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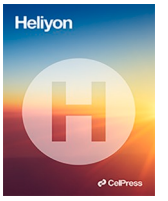

Research article

Explanatory model of motivational climate, self-concept and emotional intelligence in primary school students: Structural equation analysis

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ABSTRACT

Motivational Climate, self-concept and emotional intelligence are important factors for education and learning in children and teenagers, with special relevance in Physical Education (PE).

Purpose: Addressing a gap in the literature, this study sought to develop and compare an explanatory model for analysing the relationships within the perceived teacher-generated motivational climate, self-concept and emotional intelligence in schoolchildren, using structural equation analysis.

Methods: The sample consisted of 347 Spanish primary school students of both genders (46.4 % boys; 53.6 % girls; $Mean_{age} = 10.55$, SD = 0.97). The Form 5 Self-Concept Questionnaire (AF5), the Trait Meta-Mood Scale (TMMS-24), and the Perceived Motivational Climate in Sport Questionnaire (PMCSQ-2) were used for data collection. Structural equation modelling was carried out that was adequately adjusted ($\chi^2 = 190.152$; DF = 71; $p < .001$; CFI = .947; NFI = .938; IFI = .949; RMSEA = .070).

Results: The structural equation model demonstrated a positive association between a task-focused motivational climate and both emotional intelligence and self-concept levels, with a negative relationship between an ego-involving motivational climate and self-concept. No significant association was observed between self-concept and emotional intelligence.

Conclusion: A stronger predisposition toward a task-oriented motivational climate fosters greater development of emotional intelligence and self-concept in primary school students.

1. Introduction

Achievement goals theory is the main motivational climate (MC) framework [1,2] for interpreting characteristic behaviour that emerges in specific areas, such as Physical Education (PE). This theory suggests that perceptions and emotions related to success influence individual behaviour [3–5]. MC is closely associated with goal orientation and is shaped by environmental factors, as well as the influence of various key protagonists in the educational process [2,6,7]. In terms of theory, depending on what occurs during the PE sessions, two distinct motivational climates can be identified: the task-oriented climate (TC), which emphasizes hard work, cooperation, collaboration, personal growth and effort [8,9]; and the ego-oriented climate (EC), marked by comparisons with others, success defined by ability, competition, and the use of rewards or punishments for achievements and failures [10]. Related to Achievement

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Goal Theory is the Self-Determination Theory (SDT), which is based on the premise that the needs for social connection, autonomy and competence, which every individual possesses, significantly influence motivational levels [11]. In this regard, when these needs are met, a higher degree of intrinsic motivation is achieved. Conversely, when these needs are not satisfied, the result is a more extrinsic form of motivation, and in some cases, even demotivation may appear [12]. Previous studies have analysed the predominant MC in PE [3], and its relationship with other factors such as anxiety, self-concept, physical activity and emotional intelligence, especially in adolescents. However, no research has been found where analyses the possible influences of MC on children's self-concept (SC) and emotional intelligence (EI); psychological variables of great importance for personal development. These variables can be related to each other. The literature review indicates a relationship among various factors, including MC and EI, considered as personal factors that will become relevant in the final years of the primary education stage [13]. Additionally, if individuals have a positive self-perception, they will be more focused on tasks, particularly when they possess an ability to think internally for academic activities [14], thus demonstrating the relationship between SC and MC. On the other hand, SC and EI can serve as key indicators for designing, developing, and implementing preventive and intervention strategies aimed at strengthening students' personal resources [15]. Thus, with regard to SC, multiple studies have found that this variable has an influence on personal and social well-being development [16], especially in childhood and youth; and scientific interest regarding the study of this psychological variable is growing. SC has different components – cognitive, behavioural and evaluative – that are essential for understanding the attitudes shown for each subject [17]. The formation of SC is determined in the complex, multifaceted and multidimensional construction of different domains [18]. Specifically, academic self-concept (ASC) is linked to the individual's perception in their role as a student [19,20]; social self-concept (SSC) is built from individual's perceptions about the role who play in society [21,22]; emotional self-concept (ESC) is defined as the individual's sensations happened when emotions are controlled [23,24]; family self-concept (FSC) arises as a result of the positive or negative feelings that emerge as a consequence of acceptance and support degree from the family nucleus itself [18,25]; and physical self-concept (PSC) is linked to the opinion generated about the individual's own body, which is determined by the perception of motor competence, physical condition and physical appearance among others [26]. The promotion and practice of physical activity have a significant impact in fostering the development of this dimension [27]. Although the development of personality is promoted through all dimensions of SC, SSC and ASC are configured as essential elements for development and progress throughout the different educational stages [19,20,22,28,29].

