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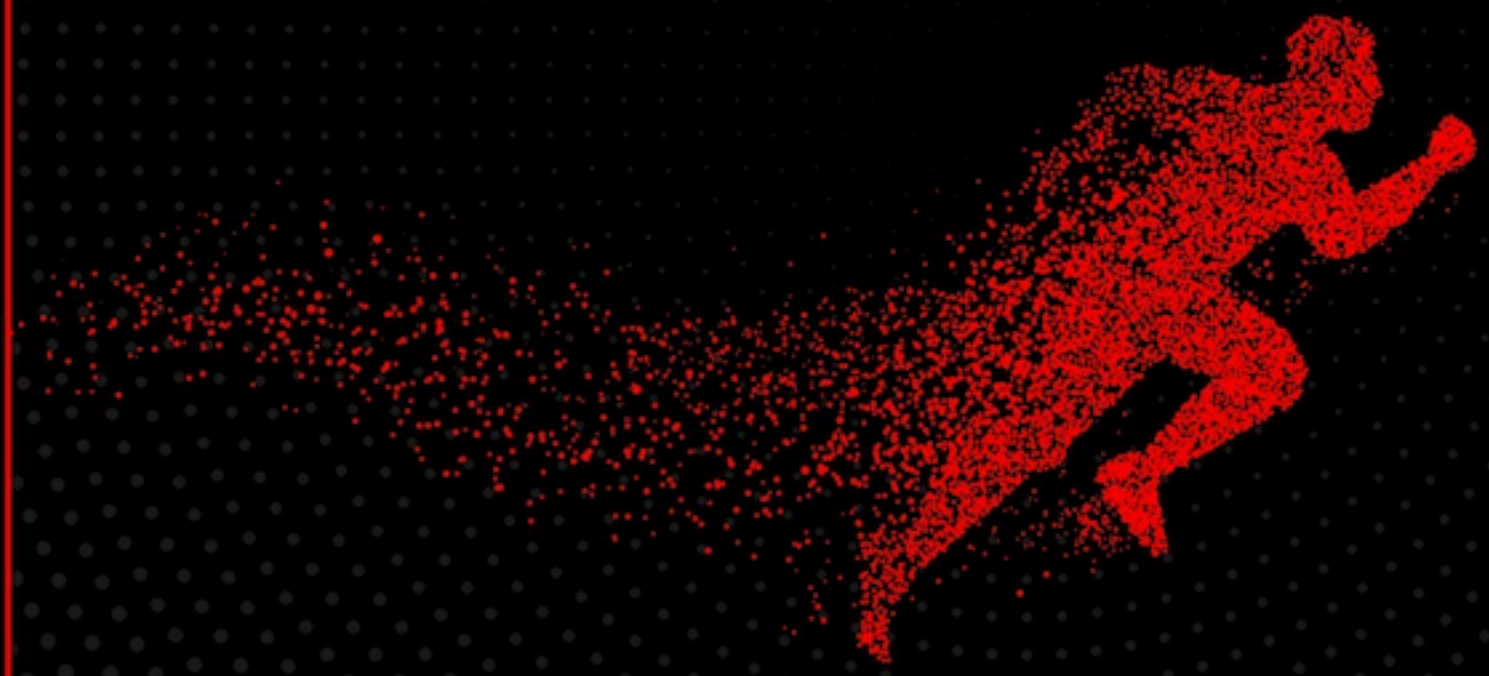

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Exploring the relationship between socioeconomic status and sport participation in Maltese children: A cross-sectional short survey of mothers in relatively affluent households

Abstract

The study aimed to explore the relationship between socioeconomic status and sport participation as a component of broader physical activity patterns in Maltese children. In light of generally low physical activity levels and high prevalence of adverse health outcomes like overweight and obesity in Malta by international standards, researchers and stakeholders have been keen to identify key operative factors and remedial long-term solutions. Trends towards low activity rates may also help to explain relative under-performance by Maltese athletes in international sports. With an interest in both sports performance and national health, therefore, a cross-sectional short survey was administered among a convenience sample of mothers in relatively affluent Maltese households, to survey sports participation in their children as a function of household socioeconomic status, from a sociological perspective. A series of non-parametric statistical procedures were used to test a range of hypotheses that ultimately revealed significant effects of household income, parental educational level, and gender on children's sports participation as the main findings. Throughout the article, we develop the argument that small nations simply cannot afford application of further restrictions on the population pool from which potentially talented future sports performers may be drawn. More commitment is recommended, in this sense, to concerted initiatives and policies designed to limit inequality of access to sport as a component of physical activity, along class, gender, or indeed any other lines.

Keywords: Socioeconomic status, sports participation, physical activity, children, Malta, Mediterranean

Maltalı çocuklarda sosyoekonomik durum ile spora katılım arasındaki ilişkinin araştırılması: Nispeten varlıklı hanelerdeki annelere ilişkin kesitsel kısa bir tarama

Özet

Bu araştırma, Maltalı çocuklarda daha geniş fiziksel aktivite kalıplarının bir bileşeni olarak sosyoekonomik durum ile spora katılım arasındaki ilişkiyi araştırmayı amaçlamaktadır. Uluslararası standartlara göre Malta'da genel olarak düşük fiziksel aktivite seviyeleri ve aşırı kilo ve obezite gibi olumsuz sağlık sonuçlarının yüksek prevalansı ışığında, araştırmacılar ve paydaşlar, temel işlevsel faktörleri ve iyileştirici uzun vadeli çözümleri belirleme konusunda istekli olmuştur. Düşük aktivite oranlarına yönelik eğilimler, Maltalı sporcuların uluslararası sporlardaki görece düşük performanslarını açıklamaya da yardımcı olabilir. Hem spor performansına hem de ulusal sağlığa ilgi duyan bu nedenle, çocukların spora katılımını hanenin sosyoekonomik durumunun bir fonksiyonu olarak sosyolojik bir bakış açısıyla araştırmak için nispeten varlıklı Malta hanelerindeki annelerden oluşan bir örneklem arasında kesitsel kısa bir anket uygulanmıştır. Bir dizi parametrik olmayan istatistiksel prosedür, nihai olarak hane gelirinin, ebeveyn eğitim düzeyinin ve cinsiyetin çocukların spor katılımı üzerindeki önemli etkilerini ortaya çıkaran bir dizi hipotezi test etmek için kullanılmıştır. Makale boyunca, küçük ulusların, potansiyel olarak yetenekli geleceğin spor sanatçılarının çekilebileceği nüfus havuzuna daha fazla kısıtlama uygulamayı göze alamayacağı argümanını geliştirdik. Bu anlamda, fiziksel aktivitenin bir bileşeni olarak spora erişim eşitsizliğini sınıf, cinsiyet ve aslında diğer açılardan sınırlamak için tasarlanmış uyumlu girişimler ve politikalar için daha fazla kararlılığa ihtiyaç vardır.

Anahtar Kelimeler: Sosyoekonomik durum, spora katılım, fiziksel aktivite, çocuklar, Malta, Akdeniz

Introduction

In terms of their performance in international sport, nations will typically strive to identify and call upon those athletes with the highest probabilities of success in their respective disciplines. Unnecessarily excluding segments of the population due to arbitrary (from the perspective of objective sporting success), and essentially artificial, characteristics like socioeconomic status (SES), appears increasingly problematic and unsustainable in the context of international sports performance. This is particularly true of small countries, where population size already represent a fairly substantial barrier. Studies on unequal access/opportunity to participate in sport in the UK (Collins & Buller, 2003; Rowley & Graham, 1999), US (Book et al., 2022; McGovern, 2021), and Asia (Li et al., 2014), have reported particular concerns about under-representation of children from lower class backgrounds. Children from more affluent families are, in this sense, increasingly likely to practice sport and receive more tangible support. Little research on the effects of SES on sport participation has been carried out specific to the small nation context, and no studies of which we are aware, have investigated the phenomenon either in Maltese or broader Mediterranean settings. The present study aimed to address this important gap. Philosophically and theoretically, our approach combines a normative performance-based perspective in its concern for sporting success as a function of unencumbered talent identification, with elements of social justice theory through the conceptualisation of physical activity, sports participation and the benefits they confer, as material rewards subject to inequitable distribution across particular social strata.

Sport for competitive success and better general health

While better performance in international sport is a welcome aim, the problem of lagging participation in sport can also be conceptualised from a health perspective. General physical activity (PA) levels have been found to correlate with body mass index (BMI) in children and adolescents (Sulemana et al., 2006), and in turn with potentially adverse health outcomes like the onset of overweight and obesity. A rationale for promoting sports participation, therefore, aside from promoting success in the competitive sphere, rests on the assumption that more active children, are also healthier. As a form of PA, regular formal sport participation can be considered an important component of total PA in children and youths. A major limitation in most studies on total PA and BMI, however, is that they are mostly observational, making causality difficult to infer (Rauner et al., 2013). In other words, it is unclear whether low PA causes increases in BMI, having a high BMI causes low PA, or the extent to which bi-

directionality or extraneous variables might be in play. More controlled experimental studies are needed to test causal claims surrounding the relationship between PA and BMI.

Hemmingsson and Ekelund (2007) showed that PA was more strongly associated with BMI particularly in obese participants, calling into question the status of PA (or lack thereof) as an a priori causal factor for increased BMI, overweight, or obesity. In other words, if PA interacts with BMI to a lesser extent in children of a healthy weight, it is unlikely that a child will *become* overweight and obese as a result of being less active. Meanwhile, genetics and poor diet are also known to predict childhood obesity (Sahoo et al., 2015), further reducing the likely proportion of variation in BMI attributable exclusively to PA. It is a similarly reasonable assumption that the relationship between PA and BMI is bidirectional (Cairney & Veldhuizen, 2017; Lee et al., 2018). Being more active and participating in sport can lower BMI, but simply having a lower BMI likewise can increase the likelihood of getting/being involved in structured PA or organised sport. Nevertheless, an excessive focus on obesity in the context of children's general health, might be unfounded. PA carries distinctive health benefits regardless of its interaction with BMI (Hills et al., 2011), or, for that matter, its relationship with adverse health outcomes like overweight or obesity. Strategies for maintaining good health in children typically combine healthy eating *and* PA programmes (Hills et al., 2011), suggesting that increased activity through organised sport is ultimately a good thing for children's health.

Unequal access to sport

Given the potential benefits of sport on general health, unequal access is rendered cause for concern. Researchers have found that children in low SES households exhibit more screen time and sedentary behaviours than high SES households, and by extension, do less PA (Lioret et al., 2007; Tandon et al., 2012). In a systematic review of the literature on adolescent PA, Stalsberg and Pedersen (2010) also argued that SES and PA are inversely correlated. Lower PA levels among children of low SES likewise suggests a decreased propensity for children of low SES to participate in structured sporting activities. If this is the case, then sport is rendered increasingly a preserve of the middle class, or at least of segments of the population representing higher relative SES (McVeigh et al., 2004; Stalsberg & Pederson, 2010; Wilson et al., 2004). Lack of resources in poorer areas mean that access to facilities and services dedicated to children's sport or general PA is increasingly restricted among disadvantaged segments of populations (Bhurosy & Jeewon, 2014). Add to this, global wealth inequality is generally considered to be rising (Piketty & Saez, 2014; Zucman, 2019). This means that future sports participants are destined to be drawn from ever-diminishing population pools as wealth is

transferred into ever smaller segments of the population. The consequences for countries like Malta are at least twofold. First, the problem of talent identification is exacerbated in small nations with populations that are already inherently restrictive, and second, the inexorable link between wealth and health inequality is also exacerbated. Unequal access to PA and sport, in other words, subjects children of low SES to lower likelihood of living actively and healthily.

The national body for the promotion of sport in Malta under the remit of the Maltese Ministry for Education and Sport launched a number of programmes aimed at including "every child, […] regardless of the resources of their parents or carers ..." (SportMalta, 2021). Such initiatives take the form of low-cost provision of opportunities to practice sport, yet more research is still needed to ascertain its effects. Although general PA has reportedly decreased relatively homogeneously in Western countries since the 1980s, Salmon et al. (2005) noted a compensatory increase in school-based and other organised forms of sport. Once again, whether any such compensation has taken place in Maltese schools is yet to be ascertained. Nevertheless, the remaining hours of a child's day spent outside of school are an important window of opportunity to engage in sport or PA, subject to facilitation by parents or guardians. As early as the 1990s, evidence in Europe showed a correlation between parents' education level and the PA levels of male children, with father's own prior PA levels being a significant predictor in the case of male offspring (Yang et al., 1996). Parent's education level is typically taken, along with financial income, as an integral constituent measure of SES in studies of this nature.

Socioeconomics, obesity, and sport in Malta

The European Gender Equality Index (EIGE, 2020) report showed that Maltese working mothers, despite their employment status, tend to retain the majority of work duties in the household, including care of immediate and extended family members. McVeigh et al. (2004) meanwhile cited mothers' education level as a significant positive predictor of PA in children, showing at least one way in which characteristics associated with mothers are influential to children's PA behaviours. The question arises, therefore, notwithstanding possibly strained familial relations brought about by mothers working both full-time and in the household, how unequal distribution of time-intensive household responsibilities might affect other outcomes like children's sport participation. Other notable idiosyncrasies in the Maltese context include alarming childhood obesity rates by international standards (Cauchi et al., 2015).

