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Association between Motivational Climate, Emotional Intelligence, and Bicycle Use in Schoolchildren

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Abstract: (1) Background: The psychological benefits of cycling have been identified such as the maintenance of low-stress levels. However, no studies have been found addressing the benefits of cycling on variables such as emotional intelligence (EI) and motivational climate (MC), which are important for holistic development in children. This study aimed to investigate the interrelationships between MC, EI, and cycling habits in schoolchildren. (2) Methods: A descriptive, comparative, cross-sectional study was conducted in a sample of 347 Spanish schoolchildren (46.4% boys; 53.6% girls; M_{age} = 10.55, S.D. = 0.97). A sociodemographic questionnaire, the Trait Meta-Mood Scale (TMMS-24), and the Perceived Motivational Climate in Sport Questionnaire (PMCSQ-2) were applied for data collection. (3) Results: Boys use bicycles more frequently than girls; task-oriented motivational climate (TC) is observed in girls and schoolchildren with moderate cycling habits; ego-involving motivational climate (EC) prevails in boys and students who cycle more than four times per week; no statistical association was found between EI and cycling use habits; and EI and its dimensions correlate with TC and some categories of EC. (4) Conclusions: Moderate cycling habits are linked to a task-oriented MC and have slightly higher scores on general EI and its dimensions.

Keywords: cycling; emotional intelligence; motivational climate; schoolchildren; physical education

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1. Introduction

Among the wide range of activities proposed within the different motor situations that structure the Physical Education (PE) curriculum, cycling offers the opportunity to develop the fundamental motor skills necessary for the practice of physical activity throughout life [1], for the improvement of health [2], and for the assumption of a commitment to the environment through the creation of active and sustainable mobility habits [3,4]. Therefore, cycling is associated with multiple benefits [5,6], both for individual and collective health [7], offering the opportunity to practice heart-healthy physical activity in children and adolescents [8]. Moreover, as an active and environmentally friendly means of transport, it contributes to the reduction in gas emissions associated with the use of private motor vehicles [9,10] while helping to achieve the 60 min of moderate to vigorous physical activity per day recommended by the World Health Organization (WHO) [11], which is necessary to reduce sedentary lifestyles and improve body composition parameters in children and adolescents [12]. Based on these arguments, governments and administrations consider it necessary to implement public policies for the promotion of cycling as a means of sustainable mobility [9,13]; therefore, in many countries, programs aimed to promote cycling as active transport to schools (ATS) have increased [14,15].

Despite the large number of studies on cycling from the perspective of ATS [3,4,15], and of sports performance [16], the scientific literature on the study of cycling from other viewpoints is rather scarce [17]. Psychological variables have been less frequently studied in the cycling literature [9,18]. So far, some psychological benefits of cycling have been identified [6], such as the positive effect on mental well-being [15,19], the improvement

of life satisfaction levels [18], the creation of positive emotions [20], the maintenance of low-stress levels [6,21], and even the motivation towards learning cycling skills which is considered as a facilitating factor of learning which must be considered in different intervention programs [22,23]; these are positive and general effects that enable students to perform better in school [19]. However, no studies have been found that address the benefits of cycling on other variables such as emotional intelligence (EI) and motivational climate (MC), factors of great importance to ensure success in learning [24], and for the holistic development of children [25]. Therefore, the improvement of EI and its relationship with MC are lines of research that require further exploration, so the present study focuses on these issues due to their significance.

Regarding EI, although there is a solid scientific basis around its concept, this definition has been subject of controversy [26], being considered by some authors as a skill, by others as a trait, and by a third group of authors that defines it as a combination of both [27]; different models that support EI have emerged, among which is the skills model of Mayer and Salovey [28] which defines EI as a system of mental skills to perceive, understand, and regulate the emotions necessary to solve problems [29]. Within this model, the use of the self-report "Trait Meta-Mood Scale" (TMMS) developed by Salovey et al. [30] aimed to assess the skills that allow individuals to be aware of their own emotions to regulate them [31] stands out. The TMMS integrates different skills: emotional perception, related to the identification of one's own and other's emotions; emotional facilitation of thought, understood as the ability to evaluate feelings when thinking or solving certain problems; emotional understanding, conceived as the ability to differentiate emotional signals; and emotional regulation, understood as the ability to regulate one's own and others' emotions, controlling negative emotions and enhancing positive ones [32]. Recently, interest in EI has continued to grow in schools, especially in PE due to the possibilities it offers for the implementation of attractive and exciting educational proposals [33], such as outdoor activities like cycling, which contribute to generating positive emotional states among those who practice it [34].