The third variable analysed in this study is EI, which is a beneficial factor for the enhancement of prosocial behaviour, adaptation to life, mental health, physical health, classroom climate and work performance [30,31]. Several studies have supported these benefits [32,33], but despite the solid scientific basis for the concept of EI [34], its definition has been an object of controversy [32,34]. In particular, for some experts, it has been considered as skill, while for others it is a trait and for a third group, it is a combination of both [32]. There are thus different frameworks responsible for analysing the role played by EI in different areas [34], with the model developed by Mayer and Salovey [35] being one of the most widely used in the social sciences [33,36]. Studies incorporating this model often use the self-report Trait Meta-Mood Scale (TMMS) developed by Salovey et al. [37], which assesses the abilities that enable individuals to recognize and manage their emotions effectively [38–40]. Within the TMMS, different skills are integrated, including emotional perception, related to the degree to which each subject can identify their own emotions and those of others; emotional understanding, or the ability to identify and classify the variety of emotional signals; emotional regulation, which is defined as the capacity to manage both one's own emotions and those of others, as well as control them; and emotional facilitation of thought, refers to the ability to use emotions as a valuable resource when contemplating or addressing specific problems [33,41].

Taking into account that EI can improve students' life and school experience [42], this variable has special prominence within the educative system [43,44], including PE [45]. EI has recently been incorporated into the primary school curriculum, with a specific weight within PE, which is attributed a relevant role for the development of EI in children, as reflected in Royal Decree 157/2022, of 1 March, about the organisation and minimum teaching in Primary Education [46]. This curricular framework stipulates that PE should contribute to students' awareness and management of their emotions, while also increasing their social skills in contexts of physical activity. The development of processes to regulate pupils' emotional response in physical activity and sport situation is thus set out at the curricular level in the fourth block of basic knowledge in PE, as well as through the third specific competence, with its respective assessment criteria established for all primary school levels.

According to the arguments provided, it is necessary to analyse the factors that determine the MC, SC and development of EI, as well as the relationships among these variables to understand the behavioural patterns that contribute to the adoption of healthy lifestyle habits and mental and emotional well-being in children [47]; therefore, the main objective of the present research is (a) to develop a theoretical explanatory structural equation model to define and contrast the associations between MC, SC and EI in primary school students.

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

H1. The theoretical model developed will confirm the existence of a negative relationship between task-oriented MC and ego-involved MC.

H2. EI has a positive association with task climate and an inversely associated with ego climate, with higher levels of EI observed when task climate is more predominant. Conversely, the opposite effect occurring when there is a greater predominance of ego climate.

H3. SC is positively associated with task climate and negatively associated with ego climate in primary school students, so a greater predominance of task climate leads to greater SC development, while a greater predominance of ego climate leads to a deterioration of SC.

H4. There is a direct association between SC and EI, so greater development of SC will accompany greater development of EI.

2. Material and methods

2.1. Design and participants

A cross-sectional and descriptive design was employed to analyse a sample of 347 children of both sexes, consisting of 46.4 % (n = 161) boys and 53.6 % (n = 186) girls, with ages ranging from 9 to 13 years (M = 10.55 years; SD = 0.97). The sample of 347 participants represents 9.47 % of the total student population from the fourth, fifth, and sixth grades of primary education, in a Spanish autonomous city in northern Africa, with a sampling error of 0.05 meeting the statistical criteria necessary to ensure its representativeness, which was analysed using the EDUCABASE database [48]. The sample was obtained using convenience. The participants were gathered from two public primary schools. The initial school was selected because one of the authors of the study worked as a PE teacher there. The second school was picked for its comparable characteristics to the first, despite being situated in a different district of the city.

Both schools report comparable sociodemographic characteristics related to the educational reality of the autonomous city, finding a comparatively low socioeconomic and cultural index among families, low levels of academic performance in different curricular areas such as language, mathematics, and natural and social sciences, as well as a somewhat elevated school failure rate. Most parents work in the service sector (small shops, bars and itinerant stalls) and the industrial sector (labourers), with a small number employed in the public sector (military and civil servants). However, both educational contexts face high unemployment rates, especially among mothers. Both schools show a relatively high rate of physical activity, largely due to their diverse range of extracurricular sports activities. It is necessary to note the participation of the researchers in the data collection to ensure that the process was conducted effectively, guaranteeing the non-repetition of subjects and avoiding the duplication of data, as well as carrying out individualised follow-up during data collection.

