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EXERCISE DEPENDENCE IN ENDURANCE SPORTS: RELATION TO EMOTIONAL REGULATION AND NEGATIVE AFFECTIVITY

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Abstract

The copious and uncontrolled practice of exercise can generate psychological dependence and mood changes. Emotional regulation and negative affectivity are relevant processes for the development of addictive patterns. This study analysed the differences in negative affectivity and emotional regulation based on the practice profile of exercise; the relationship between exercise dependence, emotional regulation, and negative affectivity; and the mediating role of emotional regulation in such relationship. 375 endurance sports practitioners participated. The differences in the physical exercise practice profiles were significant in all the study variables. Exercise dependence correlated positively and significantly with emotional regulation difficulties and with negative affectivity. Emotional regulation difficulties were predictors of exercise dependence. There was a mediating effect of emotional regulation difficulties between negative affect and exercise dependence. Improving emotional regulation skills could prevent the onset of exercise dependence.

KEY WORDS: *exercise, dependence, emotional regulation negative affectivity, endurance sports.*

Resumen

El ejercicio físico en altos volúmenes y descontrolado puede generar dependencia psicológica y cambios en el estado de ánimo. La regulación emocional y el afecto negativo son procesos relevantes para el desarrollo de procesos adictivos. Este estudio analizó las diferencias en afecto negativo y regulación emocional en función del perfil de práctica del ejercicio físico; la relación entre la dependencia del ejercicio, la regulación emocional y el afecto negativo; y el papel mediador de la regulación emocional en dicha relación. Participaron 375 practicantes de deportes de resistencia. Las diferencias en los perfiles de práctica del ejercicio físico fueron significativas en todas las variables de estudio. La dependencia del ejercicio correlacionó de forma positiva y significativa con las dificultades de regulación emocional y con el afecto negativo. Las dificultades de regulación emocional fueron predictoras de la dependencia del ejercicio. Hubo un efecto de mediación de las dificultades de regulación emocional entre el afecto negativo y la dependencia del ejercicio. Mejorar las habilidades de regulación emocional podría prevenir la aparición de la dependencia del ejercicio.

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PALABRAS CLAVE: *ejercicio físico, dependencia, regulación emocional, afecto negativo, deportes de resistencia.*

Introduction

Regular and moderate physical exercise plays a fundamental role in maintaining health and preventing diseases (Bruno et al., 2014). However, copious and uncontrolled exercising can cause physical injuries, adverse psychological effects and difficulties in both the social and individual life of the practitioner (Egorov & Szabo, 2013), sometimes producing psychological dependence (Adams et al., 2003) and changes in mood (Guszkowska & Rudnicki, 2012). Scientific literature identifies this condition as exercise addiction or exercise dependence (Szabo et al., 2015). Physical exercise dependence is described as a pattern of poorly structured physical exercise characterized by excessive amounts of physical exercise, which can increase the risk of developing mental health and physical problems (Hausenblas & Downs, 2002). Similarities have been found between the criteria defining behavioral addictions in the Diagnostic and statistical manual of mental disorders (DSM-5; American Psychiatric Association [APA], 2013) and exercise dependence: tolerance, withdrawal, lack of control, desired effects, time, reduction of other activities, and continuity. In clinical practice, certain behaviors are observed that are excessive and repetitive with similar symptoms to behavioral addictions defined by the DSM, , such as gambling disorder (Sussman et al., 2011). Nonetheless, due to the lack of evidence that allows establishing peer review diagnostic criteria, they are yet to be officially recognized in the medical and psychological field. Recent meta-analysis studies have reported that the prevalence of physical exercise dependence ranges from 5.5% in amateur athletes to 14.2% in endurance athletes (Di Lodovico et al., 2019; Trott et al., 2021).

A risk factor for the development of physical exercise dependence is negative affectivity -for example, emotions that generate negative mood states, such as anxiety (Back et al., 2021). The theoretical model of the cognitive appraisal hypothesis (CAH; Szabo, 1995) and the interactional model (Egorov & Szabo, 2013) suggest that physical exercise is often used as a tool to cope with everyday stress and anxiety. Physical exercise could therefore be used as an emotional regulator. Emotional regulation is defined as the way in which people manage the expression, suppression, and intensity of emotions, based on personal goals and specific situations they are interacting with at the moment (Gross & Jazaieri, 2014). According to Gross's process model of emotion regulation (Gross, 2015), the cycle of emotional regulation begins with a discrepancy between someone's objective state -that is, the emotion desired- and the actual state they are experiencing or projecting. The goal of emotion regulation can be both to increase pleasant emotions (e.g., happiness, euphoria, and excitement) and to reduce unpleasant emotions (e.g., sadness, anxiety, and anger) (Russell, 1980). Different authors affirm that people who have difficulties with emotion regulation suffer a progressive deterioration in quality of life and a considerable decrease in psychological wellbeing

(Campbell-Sills et al., 2016; Sheppes et al., 2015). Marchica et al. (2019) indicate that there is a relationship between emotional regulation difficulties and the development of psychopathology. Emotional regulation difficulties have been associated with dysfunctional psychological symptoms such as generalized anxiety, depression, suicidal ideation, use of psychoactive substances, and obsessive-compulsive behaviors (González et al.,2017).

Estévez, Jauregui, et al. (2017) have further shown that emotional regulation difficulties are predictors of substance addictions and non-substance-related behavioral addictions. Several authors affirm that addictive disorders are directly related to the intention to alter mood (Blaszczynski & Nower, 2002; Estévez et al., 2021; Griffiths, 2005). Emotional regulation is thus a factor of special relevance in relation to addictive processes. Different studies show that emotional regulation correlates positively with behavioral addictions, such as pathological gambling, problematic internet use, video game addiction, alcohol and other substance abuse (Coffey & Hartman, 2008; Estévez, Jauregui, et al., 2017; Estévez, Urbiola, et al., 2017; Schreiber et al., 2012). In the development and maintenance of addictive behaviors, emotional disorders such as anxiety and depression have been considered one of the main factors in the development and maintenance of these (Back et al., 2021; Elhai et al., 2017; Hausenblas & Downs, 2002; Starcevic & Khazaal, 2017). More specifically, they are closely related to online gaming (Mehroof & Griffiths, 2010), pathological gambling (Barrault et al., 2017), and substance use disorders (Vorspan et al., 2015).

Similarly, Weiss et al. (2015) mention that, when a person is under stress and has difficulties controlling behavior, the probability of developing addictive behaviors increases. Gross and John (2003) also associate poor emotion management with a range of negative outcomes, including higher levels of negative affectivity, lower levels of positive affectivity, poorer social adjustment, and lower well-being. In addition to this, not only negative feelings or emotions can create a tendency towards addictive behaviors; sometimes people who have difficulties in regulating emotions tend to overcommit to some behaviors that create positive feelings and emotions. The cause of this behavior would be rooted in the lack of mechanisms to respond to the emotions they are experiencing (Williams & Grisham, 2012). In this sense, different studies have found that there would be a relationship between physical exercise dependence and emotional regulation (Bircher et al., 2017; Downs et al., 2004; Hamer & Karageorghis, 2007; Kun et al., 2021; Szabo, 1995, 2010). Specifically, Kun et al. (2021) state that subjects who engage in excessive physical exercise have difficulties regulating their everyday emotions. Several experts have similarly confirmed that people with a high risk of physical exercise dependence may have difficulty coping with stress or negative emotional states (Hamer & Karageorghis, 2007; Szabo, 1995, 2010). A systematic review additionally analyzed personality factors and their relationship with physical exercise dependence, concluding that neuroticism and anxiety are positively related to the risk of physical exercise dependence (Bircher et al., 2017). These studies show that people can become dependent on physical exercise to control their moods (Downs et al., 2004).

To date, there is little literature regarding emotional regulation and physical exercise dependence. Therefore, this study aims to analyze the differences in

negative affectivity and emotional regulation based on the practice profile of physical exercise (dependent and non-dependent); the relationship between physical exercise dependence, emotional regulation and negative affect; and the mediating role of emotional regulation in said relationship.

Method

Participants

The sample was made up of 375 endurance sports practitioners in different modalities, 253 men and 122 women, aged between 19 and 72 years, recruited through convenience sampling. The mean age was 38.96 years (*SD*= 10.87). The type of exercise practiced mostly was leisure-recreational (74.9%), followed by amateur (22.4%) and professional (2.7%). 61.1% of the sample competed regularly and 38.9% did not.