Another variable that has received special consideration in previous research is MC [35], which is linked to the guarantee of success in learning situations proposed by PE teachers [36]. MC is a factor linked to the concept of goal orientation based on the Achievement Goal Theory (AGT), understood as the main reference framework of MC [37] to interpret characteristic behaviors triggered in certain domains, such as PE. According to this theory, the perceptions and feelings linked to success regulate the behavior of each individual [35,38]. MC is influenced by both environmental variables and the role played by the different educational actors (teachers, parents, coaches, peers, group of friends, etc.) [39]. From a theoretical point of view, two different climates can be distinguished: the task-oriented climate (TC), referring to the development of competence through mastery of the task, where the teacher or coach pays more attention to intrinsic aspects such as self-improvement or effort [40]; and the ego-oriented climate (EC) representing competition, comparisons with others, success based on ability, and reward/punishment for success and failure [24]. Several studies have associated the promotion of TC with the achievement of more positive affective and behavioral patterns [36] compared to EC, which is more specifically related to less adaptive patterns [24]. In this sense, the physical activity cycling involves a specific type of motivation linked to specific aspects such as self-affirmation, self-confidence, and life satisfaction [7,41] factors associated with TC.

Taking into account that physical activity contributes to the development of EI [42] and fosters a better MC in PE [40], and considering that cycling can be conceived as an engaging form of physical activity, the present study aims to explore the specific potential of cycling practice for developing these variables. Based on the above arguments, the following research objectives and hypotheses are proposed: (a) determine the levels of EI, describe the perceived MC concerning PE, and determine the frequency of cycling in primary school students; (b) explore the association degree between MC and its categories concerning gender and frequency of cycling; (c) examine the relationship between EI and

its dimensions as a function of gender and the frequency of cycling; and (d) analyze the relationship between MC and EI, identifying those dimensions or categories that show a greater strength of association.

Finally, the research hypotheses proposed in this study are as follows:

H1. *Most students in Primary Education use their bicycles moderately, with boys using them more frequently per week than girls.*

H2. *EI and its dimensions are more developed in girls than boys, and among students who show a higher frequency of bicycle use.*

H3. *Primary Education students have a more task-oriented MC, with girls and subjects who use bicycles more frequently reaching higher levels in this category.*

H4. *There is a greater predominance of EC in male students.*

H5. *EI is positively associated with TC and negatively with EC, with a greater development of EI being found when there is a greater predominance of TC, producing an inverse effect when there is a greater predominance of EC.*

2. Materials and Methods

2.1. Design and Participants

The present investigation used a descriptive, cross-sectional design, analyzing a sample of 347 Spanish schoolchildren of both sexes (sex assigned at birth), of whom 46.4% (n = 161) were boys and 53.6% (n = 186) girls; aged between 9 and 13 years (M = 10.55 years; S.D. = 0.97); belonging to the 4th grade (n = 98; M = 9.54 years; S.D. = 0.61; 44.9% boys; 55.1% girls), 5th grade (n = 117; M = 10.4 years; S.D. = 0.54; 47.9% boys; 52.1% girls), and 6th grade (n = 132; M = 11.4 years; S.D. = 0.62; 46.2% boys; 53.8% girls) of the primary school stage; that were recruited from two public schools located in an autonomous city in the south of Spain. The sample was selected through convenience sampling, with belonging to the last three courses of Primary Education as the main criterion. The EDUCAbase database of the Ministry of Education and Vocational Courses [43] was consulted to determine the size of the sample and ensure its representativeness. The sample of 347 subjects corresponds to 9.47% of the population of students belonging to the last three levels of primary school of the autonomous city, with a sampling error of 0.05 which satisfies the statistical criteria that guarantee its representativeness.

2.2. Variables and Instruments

Sociodemographic Questionnaire: Aimed to collect the sociodemographic variables such as the sex of the participants (male or female), age, and the frequency of use of bicycles.

Perceived Motivational Climate in Sport Questionnaire (PMCSQ-2): This questionnaire was designed by Newton et al. [44] and adapted to the Spanish version by González-Cutre et al. [45], and is a widely used instrument in research within the field of PE in primary schools. This instrument includes a total of 33 items scored on a 5-point Likert-type scale where one is strongly disagree and five is strongly agree. The questionnaire assesses motivation from the perspective of two MCs, each of which includes three subscales. The first one is the task-oriented climate (TC), which is composed of 17 items distributed in the subcategories: cooperative learning, effort/improvement, and finally, the important role of each student. The second MC is the ego-oriented climate (EC), which is composed of 16 items distributed in the subcategories of punishment for mistakes, unequal recognition, and rivalry between group members. The questionnaire has acceptable psychometric properties. The internal consistency coefficient was $\alpha = 0.856$ for EC while a score of $\alpha = 0.803$ was obtained for the TC.

The "Trait Meta-Mood Scale" (TMMS-24) questionnaire is based on the TMMS developed by Salovey et al. [30], and a Spanish version was adapted by Fernández-Berrocal et al. [32]. It is one of the most widely used instruments to assess the trait of emotional intelligence [46] in different age groups. The TMMS-24 contains three key EI dimensions with eight items each. All the items are assessed on a 5-point Likert-type scale ranging from 1 (do not agree at all) to 5 (strongly agree) and contribute to assessing the metaknowledge around each of the three dimensions: emotional attention, emotional clarity, and emotional repair. The questionnaire has acceptable psychometric properties, presenting a reliability coefficient of $\alpha = 0.854$, which is acceptable.

2.3. Procedure and Ethical Aspects

Two public schools in the autonomous city were selected to participate in the study. The first school was chosen because one of the study's authors was employed there. The second school was selected due to its similar characteristics to the first, although it was located in a different district. The sociodemographic characteristics of both schools reflect the similar characteristics of the educational landscape in the autonomous city. These include low academic performance in reading, mathematics, and science; a slightly elevated dropout rate; and a relatively low socioeconomic and cultural index among families. Most parents work in the service and industrial sectors (particularly in construction), although unemployment is high in both educational contexts, particularly among mothers. Both schools provide extracurricular sports activities, and the level of physical activity among students is relatively high. The researchers played an active role in data collection to ensure an optimal process, preventing the repetition of subjects and avoiding data duplication.

Authorization for the study was obtained from the academic and educational administration, resulting in a favorable report (register number 201708380). After selecting the schools, the researchers reached out to the headteachers and PE teachers to explain the study's aims and details and to secure their authorization and cooperation. Informed consent forms were provided to the student's legal guardians as the participants were minors. Anonymity was assured throughout the study, with the participants informed that the data would only be used for scientific purposes. The researchers were present during data collection to facilitate the process and address any questions while the children completed the questionnaires during their PE sessions in a regular classroom setting. A thank you letter was sent to the headteachers and PE teachers involved, along with a promise to provide a final report of the findings, ensuring the confidentiality of the student data for informational purposes only. Out of the 367 questionnaires collected in the initial phase, 20 were discarded due to errors, leaving a sample of 347 valid responses for analysis.

The present research is in accordance with the principles of the Declaration of Helsinki of 1975 for research projects, and with the national legislation for clinical trials, biomedical research, and confidentiality of participants. Furthermore, the present research was approved and supervised by an ethics committee belonging to the University of Granada (register number 530/CEIH/2018).

2.4. Statistical Analysis

The IBM® SPSS® Statistics (IBM Corp, Armonk, NY, USA) in version 28.0 for Windows was used for the comparative analysis. The normality of the data was checked using the kurtosis values of each item in the questionnaires: a value lower than 2 should be obtained. The data were cleaned and checked for outliers and missing values before proceeding with the analysis. After this, the descriptive statistics were analyzed, including frequencies, percentages, means, and standard deviations (S.D.). A prior analysis of the internal reliability of the instruments was carried out using Cronbach's alpha statistic, setting the index of reliability at 95.5 percent. Values equal to or greater than 0.70 were considered acceptable, obtaining greater reliability in the instrument as the resulting value approached 1. For comparative analyses, contingency tables, Pearson correlation coefficients, Student's *t*-tests, and one-way ANOVA were employed to examine the relationships between the variables.

Assumptions for these tests, including the normality and homogeneity of variances, were verified, and appropriate adjustments for multiple comparisons were considered to address type I error risks.

3. Results

3.1. Comparative Analysis of Bicycle Use Based on Sex

Table 1 shows the comparative analysis of the frequency of use of bicycles based on sex. Statistically significant differences ($p = 0.011$ *) are found observing a higher frequency of bicycle use in boys compared to girls. Specifically, most of the boys ride a bicycle between one and three times a week (37.9%), followed by those who ride more than four times a week (36.0%) and, finally, those who never ride a bicycle (26.1%). In contrast, the girls' bicycle habits are lower than those of the boys due to the existence of a high percentage of girls (40.9%) who claim to never ride a bicycle, followed by those who ride a bike between one and three times a week (33.3%), and finally, girls who claim to ride a bicycle more than four times a week (25.8%).

Table 1. Comparative analysis of bicycle use based on sex.

Frequency of Use of Bicycle per Week		Sex		Total
		Boys	Girls	
Never	Count	42	76	118
	% Frequency of use	35.6%	64.4%	100.0%
	% Sex	26.1%	40.9%	34.0%
Between 1 and 3 times	Count	61	62	123
	% Frequency of use	49.6%	50.4%	100.0%
	% Sex	37.9%	33.3%	35.4%
More than 4 times	Count	58	48	106
	% Frequency of use	54.7%	45.3%	100.0%
	% Sex	36.0%	25.8%	30.5%
Total	Count	161	186	347
	% Frequency of use	46.4%	53.6%	100.0%
	% Sex	100.0%	100.0%	100.0%

3.2. Motivational Climate Based on Bicycle Use and Sex

The analysis of the MC based on sex reflects the absence of statistical differences ($p > 0.05$) in the TC and its categories, cooperative learning, effort/improvement, and important role. Likewise, no statistical association was found ($p > 0.05$) in the EC and its categories, punishment for mistakes and unequal recognition. However, when the category rivalry between group members was analyzed, a statistical association was found ($p = 0.012$ *), with higher values in boys (M = 3.08; S.D. = 1.038) compared to girls (M = 2.78; S.D. = 1.112), who obtained a lower score in this category (Table 2).

When analyzing the association between the frequency of bicycle use and the MC (Table 3), a statistically significant association ($p = 0.011$ *) was found in the effort/improvement category, observing a greater motivation towards the task in individuals who use the bicycle between one and three times per week (M = 4.11; S.D. = 0.712), followed by those who never use it (M = 3.89; S.D. = 0.731) and finally, those who use it four or more times per week (M = 3.85; S.D. = 0.626). No statistical differences ($p > 0.05$) were found between the TC categories cooperative learning and important role and the frequency of bicycle use. Regarding the EC categories, a statistical association ($p \leq 0.05$ *) is observed for individuals who have a higher frequency of bicycle use (four or more times a week); obtaining higher mean values in the EC (M = 3.06; S.D. = 0.901) and in the categories punishment for mistakes (M = 3.14;

S.D. = 1.039), rivalry between group members (M = 3, 14; S.D. = 1.075), and unequal recognition (M = 2.96; S.D. = 1.019), followed by the subjects who use their bicycle between one and three times a week, and those who never use it.

Table 2. Motivational climate based on sex.

Motivational Climate	Sex						*t*-Test Sig. (Bilateral)
	Boys		Girls		Test of Levene		
	M	D. T.	M	D. T.	F	Sig.	
TC	3.86	0.673	3.95	0.589	1.098	0.295	0.201
CL	3.89	0.855	4.03	0.834	0.021	0.885	0.120
E/I	3.91	0.729	4.00	0.674	1.261	0.262	0.232
IR	3.76	0.852	3.80	0.709	7.277	0.007 *	0.658
EC	2.87	0.819	2.73	0.871	1.445	0.230	0.129
PM	2.87	0.973	2.85	0.926	0.182	0.670	0.869
UR	2.79	0.960	2.61	1.059	2.807	0.095	0.107
MR	3.08	1.038	2.78	1.112	0.980	0.323	0.012 *

Note: TC = task climate; CL = cooperative learning; E/I = effort/improvement; IR = important role; EC = ego climate; PM = punishment for mistakes; UR = unequal recognition; MR = member rivalry. * $p \leq 0.05$.

Table 3. Motivational Climate based on the frequency of use of bicycles.

Motivational Climate	Frequency of Use of Bicycle per Week						ANOVA	
	Never		1–3 Times/Week		More than 4 Times			
	M	D. T.	M	D. T.	M	D. T.	F.	Sig.
TC	3.84	0.666	4.01	0.644	3.87	0.560	2.535	0.081
CL	3.91	0.911	4.04	0.864	3.94	0.744	0.822	0.441
E/I	3.89	0.731	4.11	0.712	3.85	0.626	4.557	0.011 *
IR	3.70	0.745	3.83	0.778	3.83	0.813	1.012	0.365
EC	2.65	0.751	2.72	0.844	3.06	0.901	8.017	0.000 *
PM	2.70	0.840	2.76	0.912	3.14	1.039	7.363	0.001 *
UR	2.54	0.927	2.61	1.059	2.96	1.019	5.553	0.004 *
MR	2.77	1.071	2.87	1.090	3.14	1.075	3.500	0.031 *

Note: TC = task climate; CL = cooperative learning; E/I = effort/improvement; IR = important role; EC = ego climate; PM = punishment for mistakes; UR = unequal recognition; MR = member rivalry. * $p \leq 0.05$.

