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## ORIGINAL

# PLAYGROUND INTERVENTIONS DURING THE COVID-19 PANDEMIC: AFFECTIVE-MOTIVATIONAL IMPACT

## RECREOS ACTIVOS DURANTE LA PANDEMIA POR COVID-19: IMPACTO AFECTIVO-MOTIVACIONAL

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### ABSTRACT

This study examines the effect of an active recess program on self-determined motivation, basic psychological needs, global self-esteem, and mood of schoolchildren during the pandemic. 160 schoolchildren ( $M = 11.42$ ;  $SD = 0.94$ ) from 4th to 6th grade of primary education, from 2 schools (Experimental group,  $N = 83$  and Control group,  $N = 77$ ) participated. A quasi-experimental design was carried out with 3 measurements throughout the 2020-2021 academic year: T1 (January), T2 (March), and T3 (June). Repeated Measures ANOVAs taking time (T1, T2, and T3) as within-subject factor, and group as inter-subject factors revealed significant effects over time (almost all variables) and group interactions (self-esteem). Three intergroup MANOVA(s), one at each measurement time, showed differences in favor of the experimental group, which were greater at T2.

**KEYWORDS:** Motivation, self-determination theory, Covid-19, playground interventions, school playgrounds, unstructured play.

## RESUMEN

Este estudio examina el efecto de un programa de recreos activos en la motivación autodeterminada, las necesidades psicológicas básicas, la autoestima global y el estado de ánimo de los escolares durante la pandemia. Participaron 160 escolares ( $M = 11.42$ ;  $DE = 0.94$ ) de 4° a 6° curso de Educación Primaria, procedentes de 2 colegios (Grupo experimental,  $N = 83$  y Grupo control,  $N = 77$ ). Se realizó un diseño cuasi-experimental con 3 medidas a lo largo del curso 2020-2021: T1 (enero), T2 (marzo) y T3 (junio). Los ANOVAs de Medidas Repetidas tomando el tiempo (T1, T2, y T3) como factor intrasujeto, y el grupo como factor entre sujetos revelaron efectos significativos a través del tiempo (casi todas las variables) e interacciones de grupo (autoestima). Tres MANOVA(s) intergrupo, uno en cada tiempo de medida, mostraron diferencias a favor del grupo experimental, que fueron mayores en T2.

**PALABRAS CLAVE:** Motivación, teoría de la autodeterminación, Covid-19, intervenciones en patio, recreo escolar, juego no estructurado.

## INTRODUCTION

The restrictions derived from the Covid-19 pandemic have significantly reduced the health-related quality of life of the child and adolescent population (Nobari et al., 2021). Children and adolescents experienced massive changes in their daily lives that have caused this deterioration: confinement at home, school closures, digitalization in education, decrease in physical activity (PA), social distancing, and limited connection with friends and classmates. Several studies have reported a decline in PA and mental health in children and adolescents since the lockdown (De Miranda et al., 2020; Dunton et al., 2020; Tamarit et al., 2020; Tulchin-Francis, 2021). The most frequent disorders in children caused by the Covid19 pandemic are: anxiety, depression, post-traumatic stress disorder and inattention. Besides, they are accompanied by mood-swings such as sadness, irritability, fear or dread (Imran et al., 2020; Mihai, 2020; Pizarro-Ruiz and Ordóñez-Gambor, 2021). Adolescents are at increased risk for suffering depression, anxiety, distress, low self-esteem, substance use, and suicide (Douglas-Bright et al., 2020).

Encouraging activities that promote PA and play has been recommended to combat these harmful effects on both the physical and mental health of children and adolescents (Douglas-Bright et al., 2020; Mihai, 2020). Within the school context, active recess programs could promote active habits and increase social relationships; thus, improving their physical and mental health. There is some evidence of the positive impact of interventions during recess on the physical (PA), intrapersonal (motivation, behavior, attitudes) and interpersonal (social relationship) dimensions in schoolchildren (Méndez-Giménez, 2020; Pastor-Vicedo et al., 2021). At the physical level, several studies that focused on playground interventions have provided some evidence leading to conventional equipment (Broekhuizen et al., 2014; Ickes et al., 2013, Parrish et al., 2013;

Verstraete et al., 2006), movable/recycled material (Hyndman, Benson & Tedlford, 2014; Hyndman, Benson, Ullah et al., 2014; Hyndman & Lester, 2015), and self-made material (Méndez-Giménez et al., 2017) increasing schoolchildren's PA.

At the intrapersonal level, Méndez-Giménez & Pallasá (2018) reported that the application of an annual active recess program based on the use of self-made materials and the layout of children's games in the playground increased the levels of amusement, intrinsic motivation, satisfaction of basic psychological needs (relatedness, competence and autonomy) and intention to practice. At the interpersonal (social) level, mobile/recycled material programs had a positive impact on social learning, teamwork, negotiation skills, social inclusion, and cooperative play (Hyndman et al., 2014). The authors concluded that providing equipment at school recess to include students of different ability levels and backgrounds is an effective strategy to prevent social isolation, bullying, conflict, and peer victimization in schools, which are the main barriers to PA for students (Parrish et al., 2011).

The Self-Determination Theory (SDT; Deci & Ryan, 2000) has emerged as one of the most relevant theoretical frameworks to explain the motivation towards PA, both in the school and sport contexts (Ntoumanis & Standage, 2009). According to their postulates, the individual can be intrinsically motivated (due to the enthusiasm that carrying out the task implies), extrinsically (due to external reinforcement) or amotivated (due to the lack of motivation). In addition, extrinsic motivation has a series of intermediate regulations such as external, introjected and identified regulations. The SDT also establishes the existence of three basic psychological needs (BPN; competence, autonomy and relatedness) that are mediators of the most self-determined motivation. These NPBs are considered innate psychological nutrients that are essential for continued psychological growth, wholeness, and well-being (Deci & Ryan, 2000, p. 229). Autonomy refers to the student's ability to perform tasks independently. Competence refers to the student's ability to solve motor problems effectively. Lastly, the social relatedness refers to the ability to relate to peers, regardless of gender or origin. Extensive research in the PE context (Ntoumanis, 2005; Standage et al., 2003; Standage et al., 2006) has shown that greater satisfaction of these three needs is related to more self-determined motivation. Recently, the novelty has been proposed as the fourth NPB (González-Cutre et al., 2016). Finally, the SDT framework posits that motivation leads to different types of cognitive, emotional, and behavioral consequences. The most positive ones, such as the intention to perform PA, would be produced by the more self-determined forms of motivation, while the more negative consequences (dropout) would be produced by the less self-determined forms of motivation. Several studies have shown a progressive drop in PE students' self-determined motivation, an increase in amotivation, as well as a decrease in NPB throughout the last year of Primary Education (PE) and the first years of Secondary Education (SE) (Cecchini et al., 2012; Navarro- Paton et al., 2018; Vlachopoulos et al., 2011).

## OBJECTIVES

This study aimed at analysing the affective-motivational impact of an active recess program during the Covid-19 pandemic from the perspective of SDT. More in specific, the effect of a programme for both 4th and 6th grade primary school students based on self-made materials and hopscotch games about self-determined motivation, NPB satisfaction, global self-esteem and moods was analysed. During the pandemic, the organization of school life (including recess periods) was altered by the sanitary measures taken in schools to avoid contagion: creation of bubble groups, masks, delimitation of specific spaces in courtyards for each group, different schedules so as neither to coincide in the same area of the playground nor to share materials. Therefore, the applied active recess program had to be adjusted to the new reality. There is no precedent for a similar program implemented in these circumstances. It was hypothesized that the program: a) would maintain the levels of self-determined motivation of the students over time against decreases in the control group (hypothesis 1), b) would maintain high levels of satisfaction of the NPB against decreases in the control group (hypothesis 2), c) would cause higher levels of global self-esteem in the experimental group (hypothesis 3), d) would lead to higher levels of happiness and lower levels of fear, anger and sadness in the experimental group (hypothesis 4).

## MATERIAL AND METHODS

### Participants

The study was carried out in two urban schools in two cities from Spain. They were selected for their receptivity and collaboration in the research. The study population was 214 schoolchildren from 4th to 6th grade of EP. As criteria for inclusion, it was established that the participants had over 90% of attendance and that 95% of their data were duly complemented in the administrations. As a result of this filter, 46 students were not included since they either missed more than 10% of the sessions or did not participate in any of the test administrations. The final sample presented less than 5% of missing values in the analyzed variables, which followed the assumption of completely random data loss (missing completely at random: MCAR). Therefore, missing values were imputed using the EM (Expectation-Maximization) algorithm. A sample of 160 participants (77 males, 79 females, and 4 who did not identify as either boy or a girl) took part in the study, ranging in age from 9 to 12 years old ( $M = 11.42$ ;  $SD = .94$ ). To avoid data contamination during breaks, the participants in each group came from two different schools (Experimental group,  $N = 83$  and Control group,  $N = 77$ ).

### Procedure

In September of the 2020/21 academic year, principals of both schools were contacted to carry out this research project. Informed consent was also obtained from the parents and the school principals. Questionnaires were anonymous and students were assured that their answers would not be

available to their teachers or parents. They were also offered the possibility to decline participation or withdraw at any time. Questionnaires were administered through the EducaMadrid platform by means of its Lime Survey application. The already available tablets from the centers were used, and they were disinfected after each use. The completion of the questionnaires lasted 30 minutes, approximately. The dates on which the questionnaires were administered were as follows: January 2021 (T1), March 2021 (T2), and June 2021 (T3).

### Program description

In both schools, each class group had an allotted space on the playground, so students had to stay in it. Seven subgroups were created in the experimental group and six subgroups were established in the control group. For the design of the intervention program, three criteria were taken into account: a) the materials should induce games with a high demand for PA (for example, jumping), b) the materials should be easy to build and be crafted using affordable resources, and c) the materials used should not be neither throwable nor exchanged with schoolchildren from other groups as it could lead to invading those restricted areas or exchanging materials. Therefore, the intervention program was based on “not mobile” self-made materials (e.g. balls, indiacas...) and hopscotch games (Figure 1). The study was carried out from January to June 2021 divided into two periods due to the Easter holidays. The first administration of the tests (pretest) was carried out during January, just before the intervention. The first period of the intervention basically consisted on the elaboration and use of said self-made materials. The theoretical basis for the use of self-made material is found in constructionism and the idea of “learning by doing” (Papert & Harel, 1991). At the educational level, this pedagogical model is linked to transversal values such as recycling, ecological awareness, education for consumption, inclusion or care of the material (Méndez-Giménez, 2018). Families and students received directions from YouTube tutorials explaining the needed resources and the process to craft the materials to be used during recess. From Feb. 1<sup>st</sup> to Feb. 19<sup>th</sup>, the experimental group crafted jump ropes with plastic bags and played games with it during breaks. From February 22<sup>nd</sup> to March 12<sup>th</sup>, a skipper or jumping ball (paper ball attached to an ankle by a rope) was built to practice oculo-pedic coordination games, jumps and agility. Lastly, from March 15<sup>th</sup> to April 9<sup>th</sup>, some lines were drawn on the yard ground so that students played a game called “scotch-scotch” (a game in pairs coordinating jumps on a 16-square hopscotch). Just before the Easter holidays, the questionnaire (Posttest 1) was administered again to all the participants. In order not to saturate the families that were collaborating with the project, activities in the second period of the intervention focused on games that did not require self-made materials. Games were played on an agility square and on hopscotch drawn in the yard (participants take turns entering and exiting the hopscotch according to the rhythm of music). From April 12<sup>th</sup> to 30<sup>th</sup>, games were planned with an agility square in mind. From May 3<sup>rd</sup> to June 5<sup>th</sup>, African hopscotch was promoted. Finally, the third administration of questionnaires (Posttest 2) was carried out during the second week of June.

Experimental group	Pretest (T1)	01/02 - 19/02. Jump rope 22/02 - 12/03. Skipper 15/03 - 09/04. Scotch-Scotch	Post-test 1 (T2)	Agility square 03/05 - 05/06. African hopscotch	Post-test 2 (T3)
Control group	Pretest (T1)	Recess without intervention	Post-test 1 (T2)	Recess without intervention	Post-test 2 (T3)

## Research design

A quasi-experimental design was performed with pretest (T1), posttest1 (T2), and posttest2 (T3) measurements in both groups. It was a design with non-probabilistic convenience sampling. The procedures followed were in accordance with the Declaration of Helsinki (2013)

## Instruments

**Self-determined motivation.** The different types of motivation were evaluated using the *Perceived Locus of Causality* (PLOC; Goudas et al., 1994) scale translated into Spanish and validated in the PE context by Moreno et al. (2009). The instrument is headed by the statement "I participate in Physical Education..." For the purposes of this study "Physical Education" was replaced by "recess". It consists of five factors and 20 items (four for each factor): *intrinsic motivation* (e. g. "because recesses are fun"), *identified regulation* (e. g. "because I want to learn sports skills", *introjected regulation* (e. g. "because I want the teacher to think I am a good student"), *external regulation* (e. g. "because I will have problems if I do not do it") and *amotivation* (e. g. "but I do not really know why"). The study by Moreno et al. (2009) obtained the following Cronbach's  $\alpha$  values: .80 for intrinsic motivation, .80 for identified regulation, .67 for introjected regulation, .70 for external regulation, and .74 for amotivation. A Likert scale was used from 1 (*Not at all true for me*) to 5 (*Totally true for me*) The scores obtained in each of the PLOC subscales were used to calculate the self-determination index (SDI):  $(2 \times \text{intrinsic motivation} + \text{identified regulation}) - [(\text{introjected regulation} + \text{regulation external}) / 2 + 2 \times \text{amotivation}]$  (Vallerand & Rousseau, 2001). This index indicates the degree of self-determined motivation and has been widely used in motivational research in PE classes (Ntoumanis, 2005). In this research, the SDI values ranged between -5.63 and +12.

**Basic Psychological Needs.** The Basic Psychological Needs in Exercise Scale (BPNES) was used, adapted to Spanish and to PE school context by Moreno et al. (2008). The scale consists of 12 items distributed in three factors: *autonomy* (four items; e. g. "I have the opportunity to choose how to do the exercises"), *competence* (four items; e. g. "I do the exercises effectively"), and *relatedness with others* (four items; e. g. "I feel very comfortable with my

classmates”). Cronbach's  $\alpha$  values were .81 for autonomy, .78 for competence, and .84 for relationship with others. To accommodate the questionnaire to the context of recess, the word “exercise” was replaced by “game”, and “do” or “perform” by “practice”. Likewise, the items were introduced by the phrase “In breaks...” instead of “Physical Education lessons”. A Likert scale from 1 (*Totally disagree*) to 5 (*Totally agree*) was used.

**Novelty.** The fourth basic psychological need, novelty need satisfaction, was measured using the *Novelty Need Satisfaction Scale*, developed by González-Cutre et al. (2016). The scale was also preceded by the heading “In breaks...” and consists of six items (e. g. “I feel like I do new things”) rated from 1 (*Totally disagree*) to 5 (*Totally agree*). The study by González-Cutre et al. (2016) obtained Cronbach's  $\alpha$  values = .89 and .90 for studies 1 and 2, respectively.

**Global self-esteem.** The EDINA questionnaire (Serrano, 2014; Serrano, et al., 2013, 2016) was used. The questionnaire consists of 21 items that measure global self-esteem and five of its dimensions: *body* (e. g. “I like my body”), *social* (e. g. “I have a good time with other boys and girls”), *personal* (e. g. “I am an important boy or girl”), *academic* (e. g. “My teacher says I work well”), and *family* (e. g. “My family loves me very much). Participants were asked to show their degree of identification with the self-esteem statements using a three-point scale ranging from 1 (*Not at all true for me*) to 3 (*Totally true for me*). The reliability of the scale in the study by Serrano et al. (2016) was Cronbach's  $\alpha$  = .80.

**Moods.** It was measured by the Spanish version of the *Mood Questionnaire* by Rieffe et al. (2004) validated in Spanish by Górriz et al. (2013). It assesses the frequency of the different mood states (fear, sadness, happiness and anger) during the previous four weeks. This questionnaire consists of 16 items (four per dimension) with a three-point response scale: *Never*, *Sometimes* and *Often*. The internal consistency of the fear, happiness, anger, and sadness subscales in the Górriz et al. (2006) was  $\alpha$  = .69, .76, .78 and .69, respectively.

### Data Analysis

The data were processed by the IBM® SPSS 24 program. The entire cluster was analyzed in each subgroup. Descriptive statistics were calculated and the reliability of the measurement scales was checked with Cronbach's alpha statistic. Acceptable values ( $\alpha > .70$ , Nunnally, 1978) were found on all scales, except for autonomy and competence in two administrations, pretest and posttest 1 ( $\alpha$  = .68, .69, respectively). However, considering the proximity to acceptability levels, as well as the interest it represented for the study, this value was maintained for subsequent analysis (Table 1). A variable was determined to follow a normal distribution when the absolute values of skewness and kurtosis were less than 2 (Gravetter & Wallnau, 2014), which was met in all cases.

To assess the effects of the active recess program based on the self-construction of materials in self-determined motivation, the four BPNs, global

self-esteem, and mood states, several repeated measures ANOVAs over time (T1, T2, and T3) were used as within-subject factor and the group (experimental, control) as between-subject factor. The level of statistical significance was set at  $p < .05$ . Likewise, the effect size was calculated using the partial eta squared ( $\eta_p^2$ ). Cohen (1988) classifies the effect size as small ( $\eta_p^2 = .0099$ ), medium ( $\eta_p^2 = .0588$ ), or large ( $\eta_p^2 = .1379$ ). To assess the assumption of sphericity the Mauchly's W test ( $p > .05$ ) was used. Finally, for the comparison between groups, three intergroup MANOVA(s) were performed, one at each time (T1, T2, T3), taking as dependent variables the self-determination index, BPN, global self-esteem and mood states, and as fixed factors, the groups (experimental and control).

## RESULTS

### Reliability and descriptive statistics

Table 1 shows the internal reliability coefficients, the means and standard deviations of the study variables at T1, T2, and T3, both for the total sample and by group.

**Table 1.** Cronbach's alpha and descriptive statistics of the variables (at the three measurement times) in the total sample and by group.

	GRUPO	$\alpha$	T1		$\alpha$	T2		$\alpha$	T3	
			M	SD		M	SD		M	SD
SDI	Experim		6.56	3.44		6.00***	2.78		6.20	2.96
	Control		5.43	3.44		4.35	2.93		5.38	2.66
	Total	-	6.01 <sup>a</sup>	3.45	-	5.21 <sup>b</sup>	2.97	-	5.81 <sup>a</sup>	2.85
Autonomy	Experim		4.06	.65		3.93*	.58		3.82	.61
	Control		3.87	.59		3.70	.58		3.78	.67
	Total	.68	3.96 <sup>a</sup>	.63	.68	3.82 <sup>ab</sup>	.59	.72	3.65 <sup>b</sup>	.64
Competence	Experim		4.10*	.56		4.17***	.45		4.07	.58
	Control		3.88	.58		3.79	.65		3.87	.65
	Total	.69	4.00 <sup>a</sup>	.58	.69	3.99 <sup>a</sup>	.58	.74	3.97 <sup>a</sup>	.62
Relatedness	Experim		4.34	.69		4.45	.50		4.34	.63
	Control		4.33	.72		4.39	.60		4.16	.78
	Total	.84	4.33 <sup>ab</sup>	.70	.75	4.42 <sup>a</sup>	.55	.87	4.26 <sup>b</sup>	.71
Novelty	Experim		3.96***	.80		3.89***	.66		3.89***	.70
	Control		3.62	.76		3.35	.61		3.44	.73
	Total	.90	3.79 <sup>a</sup>	.79	.83	3.63 <sup>b</sup>	.69	.88	3.67 <sup>ab</sup>	.74
Global self-esteem	Experim		2.66*	.23		2.66***	.17		2.64***	.18
	Control		2.57	.24		2.46	.26		2.50	.25
	Total	.80	2.62 <sup>a</sup>	.23	.83	2.56 <sup>b</sup>	.24	.84	2.57 <sup>b</sup>	.22
Fear	Experim		1.61	.41		1.66	.33		1.65	.33
	Control		1.51	.40		1.61	.42		1.64	.37
	Total	.73	1.56 <sup>a</sup>	.41	.83	1.64 <sup>ab</sup>	.38	.83	1.64 <sup>b</sup>	.35
Happiness	Experim		2.90	.24		2.90**	.20		2.91	.20
	Control		2.84	.27		2.79	.29		2.87	.21
	Total	.75	2.87 <sup>ab</sup>	.26	.80	2.84 <sup>a</sup>	.26	.82	2.89 <sup>b</sup>	.21
Anger	Experim		1.68	.40		1.72	.33		1.77	.35
	Control		1.80	.48		1.89**	.44		1.89*	.34
	Total	.85	1.74 <sup>a</sup>	.45	.80	1.80 <sup>ab</sup>	.39	.82	1.83 <sup>b</sup>	.35
Sadness	Experim		1.37	.38		1.51	.34		1.49	.31
	Control		1.41	.42		1.53	.42		1.53	.38
	Total	.71	1.39 <sup>a</sup>	.40	.72	1.52 <sup>b</sup>	.38	.75	1.51 <sup>b</sup>	.34

Note. Cronbach's  $\alpha$  values of motivational regulations in the three waves of measurement ranged between .74 and .86.

In each row of the total sample, the means with different superscripts differ at least at the  $p < .05$  level. In each column, the groups differ at the level of \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

### Main effects: intragroup comparison

All the study variables met the normality criterion with skewness and kurtosis values less than 2. A main effect emerged over time in the self-determination index factor, Wilks Lambda (1.91, 290.90) = .917,  $F = 6.847$ ,  $p < .001$ ,  $\eta^2_p = .083$ . Mauchly's sphericity test indicated that the assumption of sphericity was not met ( $p < .05$ ); therefore, the degrees of freedom were corrected with the Greenhouse-Geisser sphericity estimate ( $\epsilon = .95$ ). Regarding the paired tests (Bonferroni), statistically significant differences were found between T1 and T2 [ $t(2) = 3.32$ ,  $p < .01$ ], and between T2 and T3 [ $t(2) = -.27$ ,  $p < .05$ ].

A main effect over time for autonomy factor also emerged, Wilks' Lambda (1.8, 257.44) = .935,  $F = 5.247$ ,  $p < .001$ ,  $\eta^2_p = .065$ . Mauchly's sphericity test indicated that the assumption of sphericity was not met ( $p < .05$ ); therefore, the degrees of freedom were corrected with the Greenhouse-Geisser sphericity estimate ( $\epsilon = .91$ ). Regarding the paired tests (Bonferroni), statistically significant differences were found between T1 and T3 [ $t(2) = 3.27$ ,  $p < .05$ ].

Likewise, a main effect over time in novelty factor was found, Wilks' Lambda (1.89, 287.60) = .954,  $F = 3.645$ ,  $p < .001$ ,  $\eta^2_p = .046$ . Since the Mauchly sphericity assumption was not met ( $p < .05$ ), the degrees of freedom were corrected with the Greenhouse-Geisser sphericity estimate ( $\epsilon = .94$ ). Regarding the paired tests (Bonferroni), statistically significant differences were found between T1 and T2 [ $t(2) = 4.37$ ,  $p < .05$ ].

In addition, another main effect over time in relatedness factor appeared, Wilks' Lambda (1.72, 260.79) = .944,  $F = 4.443$ ,  $p < .05$ ,  $\eta^2_p = .023$ . Since the Mauchly sphericity assumption was not met ( $p < .05$ ), the degrees of freedom were corrected with the Greenhouse-Geisser sphericity estimate ( $\epsilon = .85$ ). In the paired tests (Bonferroni), statistically significant differences were found between T2 and T3 [ $t(2) = .273$ ,  $p < .05$ ].

Likewise, another main effect over time in the overall self-esteem factor emerged, Wilks' Lambda (1.83, 277.76) = .921,  $F = 6.512$ ,  $p < .01$ ,  $\eta^2_p = .079$ . Mauchly's sphericity test indicated that the assumption of sphericity was not met ( $p < .05$ ); therefore, the degrees of freedom were corrected with the Greenhouse-Geisser sphericity estimate ( $\epsilon = .91$ ). Paired tests (Bonferroni) found statistically significant differences between T1 and T2 [ $t(2) = 3.62$ ,  $p < .01$ ], and between T1 and T3 [ $t(2) = .29$ ,  $p < .05$ ]. Another main effect emerged in the self-esteem factor by group, Wilks' Lambda (1.83, 277.76) = .917,  $F = 6.842$ ,  $p = .001$ ,  $\eta^2_p = .083$ . In the paired tests (Bonferroni) statistically significant differences were found in the control group, between T1 and T2 [ $t(2) = 4.83$ ,  $p < .001$ ], and between T1 and T3 [ $t(2) = 3.17$ ,  $p < .01$ ].

Similarly, a new main effect was found over time in the fear factor, Wilks' Lambda (1.78, 271.80) = .954;  $F = 3.640$ ,  $p < .05$ ,  $\eta^2_p = .046$ . Mauchly's sphericity test indicated that the assumption of sphericity was not met ( $p < .05$ ); therefore, the degrees of freedom were corrected with the Greenhouse-Geisser sphericity estimate ( $\epsilon = .89$ ). Regarding the paired tests (Bonferroni), statistically significant differences were found between T1 and T3 [ $t(2) = -2.69$ ,  $p < .05$ ].

A main effect emerged in the happiness factor, Wilks' Lambda (1.85, 281.61) = .957;  $F = 3.409$ ,  $p < .05$ ,  $\eta^2_p = .043$ . Mauchly's sphericity test indicated that the assumption of sphericity was not met ( $p < .05$ ); therefore, the degrees of freedom were corrected with the Greenhouse-Geisser sphericity estimate ( $\epsilon = .92$ ). Regarding the paired tests (Bonferroni), statistically significant differences were found between T2 and T3 [ $t(2) = -2.4$ ,  $p < .05$ ].

In the same way, a main effect was found in the anger factor, Wilks' Lambda (1.77, 269.09) = .957;  $F = 3.407$ ,  $p < .05$ ,  $\eta^2_p = .043$ . Mauchly's sphericity test

indicated that the assumption of sphericity was not met ( $p < .05$ ); therefore, the degrees of freedom were corrected with the Greenhouse-Geisser sphericity estimate ( $\epsilon=.88$ ). Regarding the paired tests (Bonferroni), statistically significant differences were found between T1 and T3 [ $t(2) = -2.63, p < .05$ ].

Finally, a main effect was found in the sadness factor, Lambda de Wilks (1.95, 296.66) = .911;  $F = 7.341, p = .001, \eta^2_p = .089$ . Mauchly's sphericity test indicated that the assumption of sphericity was not met ( $p < .05$ ); therefore, the degrees of freedom were corrected with the Greenhouse-Geisser sphericity estimate ( $\epsilon=.98$ ). Regarding the paired tests (Bonferroni), statistically significant differences were found between T1 and T2 [ $t(2) = -3.36, p < .01$ ], and between T1 and T3 [ $t(2) = -3.46, p < .01$ ].

### Intergroup comparison

In all intergroup MANOVAs, a significant effect for group emerged: T1 [Wilks' Lambda (10, 143) = .841,  $F = 2.701, p < .01, \eta^2_p = .15$ ]; T2 [Wilks' Lambda (10, 143) = .663,  $F = 7.267, p < .001, \eta^2_p = .34$ ]; T3 [Wilks' Lambda (10, 143) = .831,  $F = 2.902, p < .01, \eta^2_p = .169$ ]. At T1, competence [ $F = 6.136, p < .05, \eta^2_p = .039$ ], novelty [ $F = 7.410, p < .001, \eta^2_p = .046$ ], and global self-esteem [ $F = 5.585, p < .05, \eta^2_p = .035$ ]. At T2, differences were found in a greater number of variables: self-determination index [ $F = 12.572, p < .001, \eta^2_p = .076$ ], autonomy [ $F = 5.896, p < .05, \eta^2_p = .037$ ], competence [ $F = 17.759, p < .001, \eta^2_p = .105$ ], novelty [ $F = 27.826, p < .001, \eta^2_p = .155$ ], happiness [ $F = 7.063, p < .01, \eta^2_p = .044$ ], anger [ $F = 7.103, p < .01, \eta^2_p = .045$ ], and overall self-esteem [ $F = 32.995, p < .001, \eta^2_p = .178$ ]. And at T3, novelty [ $F = 14.784, p < .001, \eta^2_p = .089$ ], anger [ $F = 4.45, p < .05, \eta^2 = .029$ ], and global self-esteem [ $F = 15.832, p < .001, \eta^2_p = .094$ ].

### DISCUSSION

This study analysed the effect of an active recess program on 4th to 6th grade schoolchildren's self-determined motivation, satisfaction of four BPNs, global self-esteem, and mood states.

In relation to hypothesis 1 (the experimental group would maintain self-determined motivation over time), the results showed a decrease in the post-test1 SDI values, and that these significant differences between groups were due to a decrease in the control group (with intermediate effect sizes). Several studies have shown a drop in self-determined motivation as a function of age in primary and secondary education (Cecchini et al., 2012; Navarro-Patón et al., 2018; Vlachopoulos et al., 2011). Additionally, the situation caused by the pandemic may have negatively influenced the students' self-determined motivation during the course. In contrast, the levels of the SDI in the experimental group remained high throughout the treatment, without significant changes. Consequently, the intervention based on crafting and playing with these materials during recess (which characterized the first period of the intervention), could have had a positive motivational impact on the experimental group, which was maintained during the second part (hopscotch games). These

results of the active recess program are consistent with those reported by Méndez-Giménez and Pallasá (2018) before the Covid19 pandemic. Future research could determine whether programs based on the self-construction of material vs. Hopscotch games cause different effects on schoolchildren's self-determined motivation.

The results confirmed the second hypothesis (the intervention would maintain high levels of BPN satisfaction in the experimental group). On the one hand, the results showed a significant decrease over time in the autonomy factor, which was complemented by significant differences in T2 in favor of the experimental group. On the other hand, although the experimental group started from significantly higher levels of competence satisfaction, these differences increased at T2, softening at T3. Third, relatedness was the basic psychological need assessed with higher scores during the intervention, which indicates its relevance at these ages. A drop in relatedness was observed over time, with higher levels in the experimental group, although the differences between groups were not significant. Lastly, regarding novelty, although differences favored the experimental group, a significant decrease was observed in the control group at T1 and T2, which increased these differences (the effect sizes fluctuated from small to large). The first part of the intervention with self-made materials could be the protagonist of this effect. These findings, as a whole, are consistent with the evidence of a decrease in MPNs as a function of time and age (Cecchini et al., 2012; Navarro-Patón et al., 2018; Vlachopoulos et al., 2011), and they suggest a possible protective effect of the intervention against this already described fall, which could be aggravated by the restrictive strategies applied in the centers due to the coronavirus pandemic.

Regarding the third hypothesis (higher levels of global self-esteem in the experimental group), the results showed a decrease in this factor over time in T2 and significant differences between groups in the three waves of measurement (intermediate effect sizes). However, the differences between groups were due to the drop in the control group, while the level of significance of these differences increased in both post-tests (effect sizes from small to large). To date, we have not had any studies that have evaluated the impact of active recess programs on the global self-esteem of schoolchildren. Our findings could point to a positive effect of active breaks with self-made material. In the PE context, Fernández-Río et al. (2013) found increases in student physical self-concept during a self-made material intervention and argued that when a student creates a piece of equipment that is used and valued by peers, their self-esteem increases. Positive comments and the expression of joy during the game while using the crafted objects could increase self-esteem, making them believe in what they can do by their own. On the other hand, Pizarro-Ruiz & Ordóñez-Cambor (2021) reported emotional and behavioral alterations in Spanish children and adolescents during confinement. Adolescents lowered their self-esteem, but not children aged 8-12 years. Our results would suggest that this drop in self-esteem could even have started in childhood during the pandemic.

Finally, the results only partially confirmed the fourth hypothesis (higher levels of happiness and lower levels of fear, anger and sadness in the experimental

group). On the one hand, groups found an increase in fear and sadness of schoolchildren over time without differences between any of the administrations. Several studies have reported mood swings in children and adolescents due to the pandemic: sadness, irritability, fear, or dread (Imran et al., 2020; Mihai, 2020; Pizarro-Ruiz & Ordóñez-Cambor, 2021). Our conclusions converge with the described trend of fear and sadness. The changes suffered in the social, family and school contexts harmed the schoolchildren's mood regardless of the group. However, the data also showed a significant decrease in happiness at T2 and significant increases in anger at T2 and T3, only in the control group (small effect size). The impact of the intervention in the experimental group could help to control the level of anger and maintain the levels of happiness in the experimental group participants.

## CONCLUSIONS

The study findings suggest that active recess programs can have a positive impact on the schoolchildren's affective-motivational dimension, even in contexts as restrictive as those suffered during the pandemic. The implications are relevant since, despite the fact that vaccination is advancing at a rapid pace in many countries, the health measures triggered by the pandemic could remain enforced during the next school years. School principals and teachers could promote the implementation of active recess programs at very low economic cost with self-made equipment and endorsing motor games to increase the schoolchildren's physical and mental health, by encouraging their self-determined motivation, satisfying the BPN, and increasing both the self-esteem and the mood levels.

This study has a number of limitations. First, its quasi-experimental design. The participants were not randomly assigned to the experimental group, so the results should be taken with caution. In addition, the sample contains only two primary schools. Moreover, the study did not contemplate the comparison of the different bubble subgroups (within the control and the experimental groups) or the possible differences according to age. Future studies should include experimental and longitudinal designs with a broad spectrum and diversity of schools.

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