but during the restriction, mostly trained seven-days-a-week (female: 56.6%; male: 45.2 %). About 85.3% of all swimmers resumed training during the restriction (Table 2). Facer-Childs et al. (14) stated that significant changes led to decreases in training frequency along with later mid-sleep times, higher social jetlag, greater sleep latency, and increased screen time before bed during COVID-19. They reported that increased depression, anxiety, and stress symptoms related to these changes in those international, national, regional, club, or social level athletes. Most athletes (female: 58.2%; male: 63.2%) reported participating in 7-12 swimming pool training sessions in the pre-restriction period. During the restriction period, only 2.0% of female swimmers reported participating in seven-days-a-week swimming trainings ; whereas 88.9% of the females and 91.3% of the males reported not to perform any swimming training during the restriction (Table 4)!

Kaneda et al. (12) indeed revealed in male para-swimmers, healthy swimmers, and female para-swimmers a decrease in life-space mobility because of the fact that the pools were shut down during COVID-19. They also reported that the effects were particularly evident in women with disabilities who were not able to perform land-based aerobic exercise, in substitution for swimming. Girold et al. (15) reported that combining dry-land strength or resisted and assisted sprint training with swimming were more efficient than swimming training alone. In our study, in the pre-restriction period, female and male swimmers' weekly participating rates to dry-land training were 100% and 98.6%, respectively, in 1-6 training sessions. Dry-land training sessions increased significantly to 7-12 training sessions per week in both female (55.5%) and male (49.6%) swimmers during the restriction period (Table 4). Aspenes and Karlsen (16) reported that international swimmers may spend as much as five- hours-a-week on dry-land training.

Another important finding was related to the duration and type of training sessions. There was a significant change in the daily training times both for one-, and double-session trainings following restriction (Table 4). COVID-19 led to significant alterations in swimmers' training programs. It was also indicated by the athletes that the training programs were not used effectively, as intended for their main purposes.

Many athletes experience interruptions in the training and competition processes due to illness, injury, post-season break, or other factors, which may lead to the reduction of their performance level. It is known that, based on the duration of insufficient training stimuli, a four-weeks break is defined as short-term detraining, while longer periods are considered as long-term detraining (17). Thus, the 12-weeks break in athletic training during restriction may be considered as a long-term detraining. Most of the swimmers in our study participated in their trainings, either at home or outdoors, individually; and few of the athletes (3.0% females and 0.9% males) declared to have joined swimming pool trainings (Table 2). Scientists and coaches report that swimming training should consist of both dry-land and in-water sessions (18).

Another important problematic question was having professional support in the trainings during the restriction. In fact, more than half of the female (59.8%) and male (61.9%) athletes stated that they had taken professional support from their coaches during the restriction (Table 2). Stokes et al. (19) stated that psychological support may be required for athletes to overcome the challenges associated with isolation and a change in their regular training routine. Some athletes may be supplied with facilities and equipment, while others have limited equipment or no supply at all, due to severely limited trainings. Our study indicated that more than half the swimmers (female: 66.7%; male: 58.3%) purchased an equipment during the restriction term. Most of the females (82.5%) and males (79.4%) stated that theypurchased more than one equipment, including free weights, resistance elastic bands, and medicine ball equipment during the restriction (Table 2).

Most athletes preferred to purchase predominantly resistance training equipment. Resistance training increases arm strength, leads to higher maximum stroke force, and also improves sprint swim performance (20,21). Data from this study indicated that the athletes (female: 85.9%; male:78.3 %) who performed training at home preferred to combine exercise, including elastic resistance band, resistance exercise with bodyweight, and cycling. In addition, they reported preferring to perform combined exercises that consist of running, bicycle, brisk walking, resistance exercise with bodyweight, and free weights in outdoor fields. Sarto et al. (4) stated that some elite sports clubs have provided players with home-based training programs and/or organized video conferences for online training sessions led by their fitness trainers. Besides, they reported that elite athletes were mostly unsupervised. The process taught is that it is necessary to develop new training methods for athletes using their own materials, as shown in some social media outlets. It has been observed that they simulated these methods to adapt them to their training environment.

As related to eating habits, our findings indicated that most athletes (female:72.6%, male:68.7%) reported changes in these habits, using methods related to food restriction (Table 3). Although most athletes reported applying restricted

food practices during the restriction, data for both genders displayed that body weights were significantly increased comparing with pre-restriction (Table 1). As most swimmers continued their trainings, and applied food restrictions, the reasons for the bodyweight increase could be the inability to perform at the desired intensity, duration, type, and frequency of training during the restriction. The optimal composition of an athletes' diet depends on the sport, training type, volume and intensity, and the ability to manage their body weight and composition (22). Shaw et al. (23) reported that the fitness, training, and dietary habits of paracyclists appeared to be unaffected by the COVID-19 global pandemic. They suggest that elite paracyclists and paratriathletes may be affected to a lesser extent than the general population when considering diet and physical activity during the COVID-19 pandemic. Besides, according to afforementioned findings, changes in daily energy intake, training type, duration, timing, sleeping quality, etc. may lead to metabolic, biochemical, physiological, and behavioral rhythm disruptions (24). These changes could alter circadian rhythms in athletes.

As a limitation, the study only considered competitive swimmers, with at least 3-year sport experience, and the impact may be different in other sports and levels. Besides, evaluation items were limited just to a web-based Google Form survey designed in June 2020. On that date, there was lack of studies related to athletes.

CONCLUSION

COVID-19 pandemic has affected the daily lives of the swimmers. Changes in training schedules, eating and sleeping habits might have negative impacts on not only athletic performances, but also on mental and physical well-being of swimmers. Medical, nutritional and psychological support should be prioritized as well as concerted coaching practices in extraordinary circumstances such as COVID-19 pandemic.

Ethics Committee Approval / Etik Komite Onayı

The approval for this study was obtained from Institutional Ethics Committee of Hitit University, Çorum, Turkey (Decision no: 2020-64 Date: 29/06/2020).

Conflict of Interest / Çıkar Çatışması

The authors declared no conflicts of interest with respect to authorship and/or publication of the article.

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