Regarding level of studies, 4.3% had a high school degree or compulsory education, 22.1% had professional training studies, 9.9% had high school studies, and 63.7% had university studies. Regarding employment status, 84% were working or employed, 11.2% were students, 2.21% were unemployed, 2.21% were retired, and 0.5% indicated another undefined situation. Regarding marital status of the participants, 38.9% were single, 53.9% were married, 0.8% were widowed, 4% were separated/divorced, and 2.5% indicated another undefined status.

Instruments

a) *Positive and Negative Affect Schedule* (PANAS; Watson et al., 1988), adapted to Spanish by López-Gómez et al. (2015). The PANAS was used to evaluate affect in two dimensions: positive and negative. The scale includes two subscales, Positive Affectivity (AP) and Negative Affectivity (AN), each with 10 items. The items are measured in reference to a specified period of time, in this case, the last month, using a five-point Likert scale (1= not at all or very slightly, 5= very much). The total of each subscale is the sum of the score obtained in the 10 items that comprise it. A higher score indicates a greater presence of affect in particular. It is one of the most recommended scales in the literature for the evaluation of emotions with a two-dimensional structure (Thompson, 2007).The reliability of the original scale is optimal, with a Cronbach's alpha of .92 for positive affectivity and .88 for negative affectivity. Regarding the validity of the instrument, the PANAS shows a good predictive validity of depression (Crawford and Henry, 2004; Terraciano et al., 2003). In this study, the Cronbach alpha value was .76, with the reliability of its subscales between .85 and .90.
b) *Difficulties in Emotion Regulation Scale* (DERS; Gratz and Roemer, 2004), adapted to Spanish by Hervás and Jódar (2008). The DERS allows measuring different aspects of maladaptive regulation and the difficulties that can be witnessed in an event where emotional regulation is necessary. The original scale had 36 items, while the adaptation to Spanish consists of 28 items with a

five-point Likert scale response format (1= almost never, 5= almost always). It has five subscales: Emotional lack of control: expresses difficulties in maintaining behavioral control due to the intensity of emotions and the duration of negative emotional states (e.g., "When I feel bad, I think I will be like this for a long time"); Everyday Interference: reports difficulty concentrating and performing activities and tasks while experiencing negative emotions (e.g., "When I feel bad, I have difficulty concentrating"; Emotional Inattention: reports inattention and lack of awareness of emotional responses (e.g., "When I feel bad, I recognize my emotions"); Emotional confusion: shows the extent to which individuals know and are clear about the emotions they are experiencing (e.g., "I am confused about what I feel"); and Emotional rejection: expresses the tendency to have secondary negative emotional responses to the negative emotions experienced by the person, or the non-acceptance of anguish (e.g., "When I feel bad, I am ashamed to feel that way"). The reliability of the original scale is optimal, with a Cronbach's alpha of .93. The Cronbach's alpha of the subscales is between .73 and .93. In addition, the reliability of re-test in a period of 6 months was adequate, indicating temporary stability (Hervás & Jódar, 2008). The instrument in this study has a Cronbach's alpha of .90 on the total scale and between .82 and .92 on the subscales.

c) *Exercise Dependence Scale-Revised* (EDS-R; Downs et al., 2004), translated and validated by Sicilia and González-Cutre (2011). The EDS-R assesses the risk of exercise dependence in athletes. It consists of 21 items and seven subscales with which it measures the degree of physical exercise dependence: (1) Tolerance: refers to the need to increase the amount of exercise to achieve the expected effect (e.g., "I constantly increase the duration of my practice exercise to achieve the desired benefits or effects"); (2) Withdrawal syndrome: manifests the amount of exercise performed to relieve or avoid withdrawal symptoms and the malaise produced by not practicing physical exercise (e.g., "I practice physical exercise to avoid feeling in a bad mood"); (3) Desired effects: reflects the performance of physical exercise in a time or amount greater than planned (e.g., "I practice physical exercise for longer than I usually want to"); (4) Lack of control: reflects a persistent desire or unsuccessful effort to reduce or control physical activity (e.g., "I am unable to reduce the frequency with which I exercise"); (5) Reduction of other activities: manifests the reduction of social, professional, or recreational activities to practice physical exercise (e.g., "I would like to exercise more than being with my family and friends"); (6) Time: reflects the amount of time invested in the practice of physical exercise (e.g., "I spend most of my free time doing physical exercise"); (7) Continuity: reflects the maintenance of the practice of physical exercise despite the awareness of a persistent psychological or physical problem, probably caused or worsened by physical exercise, such as continuing to run despite an injury (e.g., "I practice physical exercise despite persistent physical problems"). Responses were measured using a Likert scale from 1 to 6 (1= never, 6= always). A higher score signals more symptoms of physical exercise dependence. This scale conceptualizes physical exercise dependence based on the substance dependence criteria of the DSM-IV-TR (APA, 2000) and allows physical exercise

practitioners to be classified into three groups: at risk of dependence (scores 5-6 in at least three of the seven criteria), non-dependent symptomatic (scores 3-4 in at least three criteria, or 5-6 combined with 3-4 in three criteria, but without meeting risk conditions) and asymptomatic non-dependent (scores 1-2 in at least three criteria, but without meeting the conditions of symptomatic non-dependent). The reliability of the original instrument is adequate, with a Cronbach's alpha value of .92 for the total scale and between .68 and .85 for its subscales. Regarding validity, it showed adequate criterion validity: it was found that the highest scores in physical exercise dependence corresponded to a greater frequency of physical activity practice. The reliability of the instrument in this study is Cronbach's alpha of .92 and the reliability of its subscales was between .59 and .88.

Procedure

For the collection of data and administration of the questionnaire, voluntary participation was requested through social media and in sports entities (clubs and federations) with endurance sport practitioners. The questionnaires were answered using an online form, which included a cover letter with the objectives of the study and required the informed consent of the participants. Participation was anonymous and voluntary. The contact details of the principal researcher of the study were included. The procedure was approved by the Ethics and Research Committee of the authors' university.

Data analysis

First, the normality of the sample was checked through Kolmogorov-Smirnov test; after finding that the sample did not have a normal distribution, non-parametric test were chosen. The mean differences between symptomatic dependents, symptomatic non-dependents and asymptomatic non-dependents to physical exercise (tolerance, abstinence, time, continuity, desired effects, lack of control, reduction of other activities) were analyzed, as well as; difficulties in emotional regulation (inattention, rejection, confusion, interference, lack of control) and positive and negative affectivity through Kruskal-Wallis test. Afterwards, intergroup differences were evaluated with a post hoc analysis using the Bonferroni test. The effect size was also calculated with eta squared, where the most commonly used classification levels are: 0.01= small; 0.06= medium; 0.14= large.

Next, the correlations between physical exercise dependence (tolerance, abstinence, time, continuity, desired effects, lack of control, reduction of other activities), difficulties in emotional regulation (inattention, rejection, confusion, interference, lack of control), and positive and negative affectivity were analyzed through Rho Spearman correlations.

Third, the predictive role of emotional regulation difficulties (inattention, rejection, confusion, interference, lack of control) in relation to physical exercise dependence (tolerance, withdrawal, desired effects, lack of control, reduction of

other activities, time, continuity) was evaluated by means of multiple stepwise regression analysis.

Finally, a multiple mediation analysis was performed using the INDIRECT macro of Preacher and Hayes (2008). The mediating role of emotional regulation difficulties between negative affectivity and physical exercise dependence was analyzed. In this case, age and gender were included as covariates. Seven models were analyzed to analyze the mediating role of emotional regulation with each of the seven subscales of the EDS-R (Sicilia & González-Cutre, 2011). To verify the mediating effect of emotional regulation between negative affectivity and physical exercise dependence, it was first found that the relationship between the independent variable (negative affectivity) and the mediating variables (emotional regulation difficulties) (path-a) and the mediating variables and the dependent variable (physical exercise dependence) (path-b) were significant. Next, the total effect (path-c) of the independent variable on the dependent variable together with the mediating variables was checked. In addition, the direct effect (path-c') of the independent variable on the dependent variable was controlled, controlling the effect of the mediating variables. When the total effect (path-c) is significant, but the direct effect (path-c') is not, a total mediation effect is considered to exist. On the other hand, when the total effect and the direct effect are significant, the mediation effect is considered to be partial.

Results

The mean differences between symptomatic dependents, symptomatic non-dependents and asymptomatic non-dependents in relation to physical exercise (tolerance, abstinence, time, continuity, desired effects, lack of control, reduction of other activities) were analyzed, as well as difficulties in emotional regulation (inattention, rejection, confusion, interference, lack of control) and positive and negative affectivity by Kruskal-Wallis test (Table 1). The results indicated that the differences were significant in all variables except inattention in emotional regulation difficulties and in positive affectivity.

Next, a post hoc analysis was carried out using the Bonferroni test to assess intergroup differences. Regarding physical exercise dependence, significant differences were found between the three groups (symptomatic dependent, symptomatic non-dependent and asymptomatic non-dependent) on all subscales (tolerance, withdrawal, time, continuation, desired effects, lack of control, reduction of other activities). In the case of emotional regulation difficulties (total, rejection, confusion, and lack of control), the participants who were identified as dependent had significantly higher scores than the symptomatic non-dependent and asymptomatic non-dependent. In contrast, on the interference subscale, the asymptomatic non-dependent group scored significantly lower than the symptomatic dependent and symptomatic non-dependent groups. Finally, significant differences were found between the three groups in negative affectivity,

Table 1
Comparison between dependent, symptomatic non-dependent and asymptomatic non-dependent practitioners in relation to exercise dependence, emotional regulation, and positive and negative affect

Variables	Dependent (*n*= 75)	Symptomatic non-dependent (*n*= 264)	Asymptomatic non-dependent (*n*= 36)	Kruskal-Wallis *(df)*	η^2
	M (*SD*)	*M* (*SD*)	*M* (*SD*)		
Dependence					
Total	75.50 (14.63)[b,c]	46.32 (11.97)[a,c]	28.33 (6.85)[a,b]	190.643 (2,372)*	.56
Tolerance	13.25 (3.22)[b,c]	8.40 (3.74)[a,c]	4.97 (2.81)[a,b]	111.209 (2,372)*	.30
Withdrawal	11.89 (3.80)[b,c]	7.51 (3.60)[a,c]	4.05 (1.41)[a,b]	100.928 (2,372)*	.28
Time	13.09 (2.72)[b,c]	8.19 (3.39)[a,c]	4.91 (2.39)[a,b]	127.652 (2,372)*	.35
Continuance	9.81 (3.56)[b,c]	6.06 (2.90)[a,c]	3.69 (1.14)[a,b]	92.138 (2,372)*	.26
Intention effects	8.65 (3.23)[b,c]	5.03 (2.01)[a,c]	3.33 (.86)[a,b]	112.214 (2,372)*	.34
Lack of control	10.12 (3.65)[b,c]	5.84 (2.49)[a,c]	3.41 (1.07)[a,b]	118.971 (2,372)*	.35
Reduction in other activities	8.68 (3.15)[b,c]	5.27 (1.94)[a,c]	3.94 (1.65)[a,b]	95.302 (2,372)*	.31
Emotion regulation					
Total	65.52 (19.42)[b,c]	55.52 (17.77)[a,c]	48.80 (14.69)[a,b]	25.770 (2,372)*	.07
Lack of awareness	9.94 (3.65)[a,b]	9.29 (3.39)[a]	9.05 (4.00)[b]	2.490 (2,372)	.00
Non-acceptance	16.44 (6.31)[b,c]	13.57 (5.65)[a,c]	11.83 (5.11)[a,b]	20.106 (2,372)*	.05
Lack of clarity	9.62 (4.11)[a,b]	7.57 (3.05)[a]	6.88 (2.33)[b]	19.965 (2,372)*	.07
Goal-oriented behavior	10.12 (3.51)[b]	9.35 (3.52)[a]	7.58 (3.12)[a,b]	14.593 (2,372)*	.03
Lack of control	19.38 (7.96)[a,b]	15.72 (6.51)[a]	13.44 (4.30)[b]	20.069 (2,372)*	.06
Affect					
Positive	26.08 (8.93)[b,c]	26.78 (6.53)[a,c]	29.13 (6.52)[a,b]	4.873 (2,372)	.01
Negative	11.60 (6.86)[b,c]	7.78 (5.83)[a,c]	4.72 (5.01)[a,b]	35.164 (2,372)*	.09

Note: $*p \leq .05$.

with the highest scores in the symptomatic dependent group and the lowest scores in the asymptomatic non-dependent group. The effect size was large for all the variables of the physical exercise dependence; it was medium for emotion regulation

total; emotion regulation lack of clarity and lack of control and negative affect; finally, it was small for emotion regulation lack of awareness, non-acceptance, goal-oriented behavior and positive affect.

Correlations between physical exercise dependence (tolerance, abstinence, time, continuity, desired effects, lack of control, reduction of other activities), difficulties in emotional regulation (inattention, rejection, confusion, interference, lack of control) and positive and negative affectivity through Rho Spearman correlations (Table 2). Physical exercise dependence correlated positively and significantly to emotional regulation difficulties and with negative affectivity. Emotion regulation difficulties correlated positively and significantly with negative affectivity, and negatively and significantly with positive affectivity.

Third, a multiple stepwise regression analysis was carried out to assess the predictive role of emotional regulation difficulties (inattention, rejection, confusion, interference, lack of control) in relation to physical exercise dependence (tolerance, abstinence, time, continuity, desired effects, lack of control, reduction of other activities). Seven different models were analyzed, in which the emotional regulation difficulties subscales were predictor variables for each of the seven physical exercise dependence subscales. The results have shown that emotional regulation difficulties would be predictors of physical exercise dependence. More specifically, confusion was found to be predictive of tolerance; rejection, confusion and inattention were predictors of withdrawal; confusion and inattention were predictors of time; rejection and confusion were predictors of continuity; rejection was a predictor of desired effects; lack of control and confusion were predictors of lack of control and reduction of other activities (Table 3).

Finally, according to the results obtained in the correlations, the mediating role of emotional regulation difficulties (M) between negative affectivity (IV) and physical exercise dependence (tolerance, abstinence, time, continuity, desired effects, lack of control, reduction of other activities) (DV) was analyzed through seven multiple mediation models (Preacher & Hayes, 2008). In all cases, age and gender were included as covariates to control their effect.

First, the relationship between negative affectivity (IV) and the mediating variables (the five emotional regulation subscales) was checked to be significant (path-a). Once confirmed, the relationship between the mediating variables and physical exercise dependence in the seven subscales that make it up (DV) were verified to be significant (path-b). It was then checked that the total effect between negative affectivity (IV) and physical exercise dependence in each subscale (tolerance, abstinence, time, continuity, desired effects, lack of control, reduction of other activities) (DV) was significant (path-c), and that the direct effect between negative affectivity (IV) and physical exercise dependence in each subscale (tolerance, abstinence, time, continuity, desired effects, lack of control, reduction of other activities) (DV), controlling the effect of the mediating variables, were significant (path-c'). In addition, the effect of age and gender as covariates was controlled.

The results showed that emotional regulation difficulties had a mediating effect between negative affectivity and physical exercise dependence in four of its subscales: abstinence, time, reduction of other activities, and desired effects. More

Table 2
Correlations between exercise dependence, difficulties in emotional regulation, and positive and negative affect

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
Dependence															
1. Total	--														
2. Tolerance	.77**	--													
3. Withdrawal	.67**	.37**	--												
4. Time	.75**	.53**	.34**	--											
5. Continuance	.66**	.47**	.36**	.32**	--										
6. Intention effects	.78**	.54**	.48**	.58**	.49**	--									
7. Lack of control	.77**	.51**	.47**	.52**	.46**	.63**	--								
8. Reduction in other activities	.71**	.40**	.46**	.50**	.46**	.58**	.59**	--							
Emotion regulation															
9. Total	.37**	.17**	.38**	.14**	.30**	.33**	.35**	.47**	--						
10. Lack of awareness	.09	.04	.04	.00	.13**	.01	.20**	.25**	.52**	--					
11. Non-acceptance	.34**	.16**	.40**	.12*	.27**	.29**	.28**	.38**	.87**	.28**	--				
12. Lack of clarity	.27**	.12*	.26**	.15**	.21**	.23**	.27**	.36**	.71**	.53**	.53**	--			
13. Goal-oriented behavior	.28**	.12*	.26**	.13*	.20**	.27**	.24**	.37**	.77**	.21**	.61**	.39**	--		
14. Lack of controll	.35**	.17**	.36**	.14**	.27**	.30**	.30**	.41**	.87**	.27**	.74**	.50**	.69**	--	
Affect															
15. Positive	-.06	.06	-.08	.06	-.15**	-.07	-.14**	-.17**	-.35**	-.33**	-.24**	-.24**	-.27**	-.31**	--
16. Negative	.39**	.21**	.42**	.16**	.27**	.34**	.33**	.35**	.52**	.08	.47**	.31**	.45**	.53**	-.21**

Note: **$p < .01$; *$p < .05$.

Table 3
Multiple linear regression of emotional regulation difficulties and exercise dependence

Models	B	β	*t*	Sig.
Tolerance (R= .15, R^2= .02, corrected R^2= .02, p= .00)				
Lack of clarity	.19	.15	2.87	.00***
Withdrawal (R= .41, R^2= .17, corrected R^2= .16, p= .00)				
Non-acceptance	.21	.30	5.39	.00***
Lack of clarity	.28	.22	3.48	.00***
Lack of awareness	-.17	-.15	-2.56	.01**
Time (R= .24, R^2= .06, corrected R^2= .05, p< .001)				
Lack of clarity	.34	.29	4.76	<.001***
Lack of awareness	-.18	-.16	-2.55	.01**
Continuance (R= .28, R^2= .08, corrected R^2= .07, p< .001)				
Non-acceptance	.11	.19	3.35	<.001***
Lack of clarity	.13	.12	2.13	.03*
Intention effects (R= .29, R^2= .08, corrected R^2= .08, p< .001)				
Non-acceptance	.14	. 29	5.85	<.001***
Lack of control (R= .32, R^2= .11, corrected R^2= .10, p< .001)				
Lack of control	.09	.19	3.25	.001***
Lack of clarity	.18	.19	3.22	.001***
Reduction in other activities (R= .42, R^2= .18, corrected R^2= .17, p< .001)				
Lack of control	.12	.31	5.58	<.001***
Lack of clarity	.14	.17	3 .09	.00***

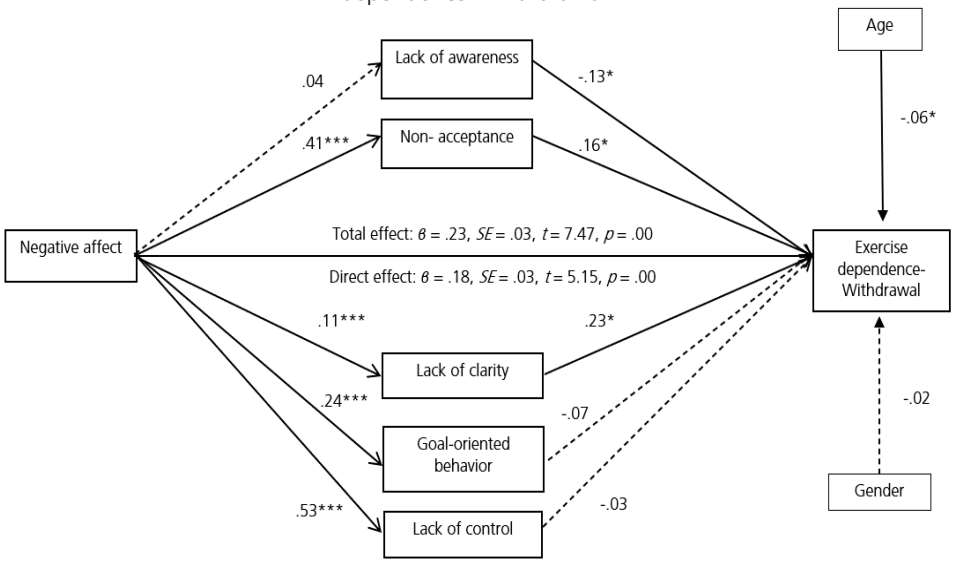
Note: ***p< .001; **p< .01; *p< .05.

specifically, the mediating relationship between negative affectivity and physical exercise dependence (Abstinence) was significant in the mediating variables of rejection and confusion, with a partial mediation effect. When checking the partial effect of the covariates, it was found that age had a significant effect (Figure 1).

The mediating variable confusion was significant in the mediational relationship between negative affectivity and physical exercise dependence (Time). Regarding the total effect, a significant relationship was identified between negative affectivity and physical exercise dependence (time). In contrast, the direct effect, the effect of the mediating variables on the relationship between the independent and the dependent variable, was not significant, obtaining a total mediation effect. Finally, the two covariates were significant, so both gender and age have an influence on the relationship between the independent variable and the dependent variable (Figure 2).

Figure 1

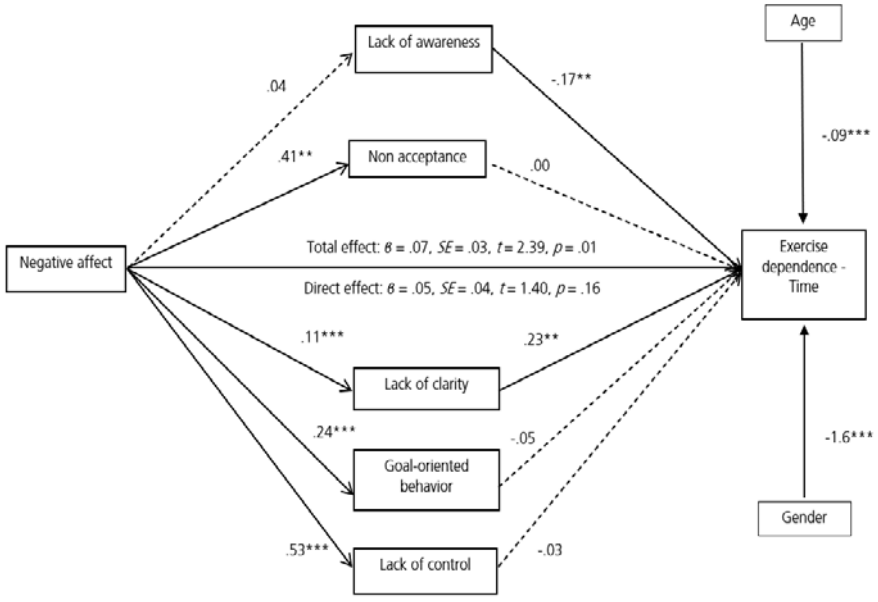
Mediational effect of emotional regulation with negative affectivity and physical exercise dependence - Withdrawal



Note: ***p< .001; **p< .01; *p< .05.

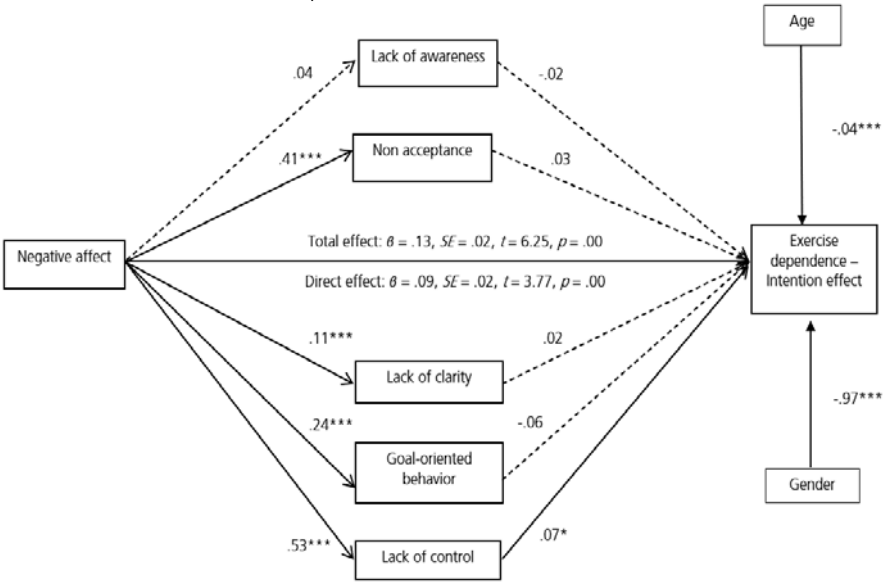
Figure 2

Mediational effect of emotional regulation with negative affectivity and physical exercise dependence – Time



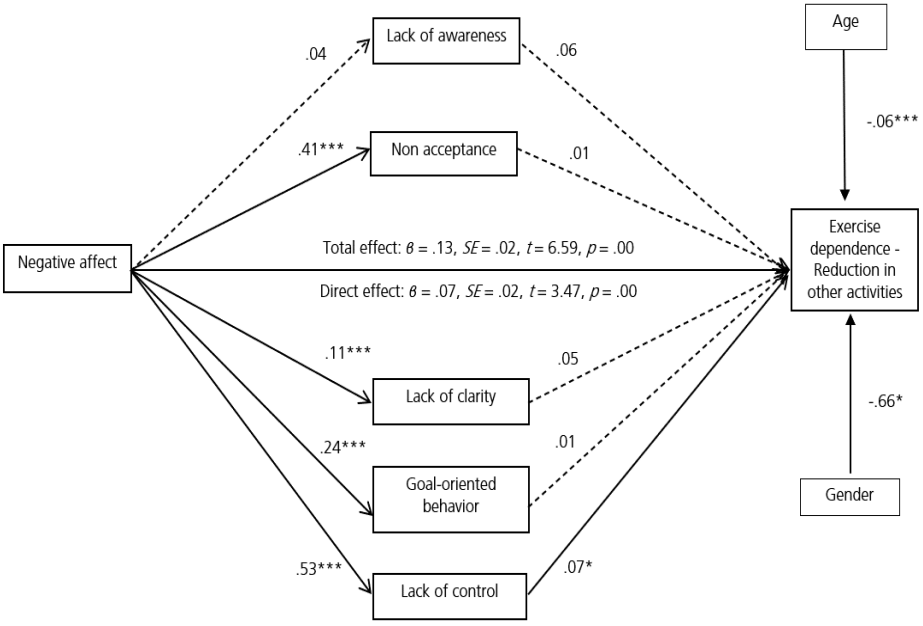
Note: ***p< .001; **p< .01; *p< .05

Figure 3
Mediational effect of emotional regulation with negative affectivity and physical exercise dependence - Intention effects



Note: ***p< .001; **p< .01; *p< .05

Figure 4
Mediational effect of emotional regulation with negative affectivity and exercise dependence - Reduction in other activities



Note: ***p< .001; **p< .01; *p< .05

Regarding the mediational relationship between negative affectivity and physical exercise dependence (desired effects) and physical exercise dependence (reduction of other activities), it was significant with the mediating variable lack of control. Both path-c and path-c' were significant, so it is a partial mediational effect. Regarding the covariates, both age and gender were significant (Figures 3 and 4).

Discussion

The objective of this study was to evaluate the differences in negative affectivity and emotional regulation according to the practice profile of physical exercise (dependent and non-dependent); analyze the relationship between physical exercise dependence, emotional regulation, and negative affect; and study the mediating role of emotional regulation in said relationship.

Firstly, analyzing the difference in means according to physical exercise practice profile (symptomatic dependents, symptomatic non-dependents, and asymptomatic non-dependents) resulted in higher symptomatic dependents scores in emotional regulation difficulties and in negative affectivity. People at high risk of physical exercise dependence may have difficulty coping with negative emotional states (Hamer & Karageorghis, 2007; Szabo, 1995, 2010). Based on the affectivity regulation hypothesis for physical exercise dependence proposed by (Hamer & Karageorghis, 2007), this study supports the statement that dependent subjects need increasingly more physical exercise, both in quantity and intensity, to continue experiencing the improvements that physical exercise leads to in terms of affectivity and mood. Consequently, they could use physical exercise as an affect regulation technique (Kun et al., 2021). Alcaraz-Ibáñez et al. (2022) suggest that the adoption of physical exercise as a coping strategy in the face of negative emotions related to depression is common in recreational practitioners. This phenomenon may be due to the subjects' rejection of the emotions they are feeling. Not accepting emotions is rooted in avoiding unpleasant situations or tolerance to anguish in such a way that it can favor the development of addictive behaviors with the aim of avoiding unpleasant internal experiences. The results of this study resemble previous studies in concluding that emotional discomfort is a determining factor for the development of physical exercise dependence. Next, it was found that physical exercise dependence correlated positively with difficulties in emotional regulation and with negative affectivity. These results suggest that similar to other behavioral addictions such as pathological gambling (Estévez, Jauregui, et al., 2017; Marchica et al., 2019), there is a relationship between addictive behaviors, emotional regulation difficulties and negative affectivity (Baker et al., 2021; Baker et al., 2004). In the case of physical exercise dependence, the role of emotion regulation is still poorly understood to date (Kun et al., 2021). There are nonetheless results that predict that anxiety leads to increasing the time or volume of physical exercise in search of positive emotions (Lukács et al., 2019; Schüler et al., 2018). It has also been found that low satisfaction of basic psychological needs is the cause of anxiety and consequently predicts a greater risk for the development of physical exercise dependence (Schüler et al., 2018). Meanwhile, Kun et al. (2021) suggest that difficulties in emotional and affect regulation are positively related to the risk of

addiction to physical exercise. Therefore, the results obtained in this study reinforce the contributions made by the authors mentioned above. Emotional regulation difficulties also correlated positively and significantly with negative affectivity. These results confirm those of other studies, which have found that difficulties in emotional regulation may explain problems associated with negative affectivity, anxiety, and depression (Salsman & Linehan, 2012).

The stepwise regression analysis carried out allowed identifying that emotional regulation difficulties were predictors of physical exercise dependence. These results are consistent with previous studies that have shown that substance addictions and behavioral addictions are positively related to emotional deficits (Di Trani et al., 2017; Garland et al., 2018; Kun et al., 2021; Kun & Demetrovics, 2010). Li et al. (2015) found that the risk of physical exercise dependence was closely related to depression, negative mood, and anxiety. Several authors suggest that these findings may be linked to mood variability associated with withdrawal symptoms (Adams, 2009; Berczik et al., 2012; Hamer & Karageorghis, 2007).

The most dominant variables in the relationship between difficulties in emotional regulation and physical exercise dependence were confusion, rejection, inattention, and lack of control. These results are consistent with studies linking alexithymia with addictive disorders (Bonnet et al., 2013; De Rick & Vanheule, 2007; De Timary et al., 2008; Dorard et al., 2008; Handelsman et al., 2000; Haviland et al., 1994; Taylor et al., 1991; Thorberg et al., 2009). That is, lack of emotional clarity (confusion), which was the most relevant variable in the relationship between emotional regulation difficulties and physical exercise dependence. Alexithymia consists of the lack of ability to identify and describe feelings and emotions. Subjects suffering from alexithymia try to regulate their emotional states through compulsive and impulsive acts (Taylor et al., 1991).

Likewise, these results show similarities with studies carried out on other behavioral addictions, which suggest that gambling disorder is a tool for coping with unwanted events (Jauregui et al., 2016; Riley, 2014). In other words, in this study emotional rejection is reflected in the desire to avoid unpleasant emotions and experiences, in the continuity shown by the subjects in the practice of physical exercise despite knowing that they have a persistent or recurrent physical or mental problem caused by said practice. Also, in the continuity of practice despite not wanting to in order to avoid the malaise generated by not doing physical exercise and, finally, in the practice of physical exercise in greater quantities or for a longer period than what was programmed. In other addictions, like in gambling addiction for example, evidence confirms that individuals use it to avoid unpleasant emotions, which is related to the rejection of these emotions (Jauregui et al., 2016; Riley, 2014). Thus, as occurs in gaming disorder (Estévez, Jauregui, et al., 2017; Marchica et al., 2019), it is suggested that lack of emotional regulation is more likely to be associated with physical exercise dependence in subjects who use physical exercise as an escape route.

These findings are also associated with research that relates impulsive behaviors as a tool to regulate negative emotions and as a consequence of failures in self-control (Jauregui et al., 2016; Tice et al., 2001). In other words, subjects have the desire to reduce the amount or time they dedicate to the practice of physical exercise

and try to, but the attempts are not successful. As a result of self-control failures, individuals dependent on physical exercise abandon or reduce social, work, or recreational activities, substituting them for the practice of physical exercise. Difficulties in emotional regulation and impulsivity have been related as determining factors in the development of addictive behaviors (Estévez et al., 2021). However, the results found in this study are novel, since there is a lack of studies that have analyzed this relationship with physical exercise dependence.

In turn, it is confirmed that difficulties in emotional regulation are mediators between negative affectivity and physical exercise dependence in four of the subscales: withdrawal syndrome, time, reduction of other activities, and desired effects. In this case, it is confirmed that confusion, rejection, and neglect are the most prominent variables. These results are novel in physical exercise dependence, but they are similar in other addictions such as gambling disorder (Estévez et al., 2014), hypersexuality (Garofalo et al., 2016) and alcohol or drug consumption (Fox et al., 2008; Gratz et al., 2007). The covariant age, in turn, has a significant effect in all the variables. Several authors state that symptoms of exercise dependence decrease with age (Costa et al., 2013). This may have two explanations: the first is that physical activity levels can gradually decrease with age (Brunet & Sabiston, 2011) and the second is that in adulthood the ability to regulate emotions is usually more developed (Birditt et al., 2005; Magai et al., 2006).

One of the limitations of this study is that causal relationships cannot be established since the study is cross-sectional. A future improvement of the research would be to propose a longitudinal study. On the other hand, the type of sport practiced could influence the profile of physical exercise dependence, so future studies could include the analysis of the different profiles of dependence depending on the physical exercise practiced. In addition, positive and negative affectivity have been evaluated using an instrument that measures the frequency of certain emotions in a time interval, so there could be a bias when collecting information. Likewise, the psychometric properties of the EDS-R instrument in this study are not entirely satisfactory given that in the subscale reduction of other activities the Cronbach's alpha value is .59.

For future lines of research, it is important to keep in mind that exercise dependence is a maladaptive behavior without substance intake; however, the EDS-R scale conceptualizes exercise dependence based on the criteria for substance dependence. Therefore, it would be of interest to explore the specific aspects that characterize exercise dependence as has been done in other addictions, such as pathological gambling. On the other hand, the currently validated version of the EDS-R questionnaire has been preserved in this study, but this version is based on the DSM-4-TR (APA, 2000) classification system, so it would be interesting to update the tool to the DSM-5 (APA, 2013) criteria where the impact and social deterioration caused by addictions are included. Regarding data analysis, given the high number of dependent variables, it would be of interest to perform multivariate analyses in future studies in which the sample has a normal distribution. Moreover, future studies could include the analysis of specific emotional disorders, such as anxiety or depression. On the other hand, the effect of age is significant in the variables

studied. Future studies could carry out cohort studies to determine the different existing profiles according to age.

In conclusion, this study has found that there are significant differences between the three groups (symptomatic dependents, symptomatic non-dependents, and asymptomatic non-dependents), and that dependents score significantly higher in emotional regulation difficulties and in negative affectivity. In addition, a relationship has been found between these variables, with emotional regulation being a predictor of physical exercise dependence. Finally, a mediating effect has been found between difficulties in emotional regulation, negative affectivity, and physical exercise dependence. This study has been of interest since it has confirmed the vulnerability of difficulty in regulating emotions, in relation to negative affectivity, in terms of the development of physical exercise dependence, and allows drawing parallels with other addictions. These results show that improving emotional regulation skills could be of interest for the development of preventive actions against the appearance of physical exercise dependence, as well as for carrying out clinical interventions in people who show symptoms of dependence.

References

Adams, J. (2009). Understanding exercise dependence. *Journal of Contemporary Psychotherapy*, *39*(4), 231-240. doi: 10.1007/s10879-009-9117-5

Adams, J., Miller, T., & Kraus, R. (2003). Exercise dependence: Diagnostic and therapeutic issues for patients in psychotherapy. *Journal of Contemporary Psychotherapy*, *33*(2), 93-107. doi: 10.1023/A:1022883104269

Alcaraz-Ibáñez, M., Paterna, A., Griffiths, M. D., & Sicilia, Á. (2022). An exploratory examination of the relationship between symptoms of depression and exercise addiction among undergraduate recreational exercisers. *International Journal of Mental Health and Addiction*, *20*, 1385-1397. doi: 10.1007/s11469-020-00450-6

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th Ed., Text Rev.). American Psychiatric Association.

American Psychiatric Association, DSM-5 Task Force. (2013). *Diagnostic and statistical manual of mental disorders* (5th Ed.). American Psychiatric Publishing, Inc.

Back, J., Josefsson, T., Ivarsson, A., & Gustafsson, H. (2021). Psychological risk factors for exercise dependence. *International Journal of Sport and Exercise Psychology*, *19*(4), 461-472. doi: 10.1080/1612197X.2019.1674902

Baker, F., Griffiths, M. D., & Calado, F. (2021). Can cycling be addictive? A qualitative interview study among amateur female cyclists. *International Journal of Mental Health and Addiction*. Advance online publication. doi: 10.1007/s11469-021-00624-w

Baker, T. B., Piper, M. E., McCarthy, D. E., Majeskie, M. R., & Fiore, M. C. (2004). Addiction motivation reformulated: An affective processing model of negative reinforcement. *Psychological Review*, *111*(1), 33-51. doi: 10.1037/0033-295X.111.1.33

Barrault, S., Bonnaire, C., & Herrmann, F. (2017). Anxiety, depression and emotion regulation among regular online poker players. *Journal of Gambling Studies*, *33*(4), 1039-1050. doi: 10.1007/s10899-017-9669-3

Berczik, K., Szabó, A., Griffiths, M. D., Kurimay, T., Kun, B., Urbán, R., & Demetrovics, Z. (2012). Exercise addiction: Symptoms, diagnosis, epidemiology, and etiology. *Substance Use and Misuse*, *47*(4), 403-417. doi: 10.3109/10826084.2011.639120

Bircher, J., Griffiths, M. D., Kasos, K., Demetrovics, Z., & Szabo, A. (2017). Exercise addiction and personality: A two-decade systematic review of the empirical literature (1995-2016). *Baltic Journal of Sport & Health Sciences*, *3* (106), 19-33.

Birditt, K. S., Fingerman, K. L., & Almeida, D. M. (2005). Age differences in exposure and reactions to interpersonal tensions: A daily diary study. *Psychology and Aging*, *20*(2), 330-340. doi: 10.1037/0882-7974.20.2.330

Blaszczynski, A., & Nower, L. (2002). A pathways model of problem and pathological gambling. *Addiction*, *97*(5), 487-499. 10.1046/j.1360-0443.2002.00015.x

Bonnet, A., Bréjard, V., & Pedinielli, J. L. (2013). Emotional dispositions and substance use: Mediating effect of alexithymia1. *Psychological Reports: Disability & Trauma*, *112*(1), 289-302. doi: 10.2466/18.09.20.PR0.112.1.289-302

Brunet, J., & Sabiston, C. M. (2011). Exploring motivation for physical activity across the adult lifespan. *Psychology of Sport and Exercise*, *12*(2), 99-105. doi: 10.1016/j.psychsport.2010.09.006

Bruno, A., Quattrone, D., Scimeca, G., Cicciarelli, C., Romeo, V. M., Pandolfo, G., Zoccali, R. A., & Muscatello, M. R. A. (2014). Unraveling exercise addiction: The role of narcissism and self-esteem. *Journal of Addiction*, 1-6. doi: 10.1155/2014/987841

Campbell-Sills, L., Barlow, D. H., Brown, T. A., & Hofmann, S. G. (2006). Effects of suppression and acceptance on emotional responses of individuals with anxiety and mood disorders. *Behaviour Research and Therapy*, *44*(9), 1251-1263. doi: 10.1016/j.brat.2005.10.001

Coffey, K. A., & Hartman, M. (2008). Mechanisms of action in the inverse relationship between mindfulness and psychological distress. *Complementary Health Practice Review*, *13*(2), 79-91. doi: 10.1177/1533210108316307

Costa, S., Hausenblas, H. A., Oliva, P., Cuzzocrea, F., & Larcan, R. (2013). The role of age, gender, mood states and exercise frequency on exercise dependence. *Journal of Behavioral Addictions*, *2*(4), 216-223. doi: 10.1556/JBA.2.2013.014

Crawford, J. R., & Henry, J. D. (2004). The Positive and Negative Affect Schedule (PANAS): Construct validity, measurement properties and normative data in a large non-clinical sample. *British Journal of Clinical Psychology*, *43*(3), 245-265. doi: 10.1348/0144665031752934

De Rick, A., & Vanheule, S. (2007). Alexithymia and DSM-IV personality disorder traits in alcoholic inpatients: A study of the relation between both constructs. *Personality and Individual Differences*, *43*(1), 119-129. doi: 10.1016/j.paid.2006.11.013

De Timary, P., Luts, A., Hers, D., & Luminet, O. (2008). Absolute and relative stability of alexithymia in alcoholic inpatients undergoing alcohol withdrawal: Relationship to depression and anxiety. *Psychiatry Research*, *157*(1-3), 105-113. doi: 10.1016/j.psychres.2006.12.008

Di Lodovico, L., Poulnais, S., & Gorwood, P. (2019). Which sports are more at risk of physical exercise addiction: A systematic review. *Addictive Behaviors*, *93* (December)*,* 257-262. doi: 10.1016/j.addbeh.2018.12.030

Di Trani, M., Renzi, A., Vari, C., Zavattini, G. C., & Solano, L. (2017). Gambling disorder and affect regulation: The role of alexithymia and attachment style. *Journal of Gambling Studies*, *33*(2), 649-659. doi: 10.1007/s10899-016-9637-3

Dorard, G., Berthoz, S., Haviland, M. G., Phan, O., Corcos, M., & Bungener, C. (2008). Multimethod alexithymia assessment in adolescents and young adults with a cannabis use disorder. *Comprehensive Psychiatry*, *49*(6), 585-592. doi: 10.1016/j.comppsych.2008.05.001

Downs, D. S., Hausenblas, H. A., & Nigg, C. R. (2004). Factorial validity and psychometric examination of the Exercise Dependence Scale-Revised. *Measurement in Physical Education and Exercise Science*, *8*(4), 183-201. doi: 10.1207/s15327841mpee0804_1

Egorov, A., & Szabo, A. (2013). The exercise paradox: an interactional model for a clearer conceptualization of exercise addiction. *Journal of Behavioral Addictions*, *2*(4), 199-208. doi: 10.1556/jba.2.2013.4.2

Elhai, J. D., Dvorak, R. D., Levine, J. C., & Hall, B. J. (2017). Problematic smartphone use: A conceptual overview and systematic review of relations with anxiety and depression psychopathology. *Journal of Affective Disorders*, *207*, 251-259. doi: 10.1016/j.jad.2016.08.030

Estévez, A., Herrero, D., Sarabia, I., & Jauregui, P. (2014). El papel mediador de la regulación emocional entre el juego patológico, uso abusivo de Internet y videojuegos y la sintomatología disfuncional en jóvenes y adolescentes [The mediating role of emotional regulation between pathological gambling, Internet and video game abuse and dysfunctional symptomatology in youth and adolescents]. *Adicciones*, *26*(4), 282-290. doi: 10.20882/adicciones.26

Estévez, A., Jáuregui, P., & Macía, L. (2021). Profiles of gamblers with gambling disorder in terms of impulsivity and emotional regulation. *Behavioral Psychology/ Psicología Conductual*, *29*(3), 681-697. doi: 10.51668/bp.8321310s

Estévez, A., Jáuregui, P., Sánchez-Marcos, I., López-González, H., & Griffiths, M. D. (2017). Attachment and emotion regulation in substance addictions and behavioral addictions. *Journal of Behavioral Addictions*, *6*(4), 534-544. doi: 10.1556/2006.6.2017.086

Estévez, A., Urbiola, I., Iruarrizaga, I., Onaindia, J., & Jauregui, P. (2017). Dependencia emocional en el noviazgo y consecuencias psicológicas del abuso de internet y móvil en jóvenes [Emotional dependence in courtship and psychological consequences of internet and mobile phone abuse in young people]. *Anales de Psicología*, *33*(2), 260-268. doi: 10.6018/analesps.33.2.255111

Etchemendy, E., Herrero, R., Espinoza, M., Molinari, G., Corno, G., Carrillo-Vega, A., Botella, C., & Baños, R. (2016). "Good things never last": Dampening positive emotions influences our optimism levels. *Anales de Psicología*, *32*(3), 704-709. doi: 10.6018/analesps.32.3.261631

Fox, H. C., Hong, K. A., & Sinha, R. (2008). Difficulties in emotion regulation and impulse control in recently abstinent alcoholics compared with social drinkers. *Addictive Behaviors*, *33*(2), 388-394. doi: 10.1016/j.addbeh.2007.10.002

Garland, E. L., Bell, S., Atchley, R. M., & Froeliger, B. (2018). *The Oxford handbook of emotion dysregulation.* Oxford University Press.

Garofalo, C., Velotti, P., & Zavattini, G. C. (2016). Emotion dysregulation and hypersexuality: Review and clinical implications. *Sexual and Relationship Therapy*, *31*(1), 3-19. doi: 10.1080/14681994.2015.1062855

González, M., Ramírez, G., Brajin, M., & Londoño, C. (2017). Estrategias cognitivas de control, evitación y regulación emocional: el papel diferencial en pensamientos repetitivos negativos e intrusivos [Cognitive strategies of control, avoidance and emotional regulation: The differential role in repetitive negative and intrusive thoughts]. *Ansiedad y Estrés*, *23*(2-3), 84-90. doi: 10.1016/j.anyes.2017.09.005

Gratz, K. L., Bornovalova, M. A., Delany-Brumsey, A., Nick, B., & Lejuez, C. W. (2007). A laboratory-based study of the relationship between childhood abuse and experiential avoidance among inner-city substance users: The role of emotional nonacceptance. *Behavior Therapy*, *38*(3), 256-268. doi: 10.1016/j.beth.2006.08.006

Gratz, K. L., & Roemer, L. (2004). Multidimensional assessment of emotion regulation and dysregulation: Development, factor structure, and initial validation of the difficulties in emotion regulation scale. *Journal of Psychopathology and Behavioral Assessment, 26*(1), 41-54. doi: 10.1023/B:JOBA.0000007455.08539.94

Griffiths, M. D. (2005). A "components" model of addiction within a biopsychosocial framework. *Journal of Substance Use*, *10*(4), 191-197. doi: 10.1080/14659890500114359

Gross, J. J. (2015). The extended process model of emotion regulation: Elaborations, applications, and future directions. *Psychological Inquiry*, *26*(1), 130-137. doi: 10.1080/1047840X.2015.989751

Gross, J. J., & Jazaieri, H. (2014). Emotion, emotion regulation, and psychopathology: An affective science perspective. *Clinical Psychological Science*, *2*(4), 387-401. doi: 10.1177/2167702614536164

Gross, J. J., & John, O. P. (2003). Individual differences in two emotion regulation processes: Implications for affect, relationships, and well-being. *Journal of Personality and Social Psychology*, *85*(2), 348-362. doi: 10.1037/0022-3514.85.2.348

Guszkowska, M., & Rudnicki, P. (2012). Mood changes in physically active men in situations of imagined discontinuation of physical exercises as an indication of the risk of addiction to physical exercises. *Polish Journal of Sport and Tourism*, *19*(1), 16-20. doi: 10.2478/v10197-012-0003-4

Hamer, M., & Karageorghis, C. I. (2007). Psychobiological mechanisms of exercise dependence. *Sports Medicine*, *37*(6), 477-484.

Handelsman, L., Stein, J. A., Bernstein, D. P., Oppenheim, S. E., Rosenblum, A., & Magura, S. (2000). A latent variable analysis of coexisting emotional deficits in substance abusers: Alexithymia, hostility, and PTSD. *Addictive Behaviors*, *25*(3), 423-428. doi: 10.1016/s0306-4603(99)00010-6.

Hausenblas, H. A., & Downs, D. S. (2002). Exercise dependence: A systematic review. *Psychology of Sport and Exercise*, *3*(2), 89-123. doi: 10.1016/S1469-0292(00)00015-7

Haviland, M. G., Hendryx, M. S., Shaw, D. G., & Henry, J. P. (1994). Alexithymia in women and men hospitalized for psychoactive substance dependence. *Comprehensive Psychiatry*, *35*(2), 124-128. doi: 10.1016/0010-440X (94)90056-N

Hervás, G., & Jódar, R. (2008). Adaptación al castellano de la Escala de dificultades en la regulación emocional [Spanish adaptation of the Difficulties in Emotional Regulation Scale]. *Clínica y Salud*, *19*(2), 139-156.