2.2. Variables and instruments

The Perceived Motivational Climate in Sport Questionnaire-2 (PMCSQ-2) designed by Newton et al. [49], with a Spanish version adapted by González-Cutre et al. [50], has been widely used in the field of PE. It includes 33 items rated on a 5-point Likert-type scale, with 1 "strongly disagree" and 5 indicating "strongly agree". The questionnaire establishes two categories, each of includes three subcategories. The first factor pertains to the identification of an ego-oriented climate (EC) and consists of 16 items divided into the subcategories: punishment for mistakes (PM), unequal recognition (UR) and rivalry between group members (MGR). The second category includes the questions identifying a task-oriented climate (TC); it is integrated of 17 items divided into the subcategories of cooperative learning (CL), effort/improvement (E/I) and, finally, the important role of each student (IR). The adapted version of the PMCSQ-2 used in this study has acceptable psychometric properties, and its validity and reliability were demonstrated in the research carried out by González-Cutre et al. [50]. The internal consistency coefficient in the present investigation was $\alpha = .856$ for EC, with the following internal consistency values for each subcategory: $\alpha = .699$ for PM; $\alpha = .795$ for UR; and $\alpha = .533$ for MGR. For TC, the reliability coefficient was $\alpha = .803$, with reliability coefficients of $\alpha = .599$ for the subcategory of CL; $\alpha = .675$ for E/I; and $\alpha = .518$ for the IR of the learner. Although the internal consistency values for some subscales were lower than $\alpha = .700$, its consistency can still be regarded as marginally acceptable given the limited number of items [51].

The Form 5 Self-Concept Questionnaire (AF-5), designed by García and Musitu [52], is an SC assessment tool that has been widely accepted among researchers; it can be widely applied to a broad spectrum of the population, from childhood to adulthood [53]. The questionnaire has 30 items, each rated on a 5-point Likert-type scale from 1 (never) and 5 (always), to assess the five dimensions of SC: ASC (items 1, 6, 11, 16, 21 and 26), SSC (2, 7, 12, 17, 22 and 27), ESC (3, 8, 13, 18, 23 and 28), FSC (4, 9, 14, 19, 24 and 29) and PSC (5, 10, 15, 20, 25 and 30). This instrument has acceptable psychometric properties, and its validity and reliability have already been demonstrated in the study by García and Musitu [54], with an internal consistency coefficient (Cronbach's alpha) similar to that obtained in the present investigation ($\alpha = .760$). For dimension, the following alpha values were obtained: ASC ($\alpha = 0.669$), SSC ($\alpha = 0.636$), ESC ($\alpha = 0.631$), FSC ($\alpha = 0.649$), and PSC ($\alpha = 0.669$). Dimensions with internal consistency values lower than $\alpha = 0.700$ can be considered marginally acceptable [51].

The TMMS-24 questionnaire is derived from the original TMMS created by Salovey et al. [37], with a Spanish adaptation conducted by Fernández-Berrocal et al. [55]. It is among the most commonly utilized tools for evaluating the trait of EI [56]. The TMMS-24 includes three essential dimensions of EI, each comprising eight items: emotional attention or perception (EIPE), emotional clarity or understanding (EIEU), and emotional repair or regulation (EIER). All items are evaluated using a 5-point Likert-type scale, where 1 indicates "strongly disagree" and 5 indicates "strongly agree". This scale allows for the assessment of the metaknowledge associated with each of the three dimensions. The questionnaire demonstrates acceptable psychometric properties [57]. The internal consistency coefficient obtained in the present study was $\alpha = .854$, which is acceptable. For the dimensions, the reliability indices were $\alpha = .745$ for EIPE; $\alpha = .731$ for EIEU; and $\alpha = .696$ for EIER.

2.3. Procedure

Authorisation for this study was requested from academic and educational administration. Consequently, a favourable report was obtained (register number 201708380). Once the schools had been selected, the researchers contacted the headteacher and the PE teachers from both schools to provide information about the aims and characteristics of this research, as well as to obtain the appropriate authorisation and collaboration for its implementation. An authorisation form was then provided to the legal guardians of

the students, seeking informed consent, as the participants are children. It should be highlighted that participant anonymity was assured throughout the study, and they were notified that the records would only be used for scientific purposes. Throughout the data collection process, researchers were present to ensure that everything was conducted efficiently, solving any type of doubt while the children were filling in the questionnaires, which were completed during school hours within the PE sessions, within a conventional classroom as the setting. Finally, A letter of appreciation was sent to the headteacher, as well as the PE teachers involved in the study; and a commitment was made to submit a final report with the data obtained in each school (always guaranteeing the confidentiality of pupils and always for purely informative purposes). From the 367 questionnaires submitted in the first phase, 20 of them were discarded because they were completed incorrectly, leaving a total of 347 questionnaires and participants to be considered the sample of this study.

The current research adheres to the principles outlined in the Declaration of Helsinki [58] for research projects, as well as with the national legislation for clinical trials [59], biomedical research [60] and confidentiality of participants [61]. Approval for the study was received from the Research Ethics Committee of the University of Granada (register number 530/CEIH/2018).