3.3. Emotional Intelligence Based on Bicycle Use and Sex

Table 4 shows the comparative analysis of EI and its dimensions with the sex of individuals; statistically significant differences ($p \leq 0.05$ *) are detected in all the dimensions, except in the emotional regulation ($p = 0.183$), where the differences between individuals from different sex are not so important. Thus, girls obtain higher results in general EI (M = 3.71; S.D. = 0.588) and in the dimensions of emotional perception (M = 3.64; S.D. = 0.718) and emotional understanding (M = 3.67; S.D. = 0.722) compared to boys, who obtained lower declines in general EI (M = 3.53; S.D. = 0.678), in the emotional perception dimension (M = 3.40; S.D. = 0.871), and emotional understanding (M = 3.47; S.D. = 0.830).

In the analysis of EI and its dimensions based on the frequency of bicycle use per week, no significant statistical association was found ($p > 0.05$). However, lower results are observed in general EI and its dimensions in individuals who never use a bicycle compared to those who use their bicycle with some frequency (Table 5).

Table 4. Emotional intelligence based on sex.

Emotional Intelligence	Sex						*t*-Test Sig. (Bilateral)
	Boys		Girls		Test of Levene		
	M	D. T.	M	D. T.	F	Sig.	
GEI	3.53	0.678	3.71	0.588	2.045	0.154	0.008 *
EP	3.40	0.871	3.64	0.718	5.552	0.019	0.007 *
EU	3.47	0.830	3.67	0.722	4.228	0.041	0.018 *
ER	3.71	0.743	3.82	0.752	0.456	0.500	0.183

Note: GEI, general emotional intelligence; EP, emotional perception; EU, emotional understanding; ER, emotional regulation. * $p \leq 0.05$.

Table 5. Emotional intelligence based on the frequency of use of bicycles.

Emotional Intelligence	Frequency of Use of Bicycle per Week						ANOVA	
	Never		1–3 Times/Week		More than 4 Times			
	M	D. T.	M	D. T.	M	D. T.	F.	Sig.
GEI	3.57	0.617	3.65	0.671	3.65	0.620	0.654	0.521
EP	3.48	0.819	3.53	0.780	3.58	0.807	0.395	0.674
EU	3.54	0.731	3.58	0.855	3.61	0.745	0.217	0.805
ER	3.69	0.763	3.84	0.747	3.78	0.733	1.199	0.303

Note: GEI, general emotional intelligence; EP, emotional perception; EU, emotional understanding; ER, emotional regulation.

3.4. Association between Motivational Climate and Emotional Intelligence

The analysis of the association between EI and task-oriented MC shows that EI correlates significantly ($p \leq 0.01$ *) with task-oriented MC. General EI and its dimensions, emotional perception, emotional understanding, and emotional regulation, are directly and positively associated with TC and its categories, specifically with cooperative learning, effort/improvement, and important role (Table 6).

Table 6. Correlation of emotional intelligence and task-oriented climate.

		EP	EU	ER	TC	CL	EI	IR
GEI	Pearson Correlation	0.818 **	0.842 **	0.802 **	0.516 **	0.366 **	0.485 **	0.406 **
	Sig. (bilateral)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
EP	Pearson Correlation		0.537 **	0.459 **	0.333 **	0.225 **	0.326 **	0.252 **
	Sig. (bilateral)		0.000	0.000	0.000	0.000	0.000	0.000
EU	Pearson Correlation			0.534 **	0.412 **	0.279 **	0.381 **	0.342 **
	Sig. (bilateral)			0.000	0.000	0.000	0.000	0.000
ER	Pearson Correlation				0.533 **	0.402 **	0.492 **	0.409 **
	Sig. (bilateral)				0.000	0.000	0.000	0.000
TC	Pearson Correlation					0.782 **	0.895 **	0.786 **
	Sig. (bilateral)					0.000	0.000	0.000
CL	Pearson Correlation						0.569 **	0.463 **
	Sig. (bilateral)						0.000	0.000
E/I	Pearson Correlation							0.528 **
	Sig. (bilateral)							0.000

Note: GEI, general emotional intelligence; EP, emotional perception; EU, Emotional Understanding; ER, emotional regulation; TC = task climate; CL = cooperative learning; E/I = Effort/improvement; IR = Important role. ** $p \leq 0.01$.

Regarding the relationship between EI and ego-oriented MC (Table 7), no correlation is found between EI and EC and the categories of unequal recognition and rivalry between group members. However, a direct association is found ($p \leq 0.01$ *) between EI and the category of punishment for mistakes. Likewise, concerning the emotional perception dimension, it correlates significantly ($p \leq 0.01$ *) with EC and the category of punishment for mistakes; no other direct correlations were found between this dimension and the rest of the categories. On the other hand, the emotional understanding dimension is not correlated with EC, nor with the categories of unequal recognition and rivalry between group members. However, a direct correlation is found ($p = 0.002$ *) between this dimension and the category of punishment for mistakes. Finally, the emotional regulation dimension is not correlated with EC, nor with any of its categories.

Table 7. Correlation of emotional intelligence and ego-oriented climate.

		EP	EU	ER	EC	PM	UR	MR
GEI	Pearson Correlation	0.818 **	0.842 **	0.802 **	0.136 *	0.206 **	0.055	0.089
	Sig. (bilateral)	0.000	0.000	0.000	0.011	0.000	0.306	0.099
EP	Pearson Correlation		0.537 **	0.459 **	0.199 **	0.255 **	0.135 *	0.089
	Sig. (bilateral)		0.000	0.000	0.000	0.000	0.012	0.098
EU	Pearson Correlation			0.534 **	0.106 *	0.165 **	0.027	0.095
	Sig. (bilateral)			0.000	0.048	0.002	0.615	0.076
ER	Pearson Correlation				0.025	0.082	−0.032	0.032
	Sig. (bilateral)				0.645	0.128	0.547	0.557
EC	Pearson Correlation					0.843 **	0.912 **	0.707 **
	Sig. (bilateral)					0.000	0.000	0.000
PM	Pearson Correlation						0.613 **	0.432 **
	Sig. (bilateral)						0.000	0.000
UR	Pearson Correlation							0.547 **
	Sig. (bilateral)							0.000

Note: GEI, general emotional intelligence; EP, emotional perception; EU, emotional understanding; ER, emotional regulation; EC = ego climate; PM = punishment for mistakes; UR = unequal recognition; MR = member rivalry. * $p \leq 0.05$, ** $p \leq 0.01$.

4. Discussion

The purpose of this study was to evaluate interrelationships among MC, EI, and the frequency of use of bicycle in primary schoolchildren. The study begins with the analysis of the frequency of bicycle use based on sex. In this sense, the weekly frequency of cycling is higher in boys than girls; specifically, most boys use a bicycle between one and three times a week, followed by those who use it more than four times a week and, finally, those who never use the bicycle. On the other hand, the majority of girls, 4 out of 10, claim to never use the bicycle, followed by those who use it between one and three times a week and, finally, those who use it more than four times a week. These results are in line with those presented in the Bicycle Barometer of Spain [47] which reports a higher frequency of bicycle use in men compared to women, and with the data reflected in the studies by Bell et al. [48], Fowler et al. [49], and Martínez-Ruiz et al. [50] where more frequent use of the bicycle is reported among male subjects compared to female subjects. Likewise, hypothesis one (H1) is confirmed due to the higher frequency of bicycle use found in boys than girls. The reasons for these differences in bicycle use habits can be explained by the girls' greater reluctance to take risks, their perception of more barriers to cycling, a lack of confidence in their cycling abilities, reduced independent mobility [46], and the influence of cultural norms in families [51], as well as for a greater safety concern when riding a

bicycle [50]. Therefore, it is necessary to promote bicycle use in girls through implementing cycling skills development programs, and via improving road infrastructure [49,52] which guarantees a greater perception of safety and contributes to cycling adherence in girls.

In terms of MC and its relationship with the sociodemographic factors, slightly higher scores have been found in the TC in girls, while boys obtain higher scores in the EC; although these differences are only significant for the EC category "rivalry between group members", where boys achieve significantly higher evaluations than girls. These data are consistent with the studies developed by Ramírez-Granizo et al. [53] and Chu and Garst [54], where boys stood out in the EC compared to girls, finding significant differences in the EC and its categories of rivalry between group members, unequal recognition, and punishment for mistakes. Likewise, these results are in line with those obtained by Vantieghem and Van Houtte [55], where girls obtained higher scores than boys in "autonomous motivation", which refers to behavior characterized by enjoyment and/or personal relevance. They also partially resemble the findings of the work by Breiger et al. [56], who found a negative relationship of EC in girls, which did not occur in boys. In the study, developed by Castro-Sánchez et al. [57], girls obtained higher evaluations than boys in the TC and its categories "cooperative learning" and "effort/improvement", a situation that is reversed in the case of EC and its respective categories (punishment for mistakes, unequal recognition, and rivalry between group members), where boys obtained higher values. A possible explanation for the greater connection of girls to the TC and boys to the EC can be found in the fact that girls show calmer, more cooperative, obedient, and orderly behavior [55], with a greater tendency towards achieving intrinsic rewards, such as personal improvement and development [57]; boys, on the other hand, show a greater rejection of school, sometimes challenging the authority of teachers, and showing disruptive behavior [55], while at the same time they are more competitive, with a greater emphasis on winning [56]. Therefore, based on the results found in the present study, hypothesis 4 (H4) is accepted, and partially, hypothesis 3 (H3) due to the lower cycling frequency observed among the girls in the study. Considering that boys are more competitive than girls, it would be interesting for teachers to guide and encourage children towards the learning process, instilling a taste for effort, participation, and carrying out the task, regardless of the results achieved in it, to achieve a more self-determined motivation among them [58].

Regarding the relationship between MC and frequency of cycling, in general, slightly higher scores on the TC are observed in children who cycle moderately, i.e., between one and three times per week, with the same significant scores for the category "effort improves". On the other hand, it is striking that pupils who report cycling more than four times per week obtain significantly higher scores on the EC and in the categories "punishment for mistakes" and "unequal recognition" compared to their peers who cycle between one and three times per week; or compared to those who never cycle at all. Although no studies have been found with which to directly compare these results, other studies have analyzed the relationship between the frequency of physical activity and MC, such as the study carried out by Martín-Espinosa et al. [59] which found that those sixth-grade children who dedicated a greater number of hours per week to physical activity obtained higher values in the EC; similar results to the present study. Kokkonen et al. [60] also found a positive relationship between motivational climate and the frequency of physical activity. However, the results of the present research partially contrast with those obtained by Digelidis et al. [61] who indicate that those children who engage in physical exercise two or more times per week achieve higher ratings on TC compared to those children who show a lower frequency of physical exercise per week. Therefore, the data obtained concerning the frequency of bicycle use and MC do not allow us to fully accept hypothesis 3 (H3) although boys who use the bicycle moderately (1–3 times a week) show higher levels of TC, which means a taste for using the bicycle without looking for other different reasons; high values are indeed found in EC by subjects who claim to use the bicycle more than 4 times a week. This tendency towards EC can be explained by the existence of competitive behavior in the subjects who cycle more frequently, which contributes to the ego boost of young people [62].

The fact that these students spend much of their free time on the streets, showing off their cycling skills, could be a factor in gaining a great reputation among their group of friends.

Related to the comparative analysis of the results obtained in the TMMS-24 self-report scale on EI according to gender, it is observed that general EI and the dimensions of emotional perception and emotional understanding are closely linked to gender, with a higher score being found in each dimension in girls compared to boys, except emotional regulation, where no differences are found between both sexes. These results confirm the partial fulfillment of hypothesis 2 (H2), specifically regarding the observation of a higher development of EI in girls compared to boys; while they are in line with the results obtained in other studies, such as those developed by Andrei et al. [63], Mavroveli et al. [64], and Pulido-Acosta and Herrera-Clavero [65], where girls obtained higher scores in EI and its dimensions than boys. However, the results of the present study contrast with those obtained by Passos-Simancas [66], who points out a minimal difference between boys and girls concerning the attention/perception/regulation of their emotions, with boys having a more adequate perception and regulation. Likewise, in the study carried out by Casas et al. [46], statistical differences are found according to sex, with boys obtaining higher scores in emotional understanding and regulation, while girls obtain better scores in emotional perception. Taking into account the results obtained in the present research, it is possible to conclude that the results of the present study show a significant difference between the sexes [64,65]. These differences suggest that sociocultural, educational, or familial factors may influence the development of EI in girls differently than in boys, opening new lines of research to explore the underlying causes of this disparity.

Regarding the analysis of EI and its dimensions according to the frequency of cycling, no statistical association was found; therefore, hypothesis 2 (H2) cannot be fully accepted. However, it is interesting to note that subjects who use bicycles between one and three times a week, and those who use them more than four times a week, have slightly higher ratings in general EI and its dimensions compared to the subjects who never use bicycles. Although there are no studies with directly compare the results obtained in the present study, the results are in line with those proposed by Ardahan and Mert [34], who relate the practice of outdoor activities, such as cycling, with the ability to evaluate and manage positive emotional states. Therefore, according to the results, the use of the bicycle from a recreational point of view, as well as from the active mobility perspective, can be interesting for the emotional well-being of individuals [67] and could contribute to the development of EI and its dimensions.

In the present study, an analysis of the relationship between MC and EI was carried out. The results obtained indicate the existence of an association between both variables. Specifically, general EI and the dimensions of emotional perception, emotional understanding, and emotional regulation correlate directly with TC and the categories cooperative learning, effort/improvement, and important role. On the other hand, regarding the relationship between EI, EC, and its categories, only general EI and emotional understanding are found to correlate directly with the category punishment for mistakes, just as emotional perception is significantly associated with EC and the category punishment for mistakes. These results are partially consistent with those provided by Castro-Sánchez et al. [68] and Méndez-Giménez et al. [69], where they found significant and positive correlations between TC and the dimensions of EI; although, in the present study, a certain tendency is also observed in students to relate EI with EC and the category punishment for mistakes, a circumstance that hardly occurs in the rest of the studies consulted. The relationship between emotional perception and understanding with the category EI and punishment for mistakes can be explained because students perceive, understand, and control their emotional states to obtain external rewards or avoid punishment [70]. Therefore, according to the results obtained in the present research, hypothesis 5 (H5) is partially accepted for the assumption of the positive relationship between EI and TC; however, the same hypotheses are partially rejected for the assumption of the negative relationship between EI and EC found in this study. Given the risk of falling into the error of creating an ego-oriented

motivational climate, PE teachers must encourage the creation of a climate which favors the students' "involvement and effort towards the task and guarantees the enjoyment of their practice to promote an improvement in the students" EI.

5. Limitations and Future Perspectives

This study has several limitations that should be considered when interpreting its findings. First, although the sample size was sufficient, the use of a descriptive and cross-sectional design may have introduced biases. Additionally, the reliance on self-reported data reflects the participants' perceptions of their behavior, which may not always align with objective reality. Second, the majority of the participants were between the ages of 9 and 13 and belonged to only two primary schools located in the same autonomous city, limiting the generalizability of the findings to other age groups, educational settings, or broader geographical areas. Consequently, future research should aim to validate these results in diverse cultural contexts and age groups. Although this study identified an association between moderate cycling practice and the development of a task climate, further longitudinal research is needed to address the long-term effects of cycling on MC improvement and EI development in children. Additionally, it would be interesting to explore the relationship between cycling and other factors, such as anxiety, student satisfaction, and the promotion of active mobility habits among schoolchildren, especially in girls. Moreover, future studies should also examine EI and MC through other types of physical activity beyond cycling to better understand how different forms of exercise contribute to these outcomes.

Despite these limitations, the study's findings are valuable as it is the first to provide a detailed analysis of the relationship between MC, EI, and schoolchildren's cycling habits in primary school students. From a practical perspective, this research suggests that policymakers should support PE teachers in integrating bicycle-based intervention programs into PE sessions. Such programs can help achieve higher levels of self-determined motivation, foster active mobility habits, acquire greater physical and emotional well-being, and enhance the development of perceptual and motor skills among primary school students.

6. Conclusions

This study is the first to analyze the relationship between cycling and the development of EI and MC in schoolchildren. In terms of cycling, gender differences were found, with boys showing a higher frequency of cycling compared to girls. Regarding MC, while a higher TC orientation is observed in individuals who use the bicycle moderately and in girls, the students who use the bicycle more than four times a week and boys show a higher EC orientation. Related to the analysis of EI, a higher score in general EI and its dimension was found in girls compared to boys. No statistical differences were found according to bicycle use; however, higher scores in EI and its dimensions were observed for the individuals who showed higher bicycle use habits. Finally, EI and the dimensions of emotional perception, emotional understanding, and emotional regulation correlate directly with TC and the categories cooperative learning, effort/improvement, and important role. However, a correlation was also observed between general EI and emotional understanding with the category punishment for mistakes, just as emotional perception was associated with EC and the category punishment for mistakes. These results suggest that PE teachers should consider incorporating didactic proposals based on the use of bicycles in their programs to guarantee the development of an adequate MC and for the EI in schoolchildren, which are necessary factors to the integral development of their pupils [24,25]. Finally, future research should aim to validate these results in diverse cultural contexts and age groups while exploring the potential impact of other physical activities on EI and MC. This approach will provide a deeper understanding of how diverse forms of exercise contribute to students' emotional and motivational development.

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