Jauregui, P., Estévez, A., & Urbiola, I. (2016). Pathological gambling and associated drug and alcohol abuse, emotion regulation, and anxious-depressive symptomatology. *Journal of Behavioral Addictions*, *5*(2), 251-260. doi: 10.1556/2006.5.2016.038

Kun, B., & Demetrovics, Z. (2010). Emotional intelligence and addictions: A systematic review. *Substance Use and Misuse*, *45*(7-8), 1131-1160. doi: 10.3109/10826080903567855

Kun, B., Urbán, R., Szabo, A., Magi, A., Eisinger, A., & Demetrovics, Z. (2021). Emotion dysregulation mediates the relationship between psychological distress, symptoms of exercise addiction and eating disorders: A large-scale survey among fitness center users. *Sport, Exercise, and Performance Psychology*, *11*(2), 198-213. doi: 10.1037/spy0000274

Li, M., Nie, J., & Ren, Y. (2015). Effects of exercise dependence on psychological health of Chinese college students. *Psychiatria Danubina*, *27*(4), 413-419.

López-Gómez, I., Hervás, G., & Vázquez, C. (2015). Adaptación de la "Escala de afecto positivo y negativo" (PANAS) en una muestra general española [Adaptation of the Positive and Negative Affect Scale (PANAS) in a general Spanish sample]. *Behavioral Psychology/Psicología Conductual*, *23*(3), 529-548.

Lukács, A., Sasvári, P., Varga, B., & Mayer, K. (2019). Exercise addiction and its related factors in amateur runners. *Journal of Behavioral Addictions*, *8*(2), 343-349. doi: 10.1556/2006.8.2019.28

Magai, C., Consedine, N. S., Krivoshekova, Y. S., Kudadjie-Gyamfi, E., & McPherson, R. (2006). Emotion experience and expression across the adult life span: Insights from a

multimodal assessment study. *Psychology and Aging*, *21*(2), 303-317. doi: 10.1037/0882-7974.21.2.303

Marchica, L. A., Mills, D. J., Derevensky, J. L., & Montreuil, T. C. (2019). The role of emotion regulation in video gaming and gambling disorder: A systematic review. *Canadian Journal of Addiction*, *10*(4), 19-29. doi: 10.1097/CXA.0000000000000070

Mehroof, M., & Griffiths, M. D. (2010). Online gaming addiction: The role of sensation seeking, self-control, neuroticism, aggression, state anxiety, and trait anxiety. *Cyberpsychology, Behavior, and Social Networking*, *13*(3), 313-316.

Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods*, *40*(3), 879-891. doi: 10.3758/BRM.40.3.879

Riley, B. (2014). Experiential avoidance mediates the association between thought suppression and mindfulness with problem gambling. *Journal of Gambling Studies*, *30*(1), 163-171. doi: 10.1007/s10899-012-9342-9

Russell, J. A. (1980). A circumplex model of affect. *Journal of Personality and Social Psychology*, *39*(6), 1161-1178. doi: 10.1037/h0077714

Salsman, N. L., & Linehan, M. M. (2012). An investigation of the relationships among negative affect, difficulties in emotion regulation, and features of borderline personality disorder. *Journal of Psychopathology and Behavioral Assessment*, *34*(2), 260-267. doi: 10.1007/s10862-012-9275-8

Schreiber, L. R. N., Grant, J. E., & Odlaug, B. L. (2012). Emotion regulation and impulsivity in young adults. *Journal of Psychiatric Research*, *46*(5), 651-658. doi: 10.1016/j.jpsychires.2012.02.005

Schüler, J., Knechtle, B., & Wegner, M. (2018). Antecedents of exercise dependence in ultra-endurance sports: reduced basic need satisfaction and avoidance-motivated self-control. *Frontiers in Psychology*, *9*. doi: 10.3389/fpsyg.2018.01275

Sheppes, G., Suri, G., & Gross, J. J. (2015). Emotion regulation and psychopathology. *Annual Review of Clinical Psychology*, *11*, 379-405. doi: 10.1146/annurev-clinpsy-032814-112739

Sicilia, Á., & González-Cutre, D. (2011). Dependence and physical exercise: Spanish validation of the Exercise Dependence Scale-Revised (EDS-R). *The Spanish Journal of Psychology*, *14*(1), 421-431. doi: 10.5209/rev_SJOP.2011.v14.n1.38

Starcevic, V., & Khazaal, Y. (2017). Relationships between behavioural addictions and psychiatric disorders: What is known and what is yet to be learned? *Frontiers in Psychiatry*, *8*(53). doi: 10.3389/fpsyt.2017.00053

Sussman, S., Lisha, N., & Griffiths, M. (2011). Prevalence of the addictions: A problem of the majority or the minority? *Evaluation and the Health Professions*, *34*(1), 3-56. doi: 10.1177/0163278710380124

Szabo, A. (1995). The impact of exercise deprivation on well-being of habitual exercisers. *Australian Journal of Science and Medicine in Sport, 27*, 68-75.

Szabo, A. (2010). Addiction to exercise: A symptom or a disorder? Nova Science.

Szabo, A., Griffiths, M., de La Vega Marcos, R., Mervó, B., & Demetrovics, Z. (2015). Methodological and conceptual limitations in exercise addiction research. *Yale Journal of Biology and Medicine*, *88*(3), 303-308.

Taylor, G. J., Michael Bagby, R., & Parker, J. D. A. (1991). The alexithymia construct: A potential paradigm for psychosomatic medicine. *Psychosomatics*, *32*(2), 153-164. doi: 10.1016/S0033-3182(91)72086-0

Terracciano, A., McCrae, R. R., & Costa, P. T., Jr. (2003). Factorial and construct validity of the Italian Positive and Negative Affect Schedule (PANAS). *European Journal of Psychological Assessment*, *19*(2), 131-141. doi: 10.1027//1015-5759.19.2.131

Thompson, E. R. (2007). *Development and validation of an internationally reliable short-form of the Positive and Negative Affect Schedule (PANAS)*. *38*(2), 227-242. doi: 10.1177/0022022106297301

Thorberg, F. A., Young, R. M. D., Sullivan, K. A., & Lyvers, M. (2009). Alexithymia and alcohol use disorders: A critical review. *Addictive Behaviors*, *34*(3), 237-245. doi: 10.1016/j.addbeh.2008.10.016

Tice, D. M., Bratslavsky, E., & Baumeister, R. F. (2001). Emotional distress regulation takes precedence over impulse control: If you feel bad, do it! *Journal of Personality and Social Psychology*, *80*(1), 53-67. doi: 10.1037/0022-3514.80.1.53

Trott, M., Jackson, S. E., Firth, J., Jacob, L., Grabovac, I., Mistry, A., Stubbs, B., & Smith, L. (2021). A comparative meta-analysis of the prevalence of exercise addiction in adults with and without indicated eating disorders. *Eating and Weight Disorders*, *26*(1), 37-46. doi: 10.1007/s40519-019-00842-1

Vorspan, F., Mehtelli, W., Dupuy, G., Bloch, V., & Lépine, J. P. (2015). Anxiety and substance use disorders: Co-occurrence and clinical issues. *Current Psychiatry Reports*, *17*(2), 1-7. doi: 10.1007/s11920-014-0544-y

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology, 54*(6), 1063-1070. doi: 10.1037/0022-3514.54.6.1063

Weiss, N. H., Tull, M. T., Sullivan, T. P., Dixon-Gordon, K. L., & Gratz, K. L. (2015). Posttraumatic stress disorder symptoms and risky behaviors among trauma-exposed inpatients with substance dependence: The influence of negative and positive urgency. *Drug and Alcohol Dependence*, *155*, 147-153. doi: 10.1016/j.drugalcdep.2015.07.679

Williams, A. D., & Grisham, J. R. (2012). Impulsivity, emotion regulation, and mindful attentional focus in compulsive buying. *Cognitive Therapy and Research*, *36*(5), 451-457. doi: 10.1007/s10608-011-9384-9

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