2.4. Data analysis

SPSS software, version 23.0 for Windows, was used to analyse the data collection, with AMOS version 23.0 for the analysis of relationships among the constructs included in the structural model, as well as for the subsequent modelling of structural equations. The Kolmogorov-Smirnov test was used to assess the normality of the sample. After developing the theoretical model, path analysis was conducted by examining the relationships derived from the matrix based on structural equation analysis. The pathway model was made up of 4 latent variables and 14 observable variables to determine the indicators (Fig. 1). Causal explanations of the latent variables were derived from the observed relationships between the indicators, with the reliability of the measurement taken into consideration. Additionally, measurement errors were incorporated into the observable variables to enable direct control over them. The one-way arrows represent the influence pathways between the latent and observable variables, which can be interpreted as multivariate regression coefficients. The bidirectional arrow shows the relationships between the latent variables, which represent the regression coefficients.

TC and the EC function as exogenous variables, with each being inferred from three distinct indicators. For TC the indicators are IR, E/I and CL. For EC, the indicators are PM, UR and MGR. EI acts as an endogenous variable, affected by TC and EC. Similarly, SC functions as an endogenous variable, receiving the influence of TC, EC and EI, the latter variable acting as a mediator.

The model fit was assessed to confirm the consistency between the proposed model and the collected empirical data. Reliability of the fit was evaluated according to Marsh's goodness-of-fit criteria [62]. For the Chi-square test, non-significant p-values reflect a strong fit of the model. Comparative fit index (CFI) values above .90 are considered acceptable, while values exceeding .95 are deemed

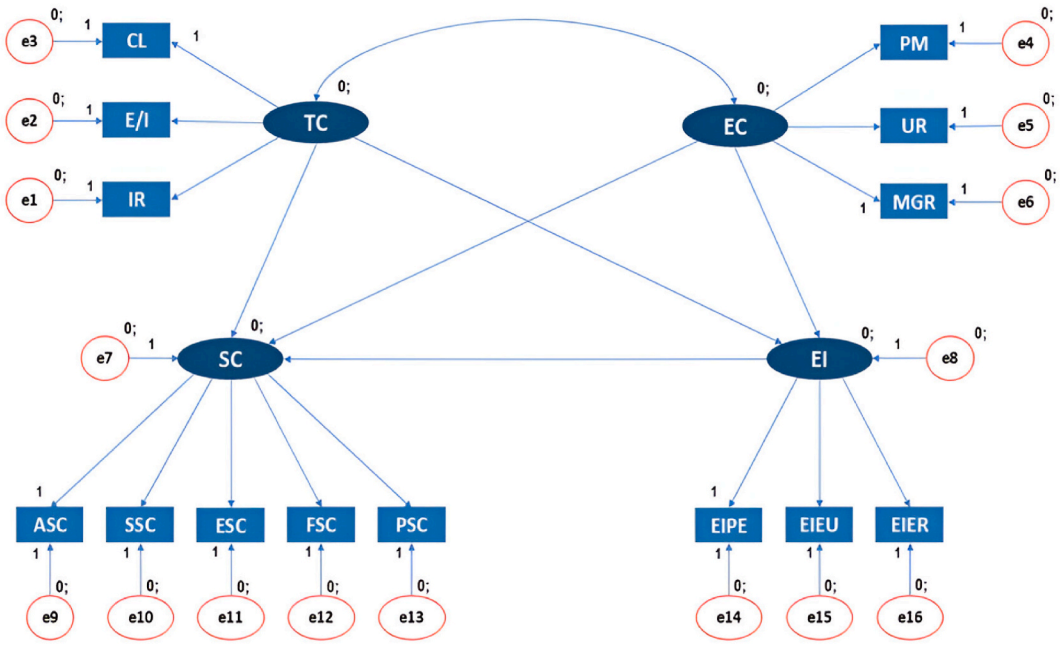

Fig. 1. Theoretical Model. **Note:** EC = Ego climate; TC = Task climate; SC = Self-Concept; EI = Emotional Intelligence; CL = Cooperative learning; E/I = Effort/improvement; IR = Important role; PM = Punishment for mistakes; UR = Unequal recognition; MGR = Member rivalry; ASC = Academic self-concept; SSC = Social self-concept; ESC = Emotional self-concept; FSC = Family self-concept; PSC = Physical Self-Concept; EIPE = Emotional Perception; EIEU = Emotional Understanding; EIER = Emotional Regulation.

excellent. For the normalised fit index (NFI) values greater than .90 are required. The incremental fit index (IFI) is acceptable when above .90, and excellent if it surpasses .95. Lastly, the root mean square error of approximation (RMSEA) is considered excellent when below .05 and acceptable if under .08.

3. Results

The proposed structural equation model demonstrates a strong fit for all evaluation metrics according to the number of participants in the study. The Chi-square statistic shows a significant p-value ($\chi^2 = 190.152$; gl = 71; $p < .001$). Nonetheