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Condición física y bienestar emocional en escolares de 7 a 12 años

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Resumen

El incremento de la prevalencia de conductas y trastornos que pueden afectar gravemente el bienestar emocional infantil es un hecho. Sin embargo, aunque la relación causal entre condición física y salud biológica se encuentra bien establecida, la asociación entre la condición física y algunas dimensiones de la salud psicológica es menos evidente. El objetivo de esta investigación fue analizar la relación entre la condición física y el bienestar emocional de escolares. Se realizó un estudio inferencial mediante análisis de la covarianza ajustada por edad en una muestra de 212 escolares (120 mujeres) de 7 a 12 años de edad, seleccionada por conveniencia, en la que se aplicó la Batería ALPHA-fitness para medir la condición física y el Strengths and Difficulties Questionnaire para evaluar el bienestar emocional. Los resultados mostraron que los participantes con mayor condición física ($X \geq P_{50}$) obtuvieron valores más positivos en problemas de conducta ($p = .002$), hiperactividad ($p < .001$), problemas con compañeros ($p = .028$), conducta prosocial ($p < .001$), y puntuación total de dificultades ($p = .029$); mientras que los escolares con menor nivel en la puntuación total de dificultades ($X < P_{40}$) tuvieron un mejor rendimiento en 4 x 10 m ($p = .010$), dinamometría manual ($p = .050$), Course-Navette ($p = .050$) y condición física general ($p = .040$). Estos resultados sugieren una relación positiva y bidireccional entre la condición física y el bienestar emocional; y, por tanto, se refuerza la necesidad de impulsar programas de mejora de la salud que tengan en cuenta la condición física y evalúen su efecto sobre las capacidades psicológicas de los escolares.

Palabras clave: condición física, actividad física, bienestar emocional, educación física, niños.

Physical fitness and emotional well-being in school children aged 7 to 12 years

Abstract

The increase in the prevalence of behaviors and disorders severely affecting children's emotional well-being is a fact. The causal relationship between fitness and biological health is well established. However, the relationship between fitness and some dimensions of psychological health is less evident. The aim of this paper was to analyze the relationship between fitness and emotional well-being. The *ALPHA-fitness Battery* was used to assess fitness, and the *Strengths and Difficulties Questionnaire*, to assess emotional well-being. A convenience sample of 212 school children (120 women) aged 7-12 years was used. An inferential study was carried out by means of covariance analysis adjusted by age. The results showed that those children with higher fitness ($X \geq P_{50}$) had more positive values in behavior problems ($p = 0,002$), hyperactivity ($p < 0,001$), problems with partners ($p = 0,028$), prosocial behavior ($p < 0,001$) and total score of difficulties ($p = 0,029$). Students with a lower level of total difficulties score ($X < P_{40}$) had a better performance in 4 x 10m ($p = 0,010$), manual dynamometry ($p = 0,050$), Course-Navette ($p = 0,050$) and general fitness ($p = 0,040$) with respect to those with medium and high levels. These results suggest a positive and bidirectional relationship between fitness and emotional well-being in primary school children. Therefore, it reinforces the need to promote programs to improve health related fitness and assess their effect on the psychological abilities of school children.

Key words: fitness, physical activity, emotional well-being, physical education, children

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Condição física e bem-estar emocional em estudantes de 7 a 12 anos

Resumo

O aumento da prevalência de consultas e transtornos que podem afetar gravemente o bem-estar emocional infantil é um fato. No entanto, ainda que a relação causal entre condição física e saúde biológica esteja bem estabelecida, a associação entre a condição física e algumas dimensões da saúde psicológica é menos evidente. O objetivo desta pesquisa foi analisar a relação entre a condição física e o bem-estar emocional de crianças em idade escolar. Realizou-se um estudo inferencial mediante a análise da covariância ajustada por idade em uma amostra de 212 estudantes (120 mulheres) de 7 a 12 anos de idade, selecionada por conveniência, na qual aplicou-se a bateria ALPHA-Fitness para medir a condição física e o *Strengths and Difficulties Questionnaire* para avaliar o bem-estar emocional. Os resultados mostraram que os participantes com maior condição física ($X \geq P50$) obtiveram valores mais positivos em problemas de conduta ($p = .002$), hiperatividade ($p < .001$), problemas com colegas ($p = .028$), conduta pró-social ($p < .001$) e pontuação total de dificuldades ($p = .029$); enquanto os estudantes com menor nível na pontuação total de dificuldades ($X < P40$) tiveram um melhor rendimento em 4 x 10 m ($p = .010$), dinamometria manual ($p = .050$), Course-Navette ($p = .050$) e condição física geral ($p = .040$). Esses resultados sugerem uma relação positiva e bidirecional entre a condição física e o bem-estar emocional e, portanto, reforça-se a necessidade de impulsionar programas de melhoria da saúde que levem em consideração a condição física e avaliem seu efeito sobre as capacidades psicológicas das crianças em idade escolar.

Palavras-chave: atividade física, bem-estar emocional, condição física, crianças, educação física.

INTRODUCTION

The available scientific evidence indicates that the practice of physical activity from moderate (≥ 3 METS) to vigorous (≥ 6 METS) intensity not only favors psychobiological health (Blair, 2009; Ortega, Ruiz & Castillo, 2013; Rosa, García-Cantó, Rodríguez-García & Pérez-Soto, 2017a), but is a major factor as a coadjutant and preventive treatment of diseases in the elderly (Mavrovouniotis, Argiriadou & Papaioannou, 2010), adults (Hackney & Earhart, 2010) and young people (Jeong et al., 2005).

At the physiological level, it represents one of the most economical and effective strategies in the fight against obesity in childhood and adolescence (Gálvez et al., 2015a, Gálvez et al., 2015b, Gálvez et al., 2015c). At a psychosocial level, physical activity can help to reduce levels of depression, fatigue, anxiety, perceived stress; improves attention, self-esteem, mood and self-concept in adults and young people (Babiss & Gangwisch, 2009, Bernstein & Mc Nally, 2017, Jiménez, Martínez, Miró & Sánchez, 2008, Panagiotopoulos et al., 2011).

Although there is some controversy among the scientific community (Martínez-Vizcaino & Sánchez-López, 2008), the evidence points to the fact that systematized physical activity can increase the levels of physical fitness (CF) in children and young people (Dencker et al., 2006). This relationship might be bidirectional (Rosa et al., 2017b).

Fitness Condition (FC) is defined as the ability to perform physical activity (or physical exercise) (Ortega et al., 2013), and its assessment represents a measure that describes the integrated state of the main organic functions (musculoskeletal, cardio-respiratory, hemato-circulatory, endocrine-metabolic and psycho-neurological) that intervene in body movement (Gálvez et al., 2015b).

The causal relationship between FC and biological health is well established (Ortega et al., 2009, Ortega et al., 2013). However, the relationship between FC and other dimensions of psychological health (emotions, thoughts, mood, and others) is less evident, with contradictory results (Berstein & Mc Nally, 2017; Rosa-Guillamón & García-Cantó, 2016; Rosa, García-Cantó, Rodríguez-García & Pérez-Soto, 2016, Rosa, García-Cantó, Rodríguez-García & Pérez-Soto, 2017a). Psychological health is understood as the well-being state in which the individual is aware of his own abilities, can face the normal stresses of life, can work productively and fruitfully and is able to make a contribution to their community (World Organization of Health, 2013).

One of the dimensions of psychological health is the emotional well-being defined by Diener, Suh, Lucas and Smith (1999) as an individual construction that includes positive measures such as positive affect, happiness, life satisfaction, and others, as well as negative measures such as negative affect, anxiety, stress, depression, among others.

A direct relationship between FC and emotional well-being has been described in young people (Jeoung, Hong & Lee, 2013). Likewise, an association between aerobic capacity and subjective happiness has been observed (Jiménez-Moral, Zagalaz, Molero, Pulido-Martos & Ruiz, 2013), and between aerobic capacity and life satisfaction (Padilla-Moledo et al., 2012).

In primary school children, a relationship has been found between FC and some constructs that influence emotional well-being such as perceived quality of life (Gálvez et al., 2015a, Rosa-Guillamón et al., 2016), general self-concept (Gálvez et al., 2016, Rodríguez-García et al., 2014), social and behavioral self-concept (Rodríguez et al., 2015), and social anxiety (Gálvez et al., 2016).

Although colloquial wisdom and some studies suggest a strong association between regular physical activity, FC and emotional well-being (Biddle & Asare, 2011; Philipsson, Duberg, Moller & Hagberg, 2013; Soyeon & Fedewa, 2011; West, Otte, Geher, Johnson & Mohr, 2004), the nature of this link continues to be poorly understood (Berstein & McNally, 2017), especially in childhood (Rosa-Guillamón & García-Cantó, 2016; Rosa et al., 2016). In addition, there is an increase in the prevalence of psychosocial disorders that can seriously affect the emotional well-being of children, a fact that raises concerns among researchers and health and educational institutions (Navarro-Pardo, Meléndez, Sales & Sancerni, 2012). Subjects at a school age are in a complex process of changes at a physiological, psychological and socio-affective level that can affect the construction of a balanced personality, the adoption of social adjusted behaviors and an autonomous and healthy lifestyle at later ages (Gálvez et al., 2015b; Rosa et al., 2016). Contributing to the improvement of their FC status and emotional well-being, by increasing the opportunities of physical practice could favor the acquisition of other healthy habits (Rosa et al., 2017a, b). Based on the studies mentioned, it is hypothesized that school children with better FC have a more positive perception of their emotional well-being. Therefore, the objective of this paper was to analyze the relationship of FC and emotional well-being in a sample of primary school children.

METHOD

Design

This research consisted of an observational, cross-sectional, ex post facto empirical study (Thomas & Nelson, 2007).

Participants

The study used a convenience sample made up of 212 school children (92 men, 120 women) aged 7-12 years ($M \pm SD$: 9.59 ± 1.09 years), belonging to four public schools from the Region of Murcia (see Table 1). Informed consent was obtained from parents / legal tutors. The presence of mental or bone-joint diseases was considered as an exclusion criterion.

Variables and instruments

The FC was measured with the ALPHA-Fitness Battery based on evidence (Ruiz et al., 2011). The following indicators were included: (a) upper train strength (hand dynamometry); (b) lower train strength (longitudinal jump); (c) aerobic capacity (Course-Navette). The measurement of body fat was not included for reasons of time availability. The 4 x 10 m test (speed-agility) was added. The selected tests allow an objective and complete evaluation of the FC (Ortega et al., 2005), and have a direct relationship with health, according to the postulates of the American College of Sport Medicine (Amstrong, Whaley, Brubaker & Otto, 2005). The study protocol has been described in other studies (Gálvez et al., 2015b, Rosa et al., 2016, Rosa et al., 2017). The reliability and validity of these tests have been previously analyzed in populations with similar sociodemographic characteristics to those of this research, yielding values in the intraclass and interexploration correlation coefficient between 0.95 and 0.99, in both cases (Rosa, Rodríguez-García, García-Cantó & Pérez-Soto, 2015).

The variable FC-ALPHA was created by adding the average escalation of scores in each FC test (Rodríguez-García et al., 2014; Rosa et al., 2016). The participants were categorized into two levels of FC adjusted according to

Table 1
Sample distribution

	7 years	8 years	9 years	10 years	11 years	12 years
Male, n(%)	21 (22.8)	10 (1.9)	4 (4.3)	9 (9.8)	39 (42.4)	9 (9.8)
Female, n (%)	17 (14.2)	12 (1.0)	15 (12.5)	15 (12.5)	53 (44.2)	8 (6.7)

sex: lower (mFC) $X < P50$, higher (MFC) $X \geq P50$. (Rosa-Guillamón & García-Cantó, 2016). In men, the P50 was 5.75, while in women the P50 was 4.50.

Emotional well-being was evaluated with the Strengths and Difficulties Questionnaire (SDQ, Goodman, 1997). The SDQ is used to assess different emotional and behavioral problems related to psychological abilities in subjects aged 4-16 years, taking the last six months as a reference criterion. It is composed of 25 items distributed in five sub-scales: emotional symptoms, behavioral problems, problems with partners, hyperactivity and pro-social behavior. Each item presents three different response modalities (*it is not true*, *it is half true*, and *it is entirely true*) that are scored zero, one and two respectively. The scale of positive aspects (prosocial behavior) is scored in reverse order. Each scale is scored between zero and 10.

The sum of the records of the five scales results in a global assessment called Total Difficulty Score (TDS), with values between zero and 40. A high score is indicative of a greater affective and behavioral symptomatology. The students were categorized into three groups according to their TDS level: under $X < P40$; medium $P40 \leq X < P80$; and, high $X \geq P80$.

The validity and reliability of the SDQ has been demonstrated (Goodman, Ford, Simmons, Gatward & Meltzer, 2000, Goodman, Renfrew & Mullick, 2000, Goodman & Scott, 1999, Ruchkin, Jones, Vermeiren & Schwab-Stone, 2008). In this study, reliability tests as well as a confirmatory factor analysis were applied to the 25 items of the scale to verify the grouping of items in the different sub-scales originally defined (Goodman, 1997).

All the items of the scale have consistency and reliability, considering that if any of them were eliminated, the variance explained and the global reliability in each sub-construct and in the global scale would decrease. The global PTD scale showed good reliability ($\alpha = 0.892$). The reliability of the different sub-constructs was the following: emotional symptoms (0.876), behavioral problems (0.856), problems with peers (0.923), hyperactivity (0.798) and pro-social behavior (0.865). The explained variance by each of the sub-constructs was: emotional symptoms (12.45%), behavioral problems (15.45%), problems with peers (23.64%), hyperactivity (11.34%) and pro-social behavior (14.67%). The total explained variance was 77.88%.

Procedure

Data were collected during the academic year 2016/17, during school hours, visiting the centers during the month of February. The team of researchers consisted of two physical education teachers and the principal investigator conducted

a theoretical-practical training session. It was recommended not to carry out sports activities the previous afternoon, not to alter the usual diet and wear light sportswear. Firstly, a warm-up based on dynamic joint mobility was performed. The SDQ was administered collectively in a room that allowed privacy and freedom in the completion. The average time to complete it was 20 minutes.

Statistical Analysis

Descriptive analysis was performed. The distribution of the sample was normal when applying the Kolmogorov-Smirnov test. The differences according to sex (males = 0 and women = 1) were studied by analysis of the covariance (ANCOVA) adjusted by age (9.76 years) for continuous variables, and the Pearson chi-square test for categorical variables. The differences in emotional well-being were studied through an analysis of covariance (ANCOVA) adjusted by sex. The differences in the FC according to the TDS were studied by means of an ANCOVA test adjusted by sex. The effect size was estimated by calculating the η^2 . The statistical significance was set at $p \leq 0.05$. The statistical program SPSS (v.19.0, Chicago, Illinois, USA) was implemented.

Ethical considerations

The research was developed following the deontological norms recognized by the Declaration of Helsinki (revision of 2013). The research received the approval from the Bioethics Committee of the University of Murcia.

RESULTS

Table 2 shows the differences in FC and in emotional well-being according to sex. The ANCOVA test detected statistically significant differences; in this way, males showed higher records in the tests of 4 x 10 m ($p = 0.002$), longitudinal jump ($p = 0.033$), Course-Navette ($p < 0.001$) and CF ($p < 0.001$), as well as in pro-social behavior ($p = 0.050$).

Regarding women, no significant differences were reported in the rest of the variables analyzed ($p > 0.1$ in all).

Table 3 shows the results of emotional well-being according to the FC level. The ANCOVA test reported statistically significant differences; thus, students with MFC-ALPHA showed higher records on the variables of emotional symptoms ($p = 0.001$), problems with classmates ($p = 0.015$) and TDS ($p = 0.013$), with respect to those with mFC-ALPHA.

Table 4 presents the values of the FC tests according to the level of TDS. The ANCOVA test registered statistically

Table 2
Sex differences according to study variables

	Males (n = 92) M ± DE (IC 95 %)	Females (n = 120) M ± DE (IC 95 %)	F	p value	η ²
4x10m (s)	13.4 ± 1.4 (13.1-13.6)	13.9 ± 1.4 (13.7-14.1)	-2.886	.002	.045
Manual dynamometry (kg.)	16.2 ± 5.7 (15.6-17.1)	15.8 ± 5.1 (14.9-16.3)	-.370	.149	.010
Longitudinal jump (cm.)	105.2 ± 2.2 (101.3-109.5)	99.7 ± 21.0 (95.9-103.1)	-2.237	.033	.021
Course-Navette (paliers)	3.9 ± 1.8 (3.6-4.2)	2.9 ± 1.3 (2.6-3.1)	-3.987	< .001	.101
FC-ALPHA	5.9 ± 2.1 (5.7-6.4)	4.9 ± 2.1 (4.6-5.2)	-3.368	< .001	.100
mFC, n (%)	49 (43.8)	63 (56.3)	1.750*	.120	-
MFC, n (%)	43 (43.0)	57 (57.0)	1.960*	.162	-
Emotional symptoms	2.1 ± 1.9 (1.6-2.5)	2.5 ± 2.4 (2.1-2.9)	2.431	.120	.011
Behavior problems	1.7 ± 1.7 (1.4-2.1)	1.4 ± 1.6 (1.1-1.7)	2.006	.158	.010
Hiperactivity	3.2 ± 2.1 (2.8-3.7)	3.1 ± 2.2 (2.7-3.5)	.210	.648	.001
Problems with classmates	1.9 ± 1.9 (1.5-2.3)	1.6 ± 1.7 (1.3-1.9)	1.429	.233	.007
Pro-social behavior	8.5 ± 1.5 (8.2-8.8)	8.9 ± 1.4 (0.6-9.1)	3.359	.050	.016
Total difficulties score	9.0 ± 5.2 (7.8-10.1)	8.6 ± 5.5 (7.7-9.6)	.140	.709	.001
Low, n (%)	38 (40.4)	56 (59.6)	1.471*	.225	-
Medium, n (%)	35 (46.1)	41 (53.9)	.059*	.808	-
High, n (%)	19 (45.2)	23 (54.8)	1.143*	.285	-

Note: ($p < 0.001$) y CF ($p < 0.001$), así como en conducta prosocial ($p = 0.050$) con CF-ALPHA = Fitness condition; mCF = low fitness condition; MCF = high fitness condition f. * Chi-square.

Table 3
Differences in emotional well-being according to fitness condition

	mCF-ALPHA (n = 112) M ± DE (IC 95%)	MCF-ALPHA (n = 110) M ± DE (IC 95%)	F	p value	η ²
Emotional symptoms	2.8 ± 2.4 (2.4-3.2)	1.7 ± 1.7 (1.3-2.2)	11.718	.001	.053
Behavior problems	1.6 ± 1.8 (1.3-1.9)	1.4 ± 1.4 (1.1-1.7)	.523	.470	.002
Hyperactivity	3.2 ± 2.2 (2.8-3.6)	3.1 ± 2.1 (2.7-3.6)	.024	.877	< .001
Problems with classmates	2.1 ± 1.7 (1.7-2.4)	1.4 ± 1.8 (1.1-1.8)	5.970	.015	.028
Pro-social conduct	8.7 ± 1.4 (8.4-9.1)	8.7 ± 1.5 (8.4-9.1)	.022	.883	< .001
Total difficulties score	9.6 ± 5.7 (8.6-10.6)	7.8 ± 4.9 (6.7-8.8)	6.280	.013	.029

Note: CF-ALPHA = Fitness condition; mCF = low fitness condition; MCF = high fitness condition.

significant differences, so that those with a high level of TDS had lower records in the tests of 4 x 10 m ($p = 0.010$), manual dynamometry ($p = 0.050$), Course-Navette ($p = 0.050$) and FC-ALPHA ($p = 0.004$) with respect to their peers with a medium or low level.

DISCUSSION

The results of this study indicate that FC is positively associated with emotional well-being in Spanish school children aged 7 to 12 years; in this way, those with MFC ($X \geq P50$) showed more positive values in the dimensions of behavioral problems ($p = 0.002$), hyperactivity ($p < 0.001$),

problems with classmates ($p = 0.028$), prosocial behavior ($p < 0.001$) and TDS ($p = 0.029$), than their pairs with mCF ($X < P50$). In addition, the results show that this relationship could be bidirectional since the students with low levels of TDS ($X < P40$) presented a better FC, since they showed a better physical performance in the tests of 4 x 10 m ($p = 0.006$), manual dynamometry ($p = 0.042$), Course-Navette ($p = 0.050$), and FC-ALPHA ($p = 0.008$), than their peers with a medium ($P40 \leq X < P80$) or high level ($X \geq P80$) of TDS.

These findings could reveal the importance of FC as a differentiating element in emotional well-being in childhood and preadolescence, and could be due to different aspects. On the one hand, it has been reported that having a better

Table 4

Differences in fitness condition according to the total difficulties score

	Low (n = 94) M ± DE (IC 95 %)	Medium (n = 76) M ± DE (IC 95 %)	High (n = 92) M ± DE (IC 95 %)	F	p value	η ²
4x10m (s)	13.5 ± 1.3 (13.2-13.7)	13.6 ± 1.4 (13.3-13.9)	14.3 ± 1.4 (13.8-14.7)	4.678	.010	.043
Hand dynamometry (kg)	16.9 ± 4.8 (15.8-17.9)	15.4 ± 5.7 (14.2-16.6)	14.8 ± 5.5 (13.1-16.4)	2.853	.050	.027
Longitudinal jump (cm)	102.8 ± 21.2 (98.7-107.1)	104.5 ± 21.5 (99.7-109.1)	96.1 ± 17.7 (89.7-102.2)	2.371	.096	.022
Course-Navette (paliers)	3.5 ± 1.5 (3.2-3.8)	3.4 ± 1.8 (3.1-3.7)	2.8 ± 1.5 (2.3-3.3)	2.790	.050	.026
FC-ALPHA	5.7 ± 2.1 (5.3-6.2)	5.5 ± 2.2 (5.1-5.9)	4.5 ± 1.8 (3.9-5.1)	5.782	.004	.053

Note: TDS = Total difficulties score; FC-ALPHA = fitness condition; mFC = low fitness condition; MFC = high fitness condition..

(or worse) FC state can change the way young people respond to their emotions and exhibit consistent patterns of behavior, although the processes underlying this relationship continue to be unproven (Bernstein & McNally, 2017).

Also, these arguments can be of great relevance in the formation of the bases of personality, given that identities that are not formed or behaviors that are not consolidated could be influenced by sociocultural factors such as friends, family, media as well as by current physical stereotypes (Ruiz-Pérez, Rioja-Collado, Graupera-Sanz, Palomo-Nieto & García-Coll, 2015).

On the other hand, it has been described that having a healthy FC state is an integrated and effective response of the structures and functions involved in undertaking not only physical sports activities but also in developing physical activities of daily life (Gálvez et al., 2015b; Rosa et al., 2017), being one of the most relevant psycho-neurological functions (Ortega et al., 2013).

Other studies have concluded that having a higher level of FC is associated with a better self-perception in different variables related to negative emotional well-being, such as social anxiety, and positive well-being, as subjective happiness and life satisfaction (Gálvez et al., 2016; -García et al., 2014; Rodríguez-García et al., 2015).

Finally, FC has been directly related to motor competence, which allows the individual with better physical qualities to be able to carry out complex motor tasks, being more efficient and effective in the sociocultural environment in which he or she develops as a person; it also facilitates the frequency and variety of physical activities, and expands opportunities for social relationships (Ruiz-Pérez et al., 2015).

The impossibility of finding research in the scientific literature that analyzes the association between FC and emotional well-being in elementary school children makes it difficult to discuss the findings of this study by making

direct comparisons. However, the results of this study partially coincide with the findings reported by Jeoung et al. (2013), in a study carried out with 228 university students, in which a strong association was observed between various variables determining the FC status such as hand grip strength, aerobic resistance, muscular strength-endurance and body composition, with different dimensions that influence emotional well-being (especially in young people and adults) such as somatization, psychosis, paranoia, phobia, hostility, anxiety, depression, interpersonal sensitivity and compulsive obsession (non-standardized β -0.535 and 0.287; R^2 between 0.048 and 0.177; p between <0.001 and 0.032).

On the other hand, Padilla-Moledo et al. (2012), in a cross-sectional study concluded, after studying 684 participants from 6 to 17.9 years (319 women), that young people with better aerobic capacity (measured with the Course-Navette test) had a higher probability of having a more positive emotional well-being (evaluated through the Health Behavior in School-aged Children questionnaire).

Along with those studies, Jiménez-Moral et al. (2013) observed in 388 participants from 12 to 18 years (207 women), a significant relationship of aerobic capacity (measured with the Course-Navette test) with some indicators of positive emotional well-being such as happiness and life satisfaction (evaluated using the scales Subjective Happiness Scale and Satisfaction with Life Scale, respectively). In addition, overall life satisfaction was higher in those adolescents with a level of healthy aerobic capacity, following the cut-off points established by the FITNESSGRAM® (Cooper Institute for Aerobics Research, 1999).

In line with the results of the present work, other studies show that the increase in the level of FC, through the application of interventions based on the performance of systematized physical activity (at least 3 days / week, 60 minutes / day, ≥ 3 METS), is strongly associated with

a reduction of symptoms in psychosocial disorders such as anxiety and depression in adolescents (Jeong et al., 2005), adults (Hackney & Earhart, 2010) and the elderly (Mavrovouniotis et al., 2010).

Similar results were found in school children suffering from stress and negative emotions after the application of a program based on the practice of African yoga and dance (West et al., 2004). Even interventions based on performing regular physical exercise improved the quality of life perceived in adolescent girls with psychological problems such as stress and other psychosomatic disorders (Philipsson et al., 2013).

These results, derived from cross-sectional and longitudinal investigations, coincide in proposing the playful and therapeutic use of physical activity, through a creative process that favors the development of physical, social, affective and creative aspects that in turn contribute to the emotional balance of the individual. However, a meta-analysis carried out by Biddle and Asare (2011), found that, although the association between physical activity and emotional well-being in children and adolescents is evident, the effects of physical practice on the various indicators studied (anxiety, depression, performance cognitive and self-esteem) are weak or moderate; in addition, they observed a slight association between sedentary habits and low emotional well-being.

In another study, Soyeon and Fedewa (2010), conducted a meta-analysis in which they compiled research work that had studied the relationship between various parameters of physical activity (type, intensity, organization, frequency, practice time, and responsibility for the activity) with different dimensions of emotional well-being (self-esteem, perceived quality of life, self-concept, anxiety, depression, behavioral problems, cognitive problems, emotional symptoms). They reported different results depending on the methodology used and the characteristics of the participants, showing that the effects of physical activity on emotional well-being were generally moderate.

Despite the arguments that support the relationship between FC and emotional well-being, several aspects remain to be clarified in this relationship. For example, there is a need to carry out research that explains the causal relationship between these variables, knowing the effect of the improvement in the different FC parameters on the dimensions of emotional well-being. In this sense, some studies coincide in revealing that school physical activity is a pedagogical strategy to improve health status related to FC, which may not only have a positive impact on physical health, but also on emotional well-being (Gálvez et al., 2015a, Rosa et al., 2017a, b), and provide empirical evidence in favor of proposals that affect the analysis of the FC state variables and can be determinant in various

constructs related to emotional well-being such as self-concept (Rodríguez -García et al., 2014), self-perceived health (Rosa-Guillamón & García-Cantó, 2016), quality of life (Gálvez et al., 2015a), or life satisfaction (Rosa et al., 2017a). There could be more randomized or longitudinal control investigations that strengthen these results, using more direct measurement methods such as accelerometers, cycloergometers or colorimetric enzymatic methods, among others, and sensometry or other methods to evaluate emotions.

In addition, this work presents other limitations inherent to cross-sectional designs and to the sampling process. On the other hand, other potentially influential parameters in FC were not included, such as the socioeconomic status that can influence the living conditions (sleep and rest patterns, academic level, sporting possibilities, diet, etc.) or the level of physical exercise which could influence the level of FC and body composition, for example.

In conclusion, the results of this study suggest a positive and bidirectional relationship between FC and emotional well-being. It reinforces the need to promote programs to improve FC and to assess its effect on the psychological abilities of school children. Longitudinal and prospective studies should determine the way in which the tendency to have or not a better FC level can affect the emotional well-being of individuals throughout their school years and in later life periods.

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