Although lagging sports participation is unlikely to be a direct causal factor leading to obesity, overweight and obese children are known to engage in less PA and sport, so high rates of obesity nonetheless place additional strain on selection pools in the context of early talent identification

and later sports performance at all levels. Grech et al. (2017) and Aquilina et al. (2019) showed in a series of representative nationwide studies, that the prevalence of obesity in Maltese children aged approximately 5 to 17 years of age was as high as 40%. Given a total population of approximately half a million inhabitants, Maltese sports administrators already face severe restrictions in identifying available talent without additional exclusion of children due to obesity, SES or indeed any other factors. Vella et al. (2013), in this sense, argued that gender inequality has also emerged in access to sport, in that Maltese boys tend to participate more than girls, further unnecessarily eliminating additional prospective successful sports performers. Various local studies have acknowledged that even when controlling for population size, Maltese sport still suffers a trend of under-performance in international competition (Grech et al., 2022; Muscat-Inglott & Vella White, 2021), rendering additional restrictions on the availability of potentially talented sports performers appears, increasingly untenable.

Our interest in lagging sports performance as an important component of PA is not limited, however, merely to the context of sport performance. In terms of safeguarding children's general health, the Maltese setting presents additional causes for concern. For instance, genetic variations and environmental influences are also known to influence adverse health outcomes like overweight and obesity status in children and youngsters (Sulemana et al., 2006). If there is a genetic component to overweight and obesity, then Malta's obesity rates may be compounded by genetic drift. Loss of genetic diversity is a predictable characteristic of small populations, leaving natural selection to act on genes associated with higher BMI, and their consequent phenotypic expression in prevalent overweight and obesity. This places more, not less, urgency on Maltese policy-makers when compared to those in larger countries, to prioritise any means of remedial action through strategies known to positively impact children's health, like structured PA programmes and sport participation. A socioeconomic component to PA and sport participation only serves to worsen the broader effects of SES exerts on precipitating adverse health outcomes (Cuschieri et al., 2017).

Questions

Various Maltese researchers have observed effects on health along geographical lines, with traditionally low-income areas being associated with increased incidence of adverse health outcomes including overweight and obesity (Aquilina et al., 2019; Camilleri et al., 2010; Cuschieri 2020; Grech et al., 2017). If SES and obesity are correlated, and obesity in turn predicts a decreased likelihood of participating in sport, then existing studies collectively support the existence of a direct link between SES and sports participation, even though such a

link has not been awarded due direct attention by researchers. Our primary aim was to investigate and explain such a relationship quantitatively. In an influential local study, Decelis et al. (2014) used an ANCOVA (Analysis of Covariance) model in their study of screen time and obesity, with SES included as a covariate. In other words, the primary relationship between screen time and obesity was analysed, while statistically controlling for SES. Since covariates are typically selected because they correlate with a principal outcome of interest, the Decelis et al. study serves as additional evidence for SES as a significant factor affecting health-related behaviours among Maltese children, even though this was not the focus of their study. In the present study, therefore, SES was considered as a primary factor in its own right. Impelled by the problems of prevalent overweight and obesity in the relatively small Maltese population, an ever-diminishing pool of potentially successful sports performers, and other nuances highlighted in the local and international literature, we sought to address the following questions:

1) How does SES correlate with sports participation in Maltese children?

2) How does mother's full-time working status affect children's PA?

3) How does SES interact with awareness of SportMalta and sport participation?

4) How does sport participation vary by sex in Maltese children?

Methods

The study took the form of a cross-sectional short survey. Ethical approval was given by the institutional review board at the Malta College of Arts, Science & Technology in December 2022, with the data collection period subsequently spanning the months of January and February 2023. An online questionnaire was developed as the main instrument using *Google Forms*.

Data Collection

Table 1. The main constructs and accompanying questionnaire items, as well as how these were coded and operationalised as the main variables driving the study.

Variable		***Measurement***
	Socioeconomic status	
INCOME	Highest household income	Multiple choice for yearly income brackets in thousands of Euros up to 1, 10, 15, 20, 30, 40, 50, 60 (Mid-point of each category was taken to treat data on the scale level)
EQF	Highest household education level (EQF)	Multiple choice (EQF levels 2 to 8)
LOCALITY	Region of residence	Dummy code (*Southern Harbour* or *South Eastern* or *Gozo & Comino* region = 0, Other = 1) *
	Sport participation	
SPORTFREQ	Frequency of sport participation	Multiple choice (Sessions per week 0 to 7) **
FOOTBALL	Attends football	Dummy code (Yes = 1, No = 0) ***
DANCE	Attends dance	Dummy code (Yes = 1, No = 0) ***
GYM	Attends gymnastics	Dummy code (Yes = 1, No = 0) ***
	Physical activity level	
PA	Parental assessment of physical activity lifestyle status	Four-point linear scale (Sedentary = 0, Light Activity = 1, Moderate Activity = 2, High Activity = 3) **
PAFAM	Time spend physically active together as a family	Multiple choice by 60-minute brackets up to 60, 120, 180, 240, 360 (Highest value of each category taken to treat data on the scale level)
	Body Mass Index	
BMI	*Estimated BMI*	Self-reported Weight / Self-reported Height^2 **
	Mother's Employment Status	
FULLTIME	Mother in full-time employment	Dummy code (Yes = 1, No = 0)
	National Sports Programme Awareness	
SPORTMALTA	Familiarity with "Sport Malta"	Five-point linear scale, single item
	Sex of Child	
SEXofCHILD	Reported sex of child	Dummy code (Female = 1, Male = 0)

*Notes: * Among the six official regions of Malta according to national statistics, these were the regions associated with lower general socioeconomic status. ** Measure averaged by household to adjust for multiple children. *** Dummy variables created post hoc based on emerging three most popular sports.*

Participation in sport was measured by frequency of sessions per week, per child. Estimated BMI was taken as a metric for added context in understanding children's health-related behaviours and extrapolated from self-reported height and weight values in *m* and *kg*, respectively. These items were accompanied by instructions for obtaining accurate height and weight measurements to encourage parents to provide quality data. SES was taken as a combination of income and education level as in similar studies (Tandon et al., 2012; Yang et al., 1996). These were taken as distinctive variables and hypothesised about separately. Indeed, residence in the national districts with lower SES was also taken as a socioeconomic marker more generally. Household income was solicited using a dropdown menu consisting of the income categories indicated in Table 1. These data were then transformed into a scale variable by taking the mid-point of each selected category. The remaining variables were operationalised as indicated in Table 1 and included in the hypotheses shown in Table 2. A total of 117

responses were received, although 21 rows in the final data set had to be deleted due to missing or corrupted data points, resulting in a final total sample size of $N = 96$ parents each representing a single household. The average number of children per household was 1.51 (Mode = 1), translating to a total of $N = 147$ children between the ages of 5 and 16 years ($M = 9.96$, $SD = 3.23$), 75 of whom (51%) were female. Only 3 of the 96 participating parents/guardians completing the questionnaire were male. They were included in all hypotheses except for those concerning full-time working status of mothers. The mean age of participating parents was 39.83 years ($SD = 5.55$).

Grech et al. (2017) and Aquilina et al. (2019) showed that approximately 40% of Maltese children aged approximately 5 to 17 are obese. Only 19 (12.9%), however, of the children in the present study had an estimated BMI of 25 or more, showing that the sample systematically differed from the general population. Furthermore, mean income of the highest earner in each participating household was €32,580 ($SD = 15,449$, $Median = 35,000$), meaning the sample was representative of relatively high SES in terms of income when compared to the nationwide average annual salary of €19,594 according to latest estimates from the National Statistics Office (NSO, 2021). The median education status of EQF 6 also meant that the sample consisted of a high degree of parents with a graduate level of education. A majority of the participants were resident in the Western, Northern and Northern Harbour regions, which have been associated with higher SES among the six national districts of Malta according to regional income, unemployment, risk of poverty, crime rates, and average property prices (Muscat-Inglott, 2021).

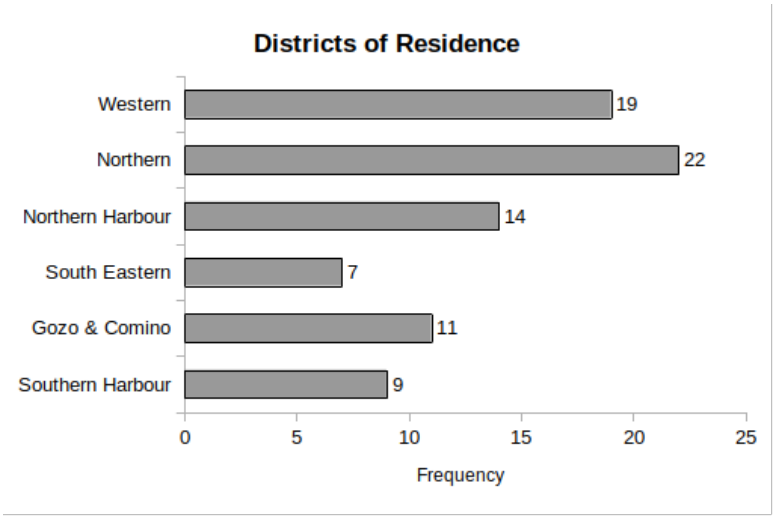

Figure 1. Distribution of parents across the six districts, ordered according to their SES.

The sampling process therefore favoured not only parents of relatively high SES, but also those households biased in favour of sport and physical activity participation, since only 12 (12.5%) of the respondents reported no sport participation. The convenience sampling strategy likely led to an increased number of respondents with existing interest in health, physical and sport, given the advertised topic. The perspectives of families' representative of lower levels of physical activity and sport participation were thereby excluded. Collins & Buller (2003) reported the same phenomenon based on their use of social media for sampling in a study on SES and sport participation, reporting a majority of respondents from middle class and relatively affluent households. These deviations from expectations, given known national norms, ultimately suggest that the sample was above average in terms of SES, and biased in favour of sports participation. Nevertheless, the study was predicated on the assumption that within group differences and variations in sport participation in the sample might yield interesting findings with respect to the hypotheses outlined in Table 2. In terms of quantiles, it should be noted that 25% of the participants reported highest annual household earnings of €25,000, and 10% reported earning less than €17,750, indicating that sufficient data were included to make inferences dependent on variations on SES, accounting for income brackets that were on par with the national average or lower.

Data analysis

Highest household income and educational level were taken as the main scale variable measures of SES, and the primary explanatory factors of interest in the study. The distribution of these data was therefore examined using a visual inspection of the histograms and the Kolmogorov-Smirnov test statistic.

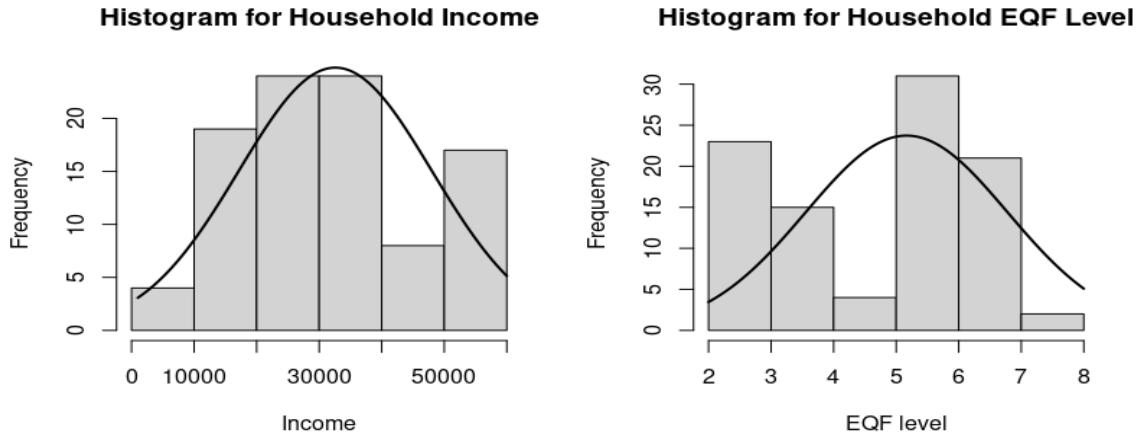

Figure 2. Histograms showing non-normal distributions of household income and education level.

Table 2. All hypotheses and statistical procedures.

Hypothesis	*Shorthand Interaction*	*Null*	*Statistical procedure*
H_{1a}	SPORTFREQ by INCOME	There is no relationship between household income and frequency of sport participation	Spearman rank correlation
H_{1b}	SPORTFREQ by EQF	There is no relationship between household educational level and frequency of sport participation	Spearman rank correlation
H_{1c}	SPORTFREQ by LOCALITY	Frequency of sport participation does not vary according to residence in districts of traditionally low or high socioeconomic status	Wilcoxon rank sum (Mann Whitney)
H_{1d}	INCOME by FOOTBALL, DANCE, GYM	The mean income is equal in each sport	95% Confidence Intervals *
H_{2a}	PA by INCOME	There is no association between household income and children's physical activity status	Spearman rank correlation
H_{2b}	PA by EQF	There is no association between household educational level and children's physical activity status	Spearman rank correlation
H_{2c}	PAFAM by INCOME	There is no association between household income and physical activity participation as a family	Spearman rank correlation
H_{2d}	PAFAM by EQF	There is no association between household educational level and physical activity participation as a family	Spearman rank correlation
H_{3a}	BMI by INCOME	There is no association between household income and BMI	Spearman rank correlation
H_{3b}	BMI by EQF	There is no association between household educational level and BMI	Spearman rank correlation
H_{4a}	SPORTFREQ by FULLTIME	Frequency of sport participation does not vary according to mother's full-time work status	Wilcoxon rank sum (Mann Whitney)
H_{4b}	PA by FULLTIME	Physical activity levels do not vary according to mother's full-time work status	Wilcoxon rank sum (Mann Whitney)
H_{4c}	PAFAM by FULLTIME	Physical activity participation as a family does not vary according to mother's full-time work status	Wilcoxon rank sum (Mann Whitney)
H_{4d}	BMI by FULLTIME	BMI does not vary according to mother's full-time work status	Wilcoxon rank sum (Mann Whitney)
H_{5a}	SPORTFREQ by SPORTMALTA	There is no association between frequency of sport participation and awareness of Sport Malta	Spearman rank correlation
H_{5b}	INCOME by SPORTMALTA	There is no association between household income and awareness of Sport Malta	Spearman rank correlation
H_{6a}	SPORTFREQ by SEXofCHILD	Frequency of sport participation does not vary according to sex of child	Wilcoxon rank sum (Mann Whitney)
H_{6b}	PA by SEXofCHILD	General physical activity levels do not vary according to ses of child	Wilcoxon rank sum (Mann Whitney)
H_{6c}	BMI by SEXofCHILD	BMI does not vary according to sex of child	Wilcoxon rank sum (Mann Whitney)

*Notes: * Confidence intervals were selected over the Kruskal Wallis test since the sport categories were not mutually exclusive, with several sports represented in some individual households with more than one child.*

The data for maximum household income ($D = 1$, $p < .001$), and maximum household education level ($D = .98$, $p < .001$), were deemed to be not normally distributed. Based also on the use of single-item ordered, and Likert data for the main variables of interest, non-parametric statistical

procedures were chosen for more robust results. The selected statistical procedures are shown in conjunction with all hypotheses in Table 2. The data were downloaded from *Google Forms*, cleaned and coded numerically using *LibreOffice*, and finally imported into *RStudio (v2022.07.2)* open-source statistical analysis software, running on a *Linux* open-source operating system. The hypotheses are shown in abbreviated, schematic form in Table 2, and elaborated logically in the results section.

Results

Table 3. Descriptive statistics for main variables.

Variable	*Median*	*Mean*	*SD*	*Frequency*	*Proportion*	*95% CI*
INCOME	35000	32581	15449	NA	NA	29450, 35711
EQF	6	5.17	1.61	NA	NA	4.85, 5.49
LOCALITY	0	.28	NA	27	.28	.19, .38
SPORTFREQ	2	2.16	1.47	NA	NA	1.87, 2.46
FOOTBALL	0	.36	NA	35	.36	.27, .47
DANCE	0	.22	NA	21	.22	.14, .31
GYM	0	.17	NA	16	.17	.10, .26
PA	2	2.10	0.74	NA	NA	1.94, 2.25
PAFAM	60	87.50	43.46	NA	NA	78.70, 96.30
BMI	18.14	19.75	5.44	NA	NA	18.65, 20.85
FULLTIME	1	.72	NA	69	.72	.62, .81
SPORTMALTA	0	.13	NA	12	.13	.07, .21
SEXofCHILD	1	.51	NA	75	.51	.43, .59

Table 4. Hypothesis testing results

Hypothesis	*Shorthand Interaction*	*Test statistic and significance*
H_{1a}	SPORTFREQ by INCOME	$r_s = .26$, $p = .01$ *
H_{1b}	SPORTFREQ by EQF	$r_s = .24$, $p = .02$ *
H_{1c}	SPORTFREQ by LOCALITY	$W = 1023.5$, $p = .45$
H_{1d}	INCOME by FOOTBALL, DANCE, GYM	(*Results in Table 6*)
H_{2a}	PA by INCOME	$r_s = .03$, $p = .74$
H_{2b}	PA by EQF	$r_s = .03$, $p = .77$
H_{2c}	PAFAM by INCOME	$r_s = .29$, $p < .01$ **
H_{2d}	PAFAM by EQF	$r_s = .23$, $p = .02$ *
H_{3a}	BMI by INCOME	$r_s = -.22$, $p = .03$ *
H_{3b}	BMI by EQF	$r_s = -.19$, $p = .07$
H_{4a}	SPORTFREQ by FULLTIME	$W = 957$, $p = .46$
H_{4b}	PA by FULLTIME	$W = 957$, $p = .44$
H_{4c}	PAFAM by FULLTIME	$W = 746$, $p = .21$
H_{4d}	BMI by FULLTIME	$W = 879$, $p = .95$
H_{5a}	SPORTFREQ by SPORTMALTA	$r_s = -.21$, $p = .04$
H_{5b}	INCOME by SPORTMALTA	$r_s = -.24$, $p = .02$
H_{6a}	SPORTFREQ by SEXofCHILD	$W = 3616$, $p < .001$***
H_{6b}	PA by SEXofCHILD	$W = 3200$, $p = .02$*
H_{6c}	BMI by SEXofCHILD	$W = 2697$, $p = .89$

*Notes: * Denotes significance at the 95% confidence level, ** at 99%, and *** at 99.9%.*

On the interaction between SES, sport participation, PA and BMI

The children sampled attended an average of 2.16 sessions of organised sport per week (*Median* = 2, *SD* = 1.47). The most popular sports were football, dance and gymnastics, distributed by sex as shown in Table 5. An overwhelming preference for football in boys, and dance or gymnastics in girls was evident. In terms of income, SES did not vary across the particular sporting disciplines selected in the households sampled (Table 6).

Table 5. Sex differences as they emerged in the three most frequently cited organised sport disciplines.

	Female	***Male***
Football	3 (4%)	40 (56%)
Dance	26 (35%)	0
Gymnastics	18 (24%)	0
Other	28 (37%)	32 (44%)

Table 6. Highest household earnings by household, according to formal sports practiced by at least one child in that household (H_{1d}).

Sport	***n***	***Mean***	***95% Confidence Interval***
Football	35	32,553	27,965 - 35,142
Dance	21	33,480	29,842 – 37,118
Gymnastics	16	34,109	30,652 – 37,567
All	96	32,581	29,450 - 35711

With respect to H_{1a} and H_{1b} concerning the main effect of SES on sport participation overall as per the main aim of the study, the evidence suggests a statistically significant, yet relatively mild effect. This was the case both in terms of highest household income (r_s = .26, p = .01), as well as highest household education level (r_s = .24, p = .02). The findings support the emerging consensus in the literature that SES is significantly associated with inactivity and adverse health outcomes more generally, both at the local and international levels (Aquilina et al., 2019; Camilleri et al., 2010; Cuschieri 2020; Grech et al., 2017; Stalsberg & Pedersen, 2010). Squaring the correlation coefficient yields an R^2 value of .07 for income, and .06 education level. This means that, according to our findings, SES explains between 6% and 7% of the total variation in frequency of sport participation among Maltese children. Residents in the areas associated with lower SES, however, did not report significantly lower sports participation in their children (W = 1023.5, p = .45). This is not necessarily surprising, given that the sample was reflective of relatively high SES overall, meaning that expected variations in SES *within*

each district likely resulted in a bias towards atypical households in poorer areas, with significantly higher SES than respective district norms.

With respect to H_{2a} and H_{2b}, SES was not associated with general PA levels. In other words, however active parents generally rated their children to be, did not appear influenced by their SES. In terms of both income ($r_s = .29$, $p < .01$) and education level ($r_s = .23$, $p < .02$), however, a significant relationship did emerge between SES and amount of PA performed together as a family (H_{2c} and H_{2d}). The higher the SES according to both metrics, the more likely children were to engage in PA together with their parents and siblings. With respect to H_{3a} and H_{3b}, there was an association between estimated BMI and income ($r_s = -.22$, $p = .03$), but not education level ($r_s = -.19$, $p = .07$). To put the above associations, or lack thereof, in further context, Table 7 shows a complete correlation matrix for the main variables and their covariance.

Table 7. Correlation matrix for main variables with Spearman rank correlation coefficients and significance values.

	INCOME	***EQF***	***SPORTFREQ***	***PA***	***PAFAM***
EQF	$r_s = .45$ $p < .001$***				
SPORTFREQ	$r_s = .26$ $p = .01$*	$r_s = .24$ $p = .02$*			
PA	$r_s = .03$ $p = .74$	$r_s = .03$ $p = .77$	$r_s = .43$ $p < .001$***		
PAFAM	$r_s = .29$ $p < .01$**	$r_s = .23$ $p = .02$*	$r_s = .12$ $p = .25$	$r_s < .01$ $p = .98$	
BMI	$r_s = -.22$ $p = .03$*	$r_s = -.19$ $p = .07$	$r_s = .04$ $p = .66$	$r_s = -.14$ $p = .17$	$r_s = .05$ $p = .64$

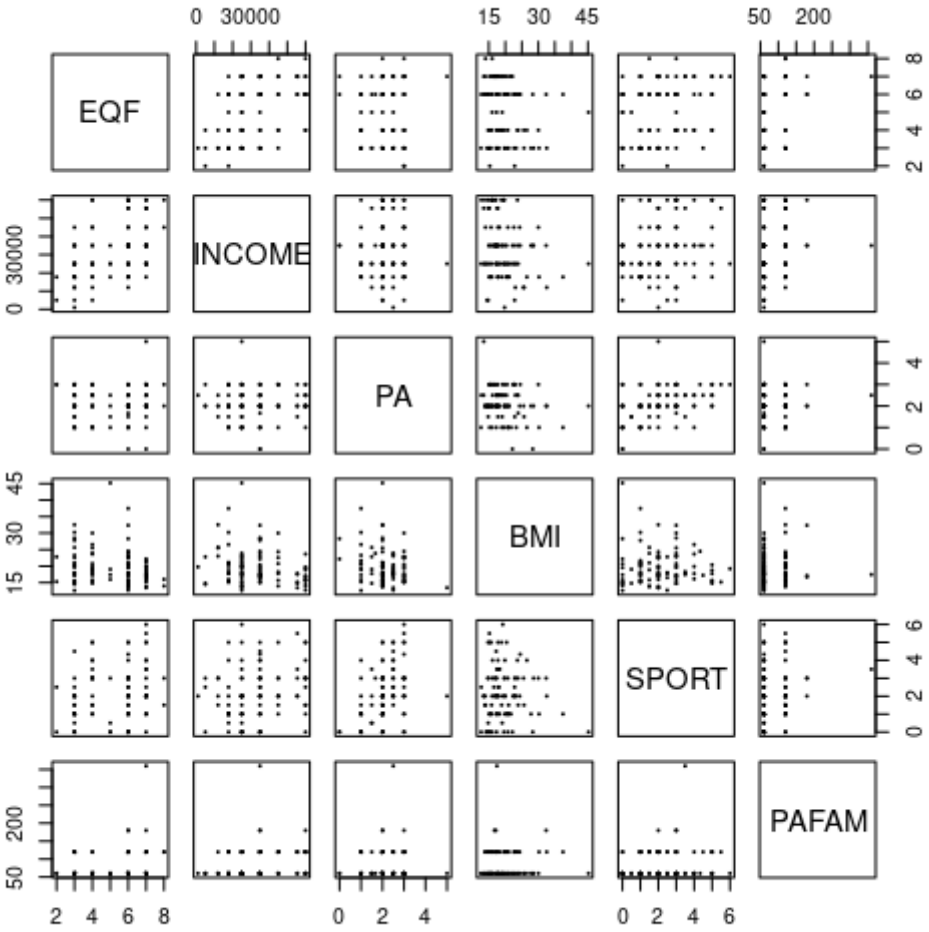

Figure 3. Scatter plot matrix for main variables.

The moderately strong correlation between sport participation and PA (r_s = .43, p < .001) suggests that, at least in affluent Maltese families, sport participation accounts for a majority of childen's PA. Income was the strongest predictor of estimated BMI, more so than sport participation or general PA. The claim that income predicts BMI but not PA (r_s = .03, p = .74), combined with a lack of direct association between sport participation and BMI (r_s = .04, p = .66), precipitates the involvement of absent yet key extraneous variables, likely to include healthy eating as a key absent component, estimation of which lay beyond the scope of the present study. Indeed, Cauchi et al. (2015) attributed Malta's obesity rates to limitations in infrastructure for physical activity combined with an energy-dense food supply. Pereira-da-Silva et al. (2016) further pointed out that the effects of unhealthy eating on the prevalence of obesity was exacerbated by SES, at least in the form of education level, providing further evidence of the multifaceted influence SES appears to have on children's health in Malta.

Furthermore, the effects of income on sport participation (r_s = .26, p = .01) and family PA (r_s = .29, p < .01) appear to be independent, given that sport participation and family PA are not in themselves directly correlated (r_s = .12, p = .25). This suggests that families representative of higher SES engage in either one or the other, being more likely, either way, to demonstrate attribution of value to the general principle of active living, corroborating a long-standing relationship discussed in the literature between SES and health in children (Bradley & Corwyn, 2002; Chen et al., 2006; Curry & Goodman, 2020; Hanson & Chen, 2007). Azevedo (2021) showed, among a sample of white and blue collar workers, that the blue collar workers were more active during work time in their roles on the factory floor, while the white collar workers engaged in predominantly office-based roles, were more active in their leisure time. It stands to reason that more physically active work would necessitate physical rest outside of work hours, while being "cooped up" in the office would contrarily engender more active forms of recreational leisure. Assuming Maltese parents with lower incomes are working more physically active jobs, then awareness of such a trend may help all parents to recognise that their leisure choices have a significant impact on their children's PA, and by extension more generally, on their general health.

On the full-time working mothers, Sport Malta, and gender norms

A total 69% of mothers (n = 64) declared they were in full-time employment. Test statistics for hypotheses H_{4a}, H_{4b}, H_{4c} and H_{4c} concerning the influence of full-time work status of mothers on children's activity did not yield any statistically significant results. If a mother works full-time, therefore, the evidence does not suggest children's activity is affected in any way, neither positively nor negatively. More research is needed, however, given that such a relationship is likely complex. Buehler and O'Brien (2011) showed, for instance, that mothers working part-time (as opposed to full-time or being unemployed), engaged in more effective parenting at least from a psychological perspective. Brown et al. (2010) also found a mild correlation between mother's working hours and children's weight, suggesting that more work is not necessarily a positive factor in promoting children's general health.

Only 13% (n = 12) of the respondents were familiar with SportMalta as an organisation. With respect to H_{5a} and H_{5b}, familiarity with SportMalta was inversely correlated with frequency of sport participation (r_s = -.21, p = .04), as well as income (r_s = -.24, p = .02). The higher the participation of children in sport within the sampled households, the less likely parents were to be familiar with SportMalta. The inverse correlation with income further suggests that more affluent families are less likely to make use of the services offered by SportMalta. These

relationships can also be interpreted such that *lower* income families are *more* likely to be familiar with SportMalta, which generally supports the stated goals of the organisation to promote sport for all. To properly substantiate this claim, however, more research is needed specifically on populations representing lower SES.

The final set of hypotheses were designed to explore if sport participation, PA and BMI vary according to the stated sex of Maltese children. The evidence (for H_{6a}, H_{6b} and H_{6c}) supported the existence of a gender difference among Maltese children, most notably in their participation in sport ($W = 3616$, $p < .001$), and their general PA levels ($W = 3200$, $p = .02$). No evidence emerged in favour of any association between sex and estimated BMI. Table 8 shows the mean values of the three main outcomes organised by sex, including the effect sizes. The results generally support previous claims by Decelis et al. (2014), and show that boys, on average, engage in more PA (via sport) than girls, approximately by one more session per week (r_s = -.28, p < .001). They are also marginally more likely to be assessed as active by their parents (r_s = -.17, .02). This finding supports the general assertion that sport participation in Malta indeed faces systematic exclusionary forces serving ultimately to exert a negative effect on both level of competitive sporting success, and public health outcomes more generally.

Table 8. Mean values for main outcomes by sex of child

Outcome	***Female***	***Male***	***Difference (Effect Size)***
SPORTFREQ	1.87 (1.60)	2.85 (1.68)	0.98 (d = 0.59, r = -.28)
PA	2 (0.90)	2.28 (0.72)	0.28 (d = 0.34, r = -.17)
BMI	19.59 (4.87)	20.13 (6.32)	*Not significant*

Conclusion

This study was based on self-reported questionnaire data. Particularly in the case of estimated BMI, which was calculated using reported height and weight, precision was necessarily compromised. All results pertaining to estimated BMI should therefore be interpreted in this light, even though BMI was not the primary focus of the study. Non-parametric procedures were selected to add robustness to resulting statistical claims. Parametric procedures, on the other hand, would have permitted more nuanced statistical analyses, as well as the possibility to statistically control for additional variables. Future research might curtail issues of precision in both measurement and analysis, through more specialised field measurements of children's BMI, fitness, or participation in sport through primary attendance data rather than self-report, in conjunction with more powerful parametric statistical approaches like general linear

modeling, or structural equation modeling. Nevertheless, the present study sought to explore and posit general trends, and ultimately encourage more sociological research in Maltese sport and exercise for health. Most importantly, it aimed to encourage more acknowledgement of SES as an important factor affecting sport and PA outcomes in Malta. In this sense, we offer the following conclusions for consideration by policy-makers, stakeholders, and researchers.

The findings support the main hypothesised relationship between SES and participation in organised sports in Malta. Our evidence suggest that SES exerts a statistically significant effect on sports participation among Maltese children (p = .02), and more specifically, that SES explains up to 7% of the variation in sports participation (R^2 = .07). This is disconcerting, both in terms of potential improvements in international sports performance, given the diminishing effect of exclusionary practices on the pool of available talent, as well as in terms of adverse health outcomes more generally associated with lowered childhood PA. An association between SES and sport participation in the context of widening global wealth and income inequality, moreover, increases the risk that practicing sport may become the sole reserve of an ever-shrinking, increasingly privileged, minority segment of the population. The findings also show that households representative of higher SES are more likely to engage in PA together as a family (p = <.01), further rendering SES and class as important factors in the development of unequal access to PA more generally. In terms of work and leisure choices among parents, the findings also showed that full-time work status among mothers had no effect on sport participation, general PA or estimated BMI.

An inverse correlation between SES and sport participation renders SportMalta a crucial means of access and promotion of sport for all. The findings indeed suggest that use of their services inversely correlates with income (p = .02). SportMalta shoulder heightened responsibility, in this sense, to ensure children attending their programmes are afforded the same quality of service and opportunities enjoyed by children of higher SES practicing sport elsewhere. And finally, the findings show that boys engage in more sports activity than girls in Malta (p < .001). The effect size was relatively mild (r_s = -.32), equivalent to approximately one extra session of sport per week. In conclusion, the study provides impetus for the timely acknowledgment that SES affects sport participation as an important component of overall PA in Malta. In the interests of long-term improvement in sports performance on the international stage, as well as in the interests of cultivating a stronger culture for healthier and more active Maltese children and youths, more inclusive sports and PA participation infrastructures and policies are needed,

combined with additional research on existing exclusionary practices in Maltese sport and PA from the sociological perspective.

Author Contribution

Stephania Dimech (Conceptual framework, data collection, revisions), Matthew Muscat-Inglott (Conceptual framework, data analysis, write-up, revisions)

Conflict of Interest

We declare no conflicts of interest.

Ethical Statement

Ethical review was carried out by the Institutional Review Board at the Institute of Community Services, Malta College of Arts, Science & Tecnology.

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Online practice of physical activity cards: A study with physical education and sports teacher candidates

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Online Practice of Physical Activity Cards: A Study with Physical Education and Sports Teacher Candidates

Abstract

This study aims to demonstrate how physical activity cards (PAC) can be taught to physical education and sports teacher candidates through distance education, and to test the effectiveness of the teaching process. Due to the lack of open access materials that provide detailed explanations on how to apply PAC cards, the study seeks to fill an important gap in physical education and sports education. Teacher candidates were provided with access to video lessons on the practice of PAC cards, and their knowledge levels were tested using the PAC Knowledge test before and after the instruction. A total of 30 teacher candidates, including 15 females and 15 males studying in the physical education and sports teaching program, were included in the research. A control group consisting of 15 female and 15 male teacher candidates was included in the research. The data collected was analyzed using the SPSS program. The study results show that PAC cards can be effectively applied through online education, and that a scientifically tested digital environment can provide teachers and teacher candidates with continuous access to these materials.

Keywords: Physical education and sports teacher candidates, PAC cards, Sufficiency

Fiziksel Etkinlik Kartlarının Çevrimiçi Ortamda Uygulanması: Beden Eğitimi ve Spor Öğretmen Adaylarında Bir Çalışma

Özet

Bu araştırma, fiziksel etkinlik kartlarının (FEK) uzaktan öğretim yoluyla beden eğitimi ve spor öğretmeni adaylarına nasıl aktarılacağını ve öğretim sürecinin etkililiğinin test edilmesini amaçlamaktadır. Araştırmada, FEK kartlarının uygulanışıyla ilgili detaylı anlatım içeren açık erişim materyallerinin eksikliği nedeniyle önemli bir açığı doldurmak hedeflenmektedir. Öğretmen adayları, FEK kartlarının uygulanışına yönelik ders videolarına erişim sağlamış ve FEK Bilgi testi uygulanarak öğretim öncesi ve sonrası bilgi düzeyleri karşılaştırılmıştır. Araştırmaya beden eğitimi ve spor öğretmenliği programında öğrenim gören 15 kadın ve 15 erkek olmak üzere toplam 30 öğretmen adayı dahil edilmiştir. Araştırmaya 15 kadın ve 15 erkek öğretmen adayından oluşan kontrol grubu alınmıştır. Toplanan veriler SPSS programında kayıt altına alınarak analiz edilmiştir. Araştırma sonuçları, çevrimiçi öğretim yoluyla FEK kartlarının etkili bir şekilde uygulanabileceğini ve öğretmenlere ve öğretmen adaylarına sürekli erişim sağlayabilecekleri bilimsel yöntemlerle test edilmiş dijital bir ortam sağlayabileceğini göstermektedir.

Anahtar Kelimeler: Beden eğitimi ve spor öğretmen adayları, FEK kartları, Yeterlilik

Introduction

Physical education and sports; physical education is the collection of movements done for the development of mental health. Sports are defined as physical activities played by individuals competing under official rules. Physical education and sports teachers organize game and sports activities that support physical activity among children and young people from kindergarten to high school. The aim is to develop motor skills and physical development among small children, and appropriate exercise and eating habits among older children.

The Physical Activity Cards consist of yellow and purple card groups. The yellow card group includes "Teacher Card", "Basic Movement Skills and Concepts Card", "Combined Movement Cards", "Health Understanding Cards", "Sports Unrestricted Card", "Movement Competency Card", and "Physical Activity and Nutrition Pyramid Card". The purple card group includes "Teacher Card", "Net and Racket Games", "Offensive Games", "Hitting and Catching Games", "Active Participation", "Health Understanding", and "Sports Unrestricted" cards.

The Physical Activity Cards (PAC) "Offensive Games Group" are designed to develop skills necessary for sports such as basketball, football, handball, hockey, and korfball among children. The activities present the skills used in offensive games in a game setting.

Physical education lessons are implemented as games, especially in the first level of primary education, for eight years in elementary school. The basic concept of the game is to gain movement skills. To sustain human life in a healthier and more qualitative way, movement is necessary (Temel and Avşar, 2009).

"Games and physical activities" are conscious and planned activities aimed at the physical, mental, emotional, and social development of the growing generations. They are considered complementary and integral parts of general education (Demirci and Demirci, 2014). Gray and Judy (2003) stated that children who participate in play activities during their childhood are more successful in acquiring movement skills in elementary school. Additionally, Ishee (2003) stated that children will be healthier and more conscious in their later years.

The Ministry of National Education (MEB) Board of Education approved the Primary School Games and Physical Activities (OFE) curriculum for implementation starting from the first grade in the 2012-2013 academic year, gradually extending to upper grades. Within the scope of the International Inspiration Project, "Physical Activity Cards (PAC)" and "I'm Playing Games Compilation Booklet" were prepared, and it was stated that it would be appropriate to use them in grades 1-4 of primary schools (MEBa, MEBb, 2012).

The use of PAC cards is reported to positively affect the cognitive, affective, and psychomotor development of children (Lapointe, 2016; Bozkurt et al., 2016; Saygılı et al., 2015; Yin and Moore, 2004; Hürmeriç, 2003). İrez et al. (2013) also stated that PAC cards are a highly useful material for skill development in physical education classes.

In this study, the aim is to teach the Yellow Physical Activity Cards, which have been developed for the acquisition of basic movement skills, to teacher candidates through distance education. The Yellow PAC cards provide a basis for mastering complex movements as they include basic movement skills. Therefore, in this study, Yellow PAC cards were selected.

Method

Ethical approval was obtained from the ethics committee of a higher education institution with protocol number 210036/28 before starting the research. An experimental design with a control group was adopted as the research model.

Yellow Physical Activity Cards

The Physical Activity Cards (PAC) yellow cards group was prepared activity and game-based to develop movements that constitute the Movement Competency sub-learning area (basic movement skills, basic movement concepts, game strategies/tactics) in the Primary School "Games and Physical Activities" course program. Yellow cards have been created under headings such as movement patterns suitable for the developmental characteristics of primary school children (walking, running, jumping, sliding, etc.), balancing movements (rotation, oscillation, stance, sitting, etc.), movements requiring object control (throwing, catching, hitting, etc.), and combined movements (relay race, target games, etc.).

Participants

A total of 30 teacher candidates, including 15 females and 15 males studying in the physical education and sports teaching program, were included in the research.

Control Group

A control group consisting of 15 female and 15 male teacher candidates was included in the research. The PAC knowledge test was also applied to this group. The control group was not included in the distance learning process.

Measurement

PAC Knowledge Test was developed to measure the knowledge levels of teacher candidates regarding Yellow PAC cards included in the research. The test, developed by taking expert opinions, was applied to teacher candidates before and after distance learning. Pre-test and post-test results were compared.

Pre-Test

Prior to participating in remote education, prospective teachers were administered the PAC test online.

Post-Test

After participating in remote education, prospective teachers were administered the PAC test online.

Practice Test

Prospective teachers who participated in remote education randomly selected and applied one of the activities included in the Yellow PAC card. The practice performances of the teacher candidates were evaluated by preparing the PAC Practice Evaluation Form, which was created in line with expert opinions. Each candidate who participated in the practice test has a practice evaluation score.

Data Collection Process

Training videos on how to apply Physical Activity Cards were created by the researcher and uploaded to the website to be created. Prospective teachers who wished to participate in the study voluntarily were given free membership to the website. Prospective teachers who applied the PAC Information test online followed a PAC practice for one day each week for two days. After the lessons were completed, the teacher candidates applied the PAC information test again. The videos length ranged between 4 minutes to 10 minutes. The post-test was applied right after the videos were completed. After the instructional process was completed, the candidates explained how they applied a randomly selected activity. This practice was evaluated by the researcher according to the PAC Practice Evaluation Form criteria. If necessary, support was obtained from assistant staff during the explanation and video recording of the PAC card. These staff members participated in the lesson as a student role during the class.

Data Analysis

The data obtained during the study was recorded in a computer environment. The pre and post-test results and PAC Practice Evaluation scores were entered into the SPSS 22 program (IBM Corp. Released 2013. IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp.) Normal distribution was determined by skewness and kurtosis values. Paired t-test was used to compare differences between dependent groups.

Results

In the study, Skewness and Kurtosis values were calculated to determine the normal distribution of the data. The Skewness test result for participants' pre-test scores is 0.204, while the result for post-test scores is -0.173. The Kurtosis value for the pre-test is 0.070, and for the post-test, it is -1.190. Based on these results, it is concluded that the Skewness and Kurtosis values are between -1.5 and +1.5, indicating that the data follows a normal distribution. Therefore, parametric tests like paired t-test were used for analysis.

Table 1. Comparison of Control and Experimental Groups.

		Mean	n	sd	p
Pair 1	Control Pre-test	40.41	30	12.26	.635
	Experimental Pre-test	42.22	30	18.10	
Pair 2	Experimental Pre-test	40.9	30	19.31	.000*
	Experimental Post-test	68.68	30	10.87	
Pair 3	Control Pre-test	40.41	30	12.26	.397
	Control Post-test	39.16	30	10.73	
Pair 4	Control Post-test	39.16	30	10.73	.000
	Experimental Post-test	68.64	30	11.05	

*$p<0.01$

Table 1 presents the pre-test and post-test comparisons of the Control and Experimental groups. There was no statistically significant difference between the pre-test means of the Control and Experimental groups ($p>0.05$). Therefore, both groups had similar levels of knowledge regarding physical activity cards. A statistically significant difference was found between the pre-test and post-test results of the Experimental group ($p<0.05$). After participating in the online education about physical activity cards, the knowledge level of the Experimental group increased. However, there was no statistically significant difference between the pre-test and post-test comparisons of the Control group. Therefore, there was no change in the knowledge level of the teacher candidates who did not participate in the physical activity card education. This indicates that the prepared education influenced the knowledge level regarding physical activity cards.

Table 2. Practice test results

Participants	PAC Choice	PAC post test	General Knowledge 30 Points	Practical Knowledge 70 Points	Total
Participant 1	Kicking	80	20	70	90
Participant 2	Stop-Control	70	25	60	85
Participant 3	Rolling	75	30	55	85
Participant 4	Hitting with Racket	80	30	65	95
Participant 5	Dribbling	78	20	60	80
Participant 6	Jumping-Hopping	75	15	70	85
Participant 7	Catching	80	20	60	80
Participant 8	Tail Tag - Ball Collecting Game	70	10	60	80
Participant 9	Target Games	60	20	70	90
Participant 10	Moving Target Hitting Games	60	15	70	85

**Ten participants among the experimental group were randomly selected for this session.*

It has been found that the teacher candidates randomly selected from the experimental group showed a very good level of performance by applying the selected activity from the physical activity cards. The results of the application test are presented in Table 2.

Discussion and Conclusion

This study provides an example of implementing physical activity cards in an online environment. According to the results of the study, the ability of teacher candidates to learn and test their application of yellow PAC cards has increased. The results of this study demonstrate that teaching physical activities through remote learning is an effective method.

Many teachers have had to adopt online teaching methods due to the pandemic. The results of this study can guide the development of online teaching materials for physical education and sports teachers. Presenting learning materials online, such as yellow PAC cards, can help teachers learn more effectively.

The use of video technology in physical education has been found to be an effective instructional tool in enhancing skill execution, technique, and knowledge learning, as well as improving physical fitness levels and increasing student engagement. Palao et al. (2015) reported that the 'video and teacher feedback' condition provided the most positive overall results, although the teacher felt overwhelmed by the demands of the technology. Weir and Connor (2009) examined the use of digital video technology in providing formative and summative assessment, allowing students to set their own learning goals and evaluate their own learning. O'Loughlin et al. (2013) found that digital video can enhance motivation, feedback, and performance in skill learning in primary physical education, and Mödinger et al. (2021) reported that video-based visual feedback is effective in enhancing motor learning. Al-Haliq et al. (2013) found that using video improved physical fitness levels more than traditional

methods, and Ningthoujam (2016) highlighted the use of self-made video models as teaching and feedback tools. Nowels and Hewit (2018) showed that immediate video feedback in addition to verbal feedback from instructors improved student learning and performance, and Casey and Jones (2011) reported that video technology enhanced students' engagement in Physical Education lessons. Laughlin et al. (2019) noted that teachers are finding creative ways to provide instant motor-performance feedback using video technology, which can be easily documented for assessment purposes. In summary, video technology has the potential to improve various aspects of physical education instruction, although it may require additional support and training for teachers to effectively integrate it into their teaching practice. The integration of technology in physical education has become increasingly important in recent years. One such technology, the Video Annotation Module (VAM), has been developed to enhance blended learning in physical education (Luo & Pang, 2010). Another technology, augmented reality, has also been explored as a means of improving instruction in physical education. In fact, studies have shown that augmented reality-assisted instruction is more effective than video-assisted instruction (Chang et al., 2020).

The COVID-19 pandemic has also brought attention to the importance of video-based instruction in physical education. Prior to the pandemic, video-based instruction was not utilized as a main teaching tool in physical education (Lee & Chang, 2020). However, the pandemic has forced educators to adapt and utilize technology to continue providing quality instruction to their students, including video-based instruction.

In conclusion, this research has tested the applicability of yellow PAC cards for online teaching. It has been found that the distance learning process has a positive impact on the learning abilities of teacher candidates. Researchers suggest that this method may be applicable for other learning materials as well.

This study has increased the ability of physical education and sports teacher candidates to learn and test the application of yellow PAC cards in an online environment. This method can help physical education teachers prepare online teaching materials and contribute to the learning process of students. The distance learning process has also accelerated the process of teacher candidates turning their theoretical knowledge into practice. As a result, this research has demonstrated the effective implementation of distance learning in the field of physical education and sports.

Author Contribution

The author designed, conducted, and concluded the study

Conflict of Interest

There is no conflict of interest.

Ethical Statement

Ethical approval was obtained from the ethics committee of a higher education institution with protocol number 210036/28 before starting the research.

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An Investigation of Focused Attention Skills in Karate Athletes

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An Investigation of Focused Attention Skills in Karate Athletes

Abstract

The universe and sample group of this study, which was carried out in order to examine the focused attention skills of karate athletes, consists of 35 participants who are over 18 years old and who are active karate athletes. Within the scope of the research, the Stroop attention test was used as a data collection tool. The analysis of the data obtained from the karate players was made in the SPSS 26 program. First, the distribution of the finishing time, the number of errors and the number of error corrections obtained from the karate athletes who were applied the Stroop test were examined descriptively by looking at the skewness and kurtosis values. It has been observed that the completion times of karate athletes are normally distributed, but the number of errors and the number of correcting errors is not normally distributed. The duration of completion of the Stroop test sections of karate athletes according to gender, age and education was compared with independent sample t-test and ANOVA analysis. As a result of this research, which was carried out to examine the focused attention skills of karate athletes; The focused attention skills of female karate athletes are at a better level compared to male athletes, the completion times of the 1st, 2nd, and 5th sections of the athletes in the 18-20 age group are at a higher level than the athletes in other age groups, as the education level increases. It was concluded that the focused attention skills of the athletes also increased.

Keywords: Karate, Stroop, Attention

Karate Sporcularının Odaklanmış Dikkat Becerilerinin İncelenmesi

Özet

Karate sporcularının odaklanmış dikkat becerilerinin incelenebilmesi amacıyla gerçekleştirilen bu çalışmanın evren ve örneklem gurubu 18 yaşın üzerinde olan ve aktif olarak karate sporcusu olan 35 katılımcıdan oluşmaktadır. Araştırma kapsamında veri toplanma aracı olarak stroop dikkat testinden yararlanılmıştır. Karatecilerden elde edilen verilerin analizi SPSS 26 programında yapılmıştır. Stroop testi uygulanan karate sporcularından elde edilen bitirme süresi, hata sayısı ve hata düzeltme sayılarının öncelikle dağılımları çarpıklık basıklık değerlerine bakılarak ve betimsel olarak incelenmiştir. Karate sporcularının bölümleri bitirme sürelerinin normal dağıldığı ancak hata sayısı ve hataları düzeltme sayılarının normal dağılmadığı gözlenmiştir. Cinsiyet, yaş ve eğitime göre karate sporcularının Stroop testi bölümlerini bitirme süreleri bağımsız örneklem t testi ve ANOVA analizi ile karşılaştırılmıştır. Karate sporcularının odaklanmış dikkat becerilerinin incelenebilmesi amacıyla gerçekleştirilen bu araştırmada sonuç olarak; kadın karate sporcularının odaklanmış dikkat becerilerinin erkek sporculara oranla daha iyi düzeyde olduğu, 18-20 yaş aralığında olan sporcuların 1. Bölüm, 2. İkinci bölüm ve 5. Bölüm bitirme sürelerinin diğer yaş gruplarında yer alan sporculara oranla daha yüksek düzeyde olduğu, eğitim durumun arttıkça sporcuların odaklanmış dikkat becerilerinin de arttığı sonucuna ulaşılmıştır.

Anahtar Kelimeler: Karate, Stroop, Dikkat

Introduction

According to Mülhim (2022), karate, defined as a martial art in Japan, is an ancient combat art that incorporates both defensive and offensive movements using arms and legs. This sport discipline is categorized both as an individual sport and a combat sport. Keleş (2021) states that in combat sports, besides factors that affect motor skills, specific techniques, and tactics, it is necessary to identify the mental aspects that influence the sport discipline. It is well-known that attention plays a significant role in individual sports such as karate, taekwondo, and boxing. Especially, athletes need attention to be able to focus on the situation they are in during the competition. According to Yaycı (2013), athletes need to concentrate their attention to select and respond to a specific stimulus that is important to them among the stimuli present in their environment.

According to Yıldırım (2023), focusing on the motor skills necessary for athletes to perform their mental activities and execute the required skills in sports is among the most important factors in sports. The ability of athletes to perform the necessary skills primarily depends on their attention and concentration. Ekmekçi (2022) suggests that attention and motor skills can be developed through athletes' focus on movement.

Daniyar (2023) states that in order to demonstrate good performance in a sporting context, athletes need to consider appropriate stimuli and be cautious against stimuli that may negatively affect their performance at that moment. Maintaining adaptation to adverse factors that occur before and during competition will elevate athletic success (Daniyar, 2023).

According to Uluç and Akçakoyun (2022), athletes need to concentrate on the goal to be successful in a sporting activity. In this regard, athletes need to focus on relevant stimuli. Göktepe, Akalın, and Göktepe (2016) suggest that athletes maintaining their concentration during competition positively impacts their performance.

Attention is related to the organism's ability to adapt to specific stimuli. According to Duman (2016), sports contribute not only to the individual's basic motor skills but also to mental skills such as memory, cognition, and attention. Karakulaklı (2017) states that attention, which involves the concentration of thought power at a specific point, allows individuals to filter out certain perceived stimuli. According to Güven (2014), combat sports require a high level of attention skills. Additionally, Uluç and Akçakoyun (2022) suggest that athletes with high levels of focused attention skills also have high performance in sports. Based on these points, it is assumed that karate athletes will have high levels of focused attention skills.

Method

Research Model/Design

The study examining the focused attention skills of karate athletes was conducted using a survey model. This research design, which allows the depiction of a situation as it existed in the past, is referred to as a survey model according to Karasar (2012).

Study Group

This study was conducted with karate athletes residing in Çanakkale province. The population and sample group of the study consisted of 35 participants who were above 18 years old and actively engaged in karate. The relevant data for the research were collected by the researcher from karate athletes training in karate dojos in the city center of Çanakkale.

Data Collection Instruments

In this research aimed at examining the focused attention skills of karate athletes, in addition to variables such as gender, age, and educational background, the Stroop attention test was used as the data collection tool. The Stroop Test is a test that measures an individual's ability to manage attention and demonstrates the difference between automatic and controlled responses. It provides information about cognitive processes such as selective attention, focused attention, response inhibition, impulse control, and information processing speed (Golden, 2002; Şahin, 2023). The Turkish validity and reliability studies of the Stroop Test, introduced by Stroop (1935), were conducted by Karakaş et al. (1999).

1. The Stroop attention test, consisting of 5 cards and 5 sections, includes the following:
2. The first section involves reading the names of colors printed in black.
3. The second section involves reading the names of colors printed in colored ink.
4. The third section involves naming the shapes on the paper.
5. The fourth section involves naming the colors of words printed in colored ink.
6. The fifth section involves naming the colors of words printed in colored ink.

Data Analysis

The analysis of the research data was conducted using the SPSS 26 program. The distributions of completion time, error count, and error correction count obtained from the karate athletes who underwent the Stroop test were examined initially in terms of skewness and kurtosis values and descriptively. It was observed that the completion times of the karate athletes in

the Stroop test sections were normally distributed, but the error counts and error correction counts were not normally distributed.

The completion times of the Stroop test sections for karate athletes were compared based on gender, age, and education using independent samples t-test and ANOVA analysis. The error counts and error correction counts were compared using the Mann-Whitney U test and Kruskal-Walli's test. The comparisons for error counts and error correction counts were not presented in table format, but the results were included in the findings.

Results

Table 1. The demographic information of Karate athletes

		f	%
Gender	Male	20	57,1
	Female	15	42,9
Age	18-20 years	6	17,1
	21-24 years	13	37,1
	25 years and over	16	45,7
Education	High School	7	20,0
	Associate Degree	6	17,1
	Undergraduate	22	62,9
	Total	**35**	**100,0**

In Çanakkale province, a total of 20 (57.1%) male and 15 (42.9%) female athletes from karate dojos participated in the research. Among these athletes, 45.7% were aged 25 and above, 37.1% were in the age range of 21-24, and 17.1% were in the age range of 18-20. Regarding their educational background, 62.9% of the athletes had a bachelor's degree, 20% had a high school diploma, and 17.1% had an associate degree.

Table 2. Comparison of completion times for test sections based on gender among Karate athletes

Completion Times for Test Sections (seconds)	Gender	N	Mean	Sd	t	p
Section 1	Male	20	8,10	1,47	1,75	0,08
	Female	15	7,25	1,31		
Section 2	Male	20	8,68	1,97	2,71	0,01
	Female	15	7,12	1,18		
Section 3	Male	20	11,39	1,93	3,05	0,00
	Female	15	9,44	1,77		
Section 4	Male	20	13,16	1,88	1,88	0,06
	Female	15	11,92	2,01		
Section 5	Male	20	22,69	3,88	7,83	0,00
	Female	15	15,34	1,38		

Table 2 presents the comparison of completion times for test sections based on gender among karate athletes. Independent samples t-test was conducted to examine the differences in completion times for Stroop test sections by gender. The results of this test indicated no

significant difference in completion times for the 1st and 4th sections of the Stroop test based on gender ($p>0.05$). However, there were significant differences in completion times for the 2nd, 3rd, and 5th sections of the Stroop test based on gender ($p<0.05$). Further analysis revealed that female karate athletes had shorter completion times in the 2nd section (7.12 seconds) compared to male karate athletes (8.68 seconds). Similarly, female karate athletes had shorter completion times in the 3rd section (9.44 seconds) compared to male karate athletes (11.39 seconds). Moreover, female karate athletes had shorter completion times in the 5th section (22.69 seconds) compared to male karate athletes (15.34 seconds).

The Mann-Whitney U test was performed to examine the differences in error and error correction counts across sections by gender. The results showed no significant differences in error and error correction counts for the 1st to 4th sections ($p>0.05$). However, there was a significant difference in the 5th section ($p<0.05$). Female karate athletes had lower error counts (1.07) in the 5th section compared to males (2.45). Additionally, female karate athletes had lower error correction counts (1.07) in the 5th section compared to males (2.30).

Table 3. Comparison of completion times for test sections based on the ages of Karate athletes

Completion Times for Test Sections (seconds)	Age	N	Mean	SD	F	p	Diff.
Section 1	18-20 years[1]	6	9,44	1,57	9,43	0,00	1>2,3
	21-24 years [2]	13	6,90	0,97			
	25 years and over[3]	16	7,78	1,19			
Section 2	18-20 years[1]	6	10,06	2,21	7,53	0,00	1>2,3
	21-24 years [2]	13	7,08	1,42			
	25 years and over[3]	16	8,00	1,38			
Section 3	18-20 years[1]	6	12,25	1,42	2,70	0,08	-
	21-24 years [2]	13	10,36	2,08			
	25 years and over[3]	16	10,07	2,07			
Section 4	18-20 years[1]	6	14,34	0,75	2,97	0,06	-
	21-24 years [2]	13	12,17	2,33			
	25 years and over[3]	16	12,37	1,78			
Section 5	18-20 years[1]	6	24,19	5,62	4,11	0,02	1>2,3
	21-24 years [2]	13	18,89	4,88			
	25 years and over[3]	16	18,32	3,40			

In Table 3, the completion times of the Stroop test sections were compared using ANOVA based on the ages of the karate athletes. According to the results of this test, no significant difference was found in the completion times of the 3rd and 4th sections of the Stroop test based on the ages of the karate athletes ($p>0.05$). However, differences were observed in the completion times of the 1st, 2nd, and 5th sections of the Stroop test based on age ($p<0.05$). According to the multiple comparisons conducted using the Bonferroni test, the completion times of the 1st, 2nd, and 5th sections were found to be higher for athletes aged 18-20 compared

to athletes in other age groups. When the number of errors and error corrections made by the athletes in the sections were examined according to their ages using the Kruskal-Wallis test, no significant difference was found (p>0.05).

Table 4. Comparison of completion times of sections based on the educational backgrounds of Karate athletes

Completion Times for Test Sections (seconds)	Education	N	Mean	Sd	F	p	Diff.
Section 1	High School[1]	7	8,89	1,74	3,55	0,04	1>2
	Associate Degree[2]	6	7,01	0,85			
	Undergraduate[3]	22	7,56	1,32			
Section 2	High School[1]	7	9,65	2,30	5,51	0,00	1>2,3
	Associate Degree[2]	6	6,70	0,64			
	Undergraduate[3]	22	7,85	1,55			
Section 3	High School[1]	7	11,81	1,31	1,71	0,19	-
	Associate Degree[2]	6	10,51	2,37			
	Undergraduate[3]	22	10,16	2,31			
Section 4	High School[1]	7	14,53	0,67	5,00	0,01	1>2,3
	Associate Degree[2]	6	11,79	1,04			
	Undergraduate[3]	22	12,26	2,14			
Section 5	High School[1]	7	22,57	3,19	1,94	0,15	-
	Associate Degree[2]	6	19,49	5,45			
	Undergraduate[3]	22	18,59	4,79			

The completion times of the Stroop test sections were compared using ANOVA based on the educational backgrounds of karate athletes in Table 4. According to the results of this test, no significant difference was found in the completion times of the 3rd and 5th sections of the Stroop test based on the athletes' educational backgrounds (p>0.05). However, differences were observed in the completion times of the 1st, 2nd, and 4th sections of the Stroop test based on their educational backgrounds (p<0.05). According to the multiple comparisons conducted using the Bonferroni test, the completion times of the 1st section were higher for karate athletes with a high school education (8.89) compared to those with an associate degree (7.01). The completion times of the 2nd and 5th sections were higher for karate athletes with a high school education compared to those with an associate or bachelor's degree.

When the number of errors and error corrections made by the athletes in the sections were examined based on their educational backgrounds using the Kruskal-Wallis test, no significant difference was found (p>0.05).

Discussion

Attention includes the processes of filtering what we perceive, balancing our various perceptions and adding emotional importance to these perceptions (Daniyar, 2023). The ability

to control thought processes and concentrate on a task is a key element for effective performance in sport (Nideffer 1993). When the related literature is examined, the effect of sports on attention has been revealed in studies conducted in many different sports branches (Yolgözteren, 2006). When the literature on attention was examined, it was seen that the sample groups of the studies consisted of child participants. In this context, it is thought that this research will contribute to the field of sports sciences.

Karate is among the defense sports in which punching, kicking and knocking the opponent down techniques are applied. In this sport branch, especially during the competition, the athlete should select and react to the relevant stimulus at the right time. The reaction given at the right time and in the right place will allow the athlete to be successful during the struggle. In this context, it is thought that attention has a very important place in combat sports such as karate.

The population and sample group of this study, which was conducted with karate athletes residing in Çanakkale province, consisted of 35 participants who were over the age of 18 and actively participated in karate. Stroop attention test was used to examine the focused attention skills of the karate athletes in the study. This test was developed by Stroop (1935) and Turkish validity and reliability studies were conducted by Karakaş et al. In this study conducted with karate athletes, the focused attention skills of the athletes were examined according to the gender variable, and it was found that the second and third section completion times of female athletes in the stroop attention test were lower than male athletes. Keleş (2021), who examined the attention skills of taekwondo athletes, found that the attention scores of taekwondo athletes did not differ according to gender variable. Similar to the result obtained by Keleş (2021), in the study conducted by Çağlar and Koruç (2006), the attention levels of the participants were examined according to the gender variable and no significant difference was found between these two variables. Üngür (2013) did not find statistically significant differences between female athletes and male athletes when the number of correct answers given at the stage of color-word mismatch in the Stroop Test and the average answering speed were compared according to gender. The results obtained by the researchers are not similar to the findings of the present study.

In 2021, in another study involving fencing, handball and volleyball athletes, it was observed that female athletes had better attention test values than male athletes (Sürek, 2021). Similarly, in this study conducted with karate athletes, it was found that the attention levels of female athletes were better than male athletes. Akbaş (2021), who examined the focused attention skills of female soccer players with the stroop attention test, found that the section completion times

of female soccer players increased from Section 1 to Section 5. The current research finding reached by Akbaş (2021) is in parallel with this study conducted with karate athletes.

In this study, in which the focused attention skills of karate athletes were examined according to the age variable; it was found that the completion times of Section 1, Section 2 and Section 5 of the athletes in the 18-20 age range were higher than the other age groups. The current research finding shows that as the age of karate athletes increases, their attention skills improve accordingly. Uluç and Akçakoyun (2022), who examined the focused attention skills of elite level bocce and darts athletes according to the age variable, could not detect a significant difference between these two variables. The results of Uluç and Akçakoyun (2022) are not similar to the findings of the current study. The main reason for this situation is thought to be the difference in the population and sample groups of the studies.

Akın (2016), who examined the focused attention skills of basketball players with the stroop attention test, found that the number of errors and the number of error corrections in the stroop attention test of basketball players increased from Section 1 to Section 5. The number of errors and error corrections of karate athletes who participated in the current study were examined according to gender, age and educational status and it was determined that there was no significant difference between these variables. In this context, the current research finding is not in line with the results obtained by Akın (2016).

Within the scope of the study, the focused attention skills of karate athletes were examined according to the educational status variable, and it was found that the time to finish the first section of the athletes with high school education was higher than the karate athletes with associate degree education. This finding obtained from the current research indicates that as the education level of karate athletes increases, their focused attention skills increase accordingly.

In this research, which was carried out in order to examine the focused attention skills of karate athletes; In this research, which was carried out in order to examine the focused attention skills of karate athletes; it was found that the focused attention skills of female karate athletes were at a better level compared to male athletes, and that the completion times of the 1st section, 2nd second section and 5th section of the athletes in the 18-20 age range were higher than the athletes in other age groups.

Akın (2016), who examined the focused attention skills of basketball players with the stroop attention test, found that the number of errors and error correction numbers in the stroop attention test of basketball players increased from Section 1 to Section 5. The number of errors

and error corrections of karate athletes who participated in the current study were examined according to gender, age and educational status and it was determined that there was no significant difference between these variables. In this context, the current research finding is not in line with the results obtained by Akın (2016).

Within the scope of the study, the focused attention skills of karate athletes were examined according to the educational status variable, and it was found that the time to finish the first section of the athletes with high school education was higher than the karate athletes with associate degree education. This finding obtained from the current research indicates that as the education level of karate athletes increases, their focused attention skills increase accordingly.

Conclusion

In this research, which was carried out in order to examine the focused attention skills of karate athletes; In this research, which was carried out in order to examine the focused attention skills of karate athletes; It was concluded that the focused attention skills of female karate athletes were at a better level compared to male athletes, the completion times of the 1st section, 2nd second section and 5th section of the athletes in the 18-20 age range were at a higher level compared to the athletes in other age groups, and the focused attention skills of the athletes increased as the educational level increased.

Suggestions

When the literature on the Stroop attention test was examined, it was seen that the population and sample groups of the studies using the Stroop attention test consisted mostly of child participants. In this context, it is suggested that especially academicians who conduct research in the field of sports sciences should examine the focused attention skills of athletes competing in different sports branches.

Author Contribution

Aksoy, S. (Conceptual framework, Data Collection), Öazdayı, N (Conceptual framework,Data Analysis).

Conflict of Interest

All authors must declare that there is no conflict of interest.

Ethical Statement

Ethical review was provided by the institutional review board.

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Coping with stress and self-confidence in athletes: A review

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Coping With Stress and Self-Confidence in Athletes: Review

Abstract

Due to the rapidly changing and developing living conditions, it is inevitable for a social being to react differently when the physical and spiritual limits of the human being are challenged and to try to adapt to these changes. The concept of stress is one of the psychological concepts that society learns quickly. Stress, which is an important part of daily life, arises as a result of the individual's reaction to events arising from his environment. The concept of stress, which was not very common in the past centuries, has become one of the words we use frequently in our daily lives, these days when living standards have increased compared to the last century and people are more knowledgeable and richer. The ability to cope with stress in athletes is a factor that greatly affects their sports performance. Self-confidence is one of the main characteristics of personality and is an important factor affecting the behavior of the individual. On the other hand, Self-confidence is the ability of an athlete to believe that he is mentally and physically sufficient. An athlete who does not trust himself and does not believe in his abilities cannot reflect his potential to his performance. While self-confidence represents being able to do the target behavior, trying, responsibility, pleasure, and enthusiasm, not self-confidence brings with it fear, worry, anxiety and pain. Self-confidence is a feature that can be differentiated with the effect of variables such as family, environment, and school, which are shaped as the individual gets older. In short, self-confidence is not an innate feature, it has a dynamic compilation structure. Self-confidence is also an interesting factor in athletes because it does not allow the success of athletes to be negatively affected. In the light of this information, coping with stress and self-confidence in athletes are presented in this review.

Keywords: Self-Confidence, Sports Self-Confidence, Stress, Coping with stress

Sporcularda Stresle Başa Çıkma ve Özgüven: Derleme

Özet

Hızla değişen ve gelişen yaşam koşulları nedeniyle, bir sosyal varlığın, insanın fiziksel ve ruhsal sınırlarının zorlanıp tehdidi ile farklı tepki göstermesi ve bu değişikliklere uyum sağlamaya çalışması kaçınılmazdır. Stres kavramı, toplumun hızlıca öğrendiği psikolojik kavramlardan bir tanesidir. Günlük yaşamın önemli bir parçası olan stres, bireyin çevresinden kaynaklanan olaylara tepkisinin bir sonucu olarak ortaya çıkmaktadır. Yaşam standartlarının geçtiğimiz yüzyıla göre arttığı ve insanların daha bilgili ve daha zengin olduğu bu günlerde, geçmiş yüzyıllarda çok yaygın olmayan stres kavramı günlük yaşamımızda sık kullandığımız kelimelerden biri haline gelmiştir. Sporcularda da stresle başa çıkabilme spor performanslarını oldukça etkileyen bir faktördür. Özgüven, kişiliğin temel özelliklerinden biridir ve bireyin davranışlarını etkileyen önemli bir faktördür. Diğer yandan; özgüven, sporcu bireyin kendini zihinsel ve fiziksel yönden yeterli olduğuna inandırabilmesidir. Kendine güvenmeyen, yeteneklerine inanmayan sporcu birey sahip olduğu potansiyeli performansına yansıtamaz. Kendine güven, hedef davranışı yapabilmeyi, denemeyi, sorumluluğu, hazzı ve coşkuyu temsil ederken, kendine güvenmemek ise korku, edişe, kaygı ve acıyı da beraberinde getirmektedir. Özgüven, bireyin yaş aldıkça şekillenen aile, çevre ve okul gibi değişkenlerin etkisiyle farklılaşabilen bir özelliktir. Kısaca özgüven doğuştan kazanılan bir özellik değil dinamik derleme de bir yapıya sahiptir. Özgüven sporcu bireylerde de ilginç bir etken olarak yer alır çünkü sporcuların başarımlarının olumsuz yönde etkilenmesine müsaade etmez. Bu bilgiler ışında sporcularda stresle başa çıkma ve Özgüven bu derlemede sunulmuştur.

Anahtar Kelimeler: Özgüven, Sportif Özgüven, Stres, Stresle

Introduction

The level of athletic self-confidence in athletes is one of the most important factors that indirectly affects sports performance, the functionality of sports, and the diversity of emotions and thoughts in the athletic context. Confident individuals tend to be more capable of completing assigned tasks and overcoming obstacles than others. They also use cognitive resources required for athletic success more effectively (Hays et al., 2009). On the other hand, individuals with low self-confidence, regardless of their success in dealing with daily life problems, do not believe that they have the power and belief to cope with these problems. These individuals do not engage in love-based relationships with others due to fear of rejection and not being valued, and constantly feel dependent on others (Soner, 2013).

To increase an individual's level of self-confidence in the athletic context, they must become familiar with their surroundings, communicate with different people, maintain personal control, and motivate themselves with calm behavior (Sevim, 1997). Athletes who do not have enough confidence in themselves to achieve athletic success experience difficulties in transforming their existing abilities into performance due to fear, anxiety, and pain (Biçer, 2018). If athletes are aware of their abilities within environmental conditions and have enough confidence in themselves, their level of athletic success will inevitably become a certain truth that rises in the same proportion (Thomas et al., 2011). Stress, an important part of daily life, arises as a result of an individual's reaction to events from their environment. In these days when living standards have increased compared to the past century and people are more knowledgeable and wealthier, the concept of stress, which was not very common in previous centuries, has become one of the words we use frequently in our daily lives (Tarhan, 2014).

According to Yıldırım (1991), stress is defined as a situation that arises from the organism's perception and the physical and mental boundaries that emerge against any situation or event. Stress is described as negative psychological reactions that disturb the emotional and psychological happiness of individuals. This means the body's response to an uncomfortable situation. Aggression is a hostile behavior aimed at intentionally causing harm, insult or domination over a normal person or rival (Bayram, 2012). In other words, it is the collection of violent and hate-filled behaviors that a person performs to cause physical or mental harm to their opponent. It is actions that cause suffering and material losses to the person, directly or indirectly (Şahin, 2003). Both physical strength and psychological resilience are important in all sports. The relationship between these factors is especially important in individuals who participate in sports on the road to success. It is seen that individuals who engage in sports have

high levels of self-confidence and high success rates. In addition, one of the benefits of sports is that it is effective in releasing negative behaviors such as irritability, tension, and aggression that can accumulate in individuals and prevent these behaviors from becoming harmful. As a result, exercising is a factor that enables individuals to be physically and mentally healthy, live in harmony with their surroundings, and achieve success in life (Şeker, 2020).

Method

Conceptual Framework

Concept of Stress

The word "stress" in Turkish language carries meanings such as pressure, tension, strain, hardship, and agony. It originates from the Latin word "Estrica" and the Old French word "Estrece". Over the years, the word "stress" has been used with different meanings. In the 17th century, it meant words such as disaster, trouble, calamity, affliction, and grief, while in the 18th and 19th centuries, it was used for words that meant pressure, difficulty, and hardship related to an individual, object, or mental structures. When considering translations made in the Turkish language, it can be understood that it mostly carries meanings of "loading and straining". Stress can also be used as resistance against pressure, difficulty, or force applied to an individual or object (Baltaş and Baltaş, 2002).

Stress occurs to adapt the body's response to any kind of external stimuli without looking at the result for the individual (Allen, 2003). In other words, it refers to the effort shown by the body and psychological elements to use all the available resources and sometimes even exceed the possibilities to cope with the events that occur in the physical or social framework that an individual encounters, especially in negative or incompatible positions (Cüceloğlu, 1994).Lazarus and Folkman (1984) stated that the occurrence of stress is a result of an individual's physical and mental limits being pushed. In other words, stress is defined as an interaction between an individual and their environment that threatens the individual's positive mental state, exceeds their limits, and diminishes their capacity. Two conditions are necessary for the occurrence of stress factors. The first condition is that the individual must interact with their environment. The second condition is that the individual must identify the events and people around them as sources of stress after the interaction. However, if the individual does not view events and people around them as sources of stress, it does not mean that there is no stress (Çakır, 2006).

The term "stress response process" (SRP) refers to the general definition that describes the reaction created by a real, imaginary, or symbolic stimulus that threatens an individual's life. In this case, the body produces a physical reaction to reduce the effects of the stress that the individual is experiencing. The body's response to stress aims to restore homeostasis, the body's balance, and to adapt to the new situation (Kılıç and Esel, 2002). The most critical point in the occurrence of stress factors is the relationship and interaction between the individual and the situation they are facing (Baltaş and Baltaş, 1990).

Selye's General Adaptation Syndrome (GAS) is a three-dimensional response that individuals give to stressful situations. The stages are the alarm phase, the resistance phase, and the exhaustion phase. The alarm phase activates the autonomic nervous system and sends signals to the glands, initiating the release of adrenaline and noradrenaline into the bloodstream. The resistance phase continues with the maintenance of high levels of adrenaline and noradrenaline in the blood. The final phase is the exhaustion phase, where the organism, which is constantly on alert, collapses as a result of excessive use of energy reserves (Tiryaki, 2000; Arsan, 2007). An increase in anxiety levels does not require the existence of a visible object or situation (Arsan, 2007). One of the most critical features of stress is that it is manageable and controllable. This allows individuals to take action (Durna, 2006).

Coping with Stress

When coping with stress, it is interpreted as a constantly changing cognitive and behavioral effort that regulates the capacity the individual uses, considering the situation that exceeds the individual's available resources (Lazarus and Folkman, 1984). Coping encompasses a dynamic and continuous process related to internal (beliefs, values, goals) and external (situational) conditions (Lazarus, 2000). Coping with stress involves behaviors that affect person-environment interactions, motivated by the desire to regulate emotions that will be carried into the past, present, or future (Thompson, Toner, Perry, Burke, and Nicholls, 2020). In the BMI theory, which defines stress as arising from person-environment interactions, coping with stress, which encompasses cognitive and behavioral efforts to manage stress, also plays an important role (Lazarus, 2000).

Roth and Cohen (1986) examined coping techniques under two headings: approach and avoidance. In the approach-oriented coping technique, the individual engages in behaviors to manage the situation when under stress. In the avoidance-oriented coping technique, the focus is on the effect of stress on the individual, and the individual controls their behavior to avoid the impact of the stressful event (Roth and Cohen, 1986). Lazarus (2000) expressed coping with

stress as cognitive and behavioral efforts related to managing and regulating emotions and categorized coping techniques into three subheadings: problem-focused, emotion-focused, and avoidance-focused. Problem-focused coping technique is the behavior used to render the stress-causing event ineffective or reduce its effects. It is a problem-focused coping technique to determine how to deal with situations that cause stress or plan how to eliminate the stress-causing event. For example, an athlete tries to increase their skill capacity to cope with the fear of losing to their opponent (Robazza, 2006). Emotion-focused coping technique encompasses behaviors that focus on gaining control over the emotions and thoughts caused by the stressful event. To gain control over stressful events, it is a coping technique that reduces the emotions caused by stressful situations in individuals. For example, an athlete uses techniques such as emotion regulation or cognitive reappraisal to change their thoughts about the importance of competitions (Robazza, 2006). Avoidance-focused coping technique is the behavior of trying to distract oneself from the situation that causes stress while in it. This type of coping technique can lead to behaviors such as denial and substance use (Gaudreau and Blondin, 2002).

There is a debate whether coping techniques for dealing with stress are constantly present or situation specific (Gaudreau and Blondin, 2002). From a different perspective, coping techniques are said to be relatively stable in individuals (Anshel et al., 2001). This suggests that the types of behavior that an individual exhibits in stressful situations are constant. However, Lazarus and Folkman (1984) argue that the reactions or coping techniques displayed in stressful situations may vary depending on the situation. When evaluating these different approaches, it is important to distinguish between coping techniques and coping strategies for dealing with stress (Anshel et al., 2001). Coping styles are a constant structure that shapes an individual's responses to similar situations. Coping strategies, on the other hand, are not a constant structure and are specific to situations perceived as stressful, containing behavioral and cognitive actions related to stress-inducing situations (Anshel et al., 2001).Türküm (2002) developed a stress coping scale and identified coping strategies as social support seeking, problem-focused coping, and avoidance coping. Additionally, Senol-Durak, Durak, and Elagöz (2011) adapted a stress coping strategies scale and identified coping strategies as planned problem solving, self-distraction, social support seeking, avoidance, acceptance of responsibility, fatalism, and belief in supernatural powers - superstitions. These studies, which can be evaluated under the heading of coping strategies, distinguish between coping strategies used in adult samples in Turkey (Türküm, 2002; Senol-Durak et al., 2011).

The phenomenon of coping with stress is one of the common topics in sports. Sports competitions consist of activities that contain stress, which test the individual's physical and psychological abilities, and coping with stress is crucial for athletes to manage their psychological reactions while being in a stressful situation (Cerin et al., 2000; Nicholls and Polman, 2007). Gaudreau and Blondin (2002) conducted research on coping with stress in the sports field and found that the coping strategies identified for this area did not include the stress responses experienced by athletes. They developed a scale to evaluate coping strategies for stress in sports. The coping strategies they described for sports include task-oriented coping, such as thought control, visualization, relaxation, effort, mental analysis, and seeking support; withdrawal-oriented coping, such as expressing unpleasant emotions and social withdrawal; and distraction-oriented coping, such as mental confusion and withdrawal, which were categorized under three main headings (Gaudreau and Blondin, 2002).

Thought control: The path that an individual draws to transfer their thoughts positively towards a stressful situation that has been experienced or will be experienced.

Mental imagery: The path that an individual draws to mentally rehearse tactical, technical, or mental conditions for a stressful situation that has been experienced or will be experienced.

Relaxation: The position that an individual finds to get out of physiological, muscular, or mental tension.

Effort expenditure: The path that an individual draws to directly control a stressful situation by utilizing their physical and mental capabilities.

Logical analysis: The effort that an individual puts into evaluating or defining internal or external factors that would be effective for a stressful situation that has been experienced or will be experienced.

Seeking support: Behavioral action that involves seeking advice, feedback, emotional support, or external assistance.

Venting of unpleasant emotion: The path that an individual draws to reflect or attempt to express negative emotions they feel towards stressful situations that they have experienced.

Social withdrawal: The path that an individual draws to stay away from social interaction for a while.

Mental distraction: The path that an individual draws to intentionally focus their attention on unrelated or irrelevant topics to their sporting achievements.

Disengagement/resignation: The path that an individual draws to avoid the actions that need to be taken to achieve performance goals.

Gaudreau and Blondin (2002) proposed coping strategies for dealing with stress, and adaptations for Turkish athletes were made by Arsan and Koruç (2009) based on their work.

Coping with Stress in Sports

Stress is inherent in sports. The level of importance of upcoming competitions, the reactions of coaches, the reactions that may come with failure, and the decisions made by competition referees are some of the stressors. Psychological changes caused by stress can have a physiological effect on individuals. Increased heart rate, sweating, and breathing problems can cause athletes to tire more quickly. Additionally, the ability of the athlete to make judgments decreases and problems may arise in planning (Alderman 1974, Hardy et al. 1996, Çetin 2009).

Stress limits the potential of individuals to perform their best, so coping techniques are aimed at minimizing stress and maximizing athletes' performance, as well as promoting a healthy lifestyle before and after competition (Anshel and Anderson 2002).

Reactions to stress vary from person to person. The methods that athletes use to cope with stress vary depending on the type of reaction to stress. Coping techniques minimize the damage to athletes' physical and psychological conditions and their performance during competitions. In case of injury, these techniques allow for a more comfortable and faster rehabilitation process (Michelle 2007).

Stress management techniques that focus on the problem often provide benefits when the source of stress is perceived. These practices plan to overcome stress more directly than emotion-focused techniques. Problem-centered strategies are active and put into action as soon as possible. They aim to prevent athletes from experiencing negative situations. For example, athletes may contact their psychologist or coach to deal with inconsistent ideas they may have during competitions and to approach them within a logical framework in order to prevent failures (Konter 1996, Kimball and Freysinger 2003).

Compared to problem-focused stress management methods, it is seen that emotion-focused stress management follows a more detailed path. It is generally more beneficial in negative events. These plans are passive and try to prevent individuals who exercise from carrying psychological wounds after negative events. By looking at the negative situations from a brighter perspective, they can add positives for athletes in future competitions. For example, a competitor who has lost a race can find a source of motivation by thinking that he/she will

achieve better results in the upcoming matches by using the experiences gained after the match, or he/she can focus on their thoughts differently during the competition and succeed in getting rid of or minimizing stressors (such as scoreboards, decisions made by referees, the opponent athlete or athletes) in front of them (Crocker and Graham 1995, Konter 1996, Michelle 2007).

Self-confidence

Ekinci (2013) defines self-confidence as strengthening one's self-esteem in a desired and constructive way by identifying their strengths and weaknesses in dealing with problems that arise throughout their life.

Self-confidence is expressed as the confidence and belief one has in oneself by understanding their own judgment, thoughts, and abilities, without being influenced by negative situations and criticism that have happened in the past (Carter, 2020). Generally, the concept of self-confidence is described as an individual's ability to control their self-esteem and abilities, value themselves, and stand up for their own feelings based on the reinforcement of positive emotions (Kukulu et al., 2013). Self-confidence is generally considered as a specific concept for certain tasks. It is strengthened by the individual's belief and mastery of themselves (Pasaribu, 2011). Confidence is related to how a person sees themselves, how they think, evaluate, and finally, how confident they are in themselves. Self-confidence involves knowledge, experience, discipline, and effort. The more positive feelings an individual has about themselves, the happier and more successful they can be with that positivity (Pettinelli, 2012; Can, 2019).

Self-confidence is an emotional quality expressed as the psychological necessity of basic experiences that make an individual feel valuable enough (Lindenfield, 2004). All individuals need the approval and admiration of others. This need can be divided into two groups. The first group is to be a character and personality that other people will trust as a strong, successful, and capable person. The second group consists of needs such as being important, being appreciated, and being respected (Kasatura, 1998).

If an individual can establish dominance and experience the feeling of control in their own world, they will begin to gain self-confidence. As a result of this dominance, the individual begins to perform internal and external controls in their world. These controls can create positive or negative reflections in the individual's world. The point to remember is that life requires struggle. The individual must confront all the negative situations in their life, accept all aspects of their experiences, and fight to build a happy, peaceful, and successful future (Göknar, 2007).

Terms Related to Self-Confidence

To fully understand the concept of self-confidence, it is necessary to also know and understand the concepts of self-esteem and self-efficacy (Kaya and Taştan, 2020).

Self (Ego)

Self is the dynamic process that forms according to the way a person perceives their world and experiences. As the individual grows and develops, they begin to discover their self-awareness and find their place and role in society by interacting with their environment. To create the concept of self-confidence, there must be communication and respect between parents and children, and the individual must have developed a sufficient level of self-esteem. If the family supports the child's ideas within the framework of respect, the child begins to cultivate positive thoughts about themselves and tries to understand their self. Therefore, the self-factor takes shape in the individual depending on how other individuals perceive and evaluate them. In summary, we can define the act of evaluating oneself as "self" (Kasatura, 1998; Kurtuldu, 2007).Although the self-factor is expressed as a concept that takes on a confident state after the individual gains achievements (Sheldrake, 2016a), this concept is formed by combining the individual's values, goals, and ideals. The essence of the self-concept is not shaped by the process of how others perceive the individual and how they form their perceptions, but rather by the individual's feeling of self-worth (Sheldrake, 2016b; Özoğlu, 2019). The self is formed and molded within the bodily, psychological, and social process. As the process continues in a healthy manner, individuals create their own balanced personalities (Kaya and Taştan, 2020).

Self-esteem (Self-Respect)

The concept of self-esteem is expressed as an individual's approach to their own set of values and qualities with respect. This phenomenon arises from the individual's evaluation and appreciation of themselves. Self-esteem is not one of the innate qualities an individual possesses. It develops as a result of the individual's interactions with their environment and family. To gain high self-esteem, the individual must have control over their emotions related to themselves. A person with high self-esteem stands out with their physical and mental resilience, enjoys their own choices, has immunity to stress, is confident, and avoids conflicts in their lives (Bojanic et al., 2019).Self-esteem, which is a part of the emotional dimension of the concept of self, is related to the individual's ability to recognize themselves as well as their ability to judge their emotions related to who they are (Yıldız, 2006). An individual may feel lacking in their sense of self, may compare themselves to others, or may think they are perfect.

However, it is not necessary for an individual to have exceptional abilities or be different from others in order to have self-love. Within the general framework of self-esteem, it is important for the individual to see themselves as they are. Individuals with high self-esteem see themselves as valuable and useful for their societies and as individuals worthy of love and respect (Yörükoğlu, 2007).

Self-esteem is the desire of a person to be happy with themselves. A person with high self-esteem carries qualities of being loving, peaceful with their surroundings, and capable of feeling their abilities. The level of a person's ability to feel their love and skills will be a factor that affects every aspect of their future life (BalkışBaymur1994). Some researchers have emphasized the critical importance of the evaluation of an individual's characteristics by other people in terms of self-esteem, and have emphasized that it is necessary for the individual to find their role and value in the society they are a part of. People who are valued in society reflect the qualities of a person with high self-esteem through their achievements, confidence, ability to fulfill their given missions, and ability to achieve their self-determined goals (Kelecsenyi, 2018).

Self-efficacy

Self-efficacy refers to the belief that an individual has in their ability to successfully complete the missions they undertake and achieve their future goals (Sheldrake, 2016b). Self-efficacy, which becomes the predictor of an individual's behavior, is expressed as the belief in their ability to plan the tasks they begin. Self-efficacy does not depend on being capable of carrying out the action plans required to achieve results, but rather on the individual's sense of accomplishment and confidence. This fact is valued by gaining experience from difficult situations that may be encountered when an action is organized in a planned manner. An individual with a high level of self-efficacy, in the event of failure of the action plan implemented, will seek the problem in their methods and strategies rather than in themselves (Dzewaltowski et al., 2007; Yıldırım and İlhan, 2010).

One of the fundamental qualities of individuals who have a predetermined level of self-efficacy is that they know themselves quite well. They are aware of their strengths and weaknesses and act consciously on whether or not to take action. They are constantly striving to improve themselves and to show their peak performance. These individuals are satisfied and fulfilled only by the effort and struggle they put forth on the road to success, as they achieve more success in every situation they face. Individuals with a low level of self-efficacy, on the other hand, are inclined to give up in the face of the first difficult situation they encounter and do not

want to make an effort. The main reasons that cause anxiety, mistakes, and psychological pressure in these individuals are the most formidable enemies of these individuals, as they show resistance against external forces (Özkan, 2019).

Types of Self-Confidence

There are two different dimensions in which self-confidence is examined: internal self-confidence and external self-confidence. Internal self-confidence is related to individuals being at peace with themselves and reflecting their feelings and thoughts that they have identified with themselves. External self-confidence, on the other hand, is expressed as the external expression of internal self-confidence. That is, it is the ability of an individual to reflect their feelings and thoughts that they are satisfied, positive, and confident with to their surroundings (Akagündüz, 2006). Lindenfield (2004) has categorized the qualities of internal self-confidence under four subheadings: self-knowledge, self-love, setting clear goals, and positive thinking ability. Individuals who know themselves create their own value judgments, recognize their strengths and weaknesses, and benefit from criticisms and feedback. Individuals with high communication skills, who have developed themselves, do not hesitate to be part of the society and can express their opinions fluently. Additionally, individuals who can express themselves well are the ones who can best demonstrate their physical and self-worth values. Moreover, these individuals successfully fight all negative emotions such as jealousy, anger, disappointment, fear, and anxiety with the confidence they have in themselves.

Sports Confidence

Believing that they possess the potential, physical and mental abilities necessary to achieve success, reflects sports confidence in individual athletes. Therefore, athletes with high levels of confidence are successful people who try to think positively, control their anxiety levels, try to maintain their composure even when stressed, and remain loyal to their goals (Ekinci et al., 2014).

According to studies conducted on the confidence phenomenon, which is quite common in sports, researchers have believed that confident individuals have the physical and mental qualities to put forward the potential required to achieve the concept of success, even more importantly, the concept of success itself (Yıldırım, 2013). Jones and Swain (1995) have determined that athletes with high levels of confidence have a harder time worrying than other athletes and can also more easily focus on positive thoughts. It is stated that the confidence

factor supports and contributes to the effort, desire and continuity qualities of athletes (Hanton et al., 2004).

Athletes realize that they are improving over time and must learn to wait patiently while going through this period. As a result of these developments, they can achieve some successes in the sport they are engaged in. Successful athletes taste victory and want more of it, realizing that they are capable of achieving what they want and thus building confidence. If individuals engaged in sports behave in a controlling, ambitious, and confident manner, continuity and success levels will be at a high level, and as a result, they can fight against problems such as stress, depression, and anxiety, and achieve the desired goals. Therefore, confidence enables athletes and sportspeople to control themselves, manage their anxiety levels and affect their achievements (Vealey, 2009).

Confident athletes can achieve a higher level of motivation, and this self-confidence stands out in their battles against difficult situations and problematic days (Ramazanoğlu and Çoban 2004). In a study, competitors participated in a wrist-wrestling experiment, and by convincing them that their opponent was weaker than they appeared, they managed to defeat their superior opponent with the gained self-confidence. This situation can also be valid in team sports. Athletes who have high levels of self-confidence in the team tend to show a better performance than others. In a rugby match held among universities at Twickenham Stadium in 2004, Oxford University managed to defeat Cambridge University. Before the match, individual athletes were asked to write what they admired the most. These writings, which were placed in separate envelopes for each player, were opened three hours before the match, and a high expectation level was found for the team to achieve successful results in most of the opened papers. The match, which was 11-7 at halftime, ended with a score of 18-17 (Karageorghis and Terry 2010).

Results

Sports psychology has emerged as a multidisciplinary field of study in today's world. Concepts related to athletic performance are researched both in sports sciences and psychology. While physical factors are compared to the hardware of a computer, psychological factors can be compared to its software. The best performance is seen as an output that can be achieved by athletes who have developed both hardware and software (Moran, 2016). Among the topics studied in the field of sports psychology to improve athletic performance are motivation, stress, self-confidence, arousal, and emotional concepts such as anxiety and excitement (Németh & Balogh, 2020). Lazarus (2000) stated that stress is one of the main concepts that affect athletic

performance. Lazarus and Folkman (1984) treated stress as a special experience within the person-environment interaction and focused on stress evaluations and coping strategies in their model. In sports, stress and stress-related concepts should be studied to improve performance. Because athletic competitions are stressful events that reveal athletes' physical and psychological capacities, coping strategies are used by athletes to manage their psychological responses in stressful situations (Cerin, Szabo, and Hunt, 2000; Nicholls and Polman, 2007). Positive or negative emotions are felt depending on how a person evaluates stress (Lazarus, 1991). Investigating the relationship between stress evaluations, coping strategies, functional and dysfunctional emotions in athletes can help us understand stress-related factors that may affect performance (Martens, Vealey, and Burton, 1990). Another factor that affects success in sports is self-confidence. Self-confident athletes are observed to work harder, produce more, cope with difficulties, achieve set goals, and have high levels of motivation compared to athletes who lack self-confidence. Thus, it has been suggested that self-confidence factor affects making accurate decisions and providing high-level concentration (Vealey, 2009).

Author Contribution

Güneş, E. (Conceptual framework, review), Yetim, A. A. (Conceptual framework, review)

Conflict of Interest

All authors must declare that there is no conflict of interest.

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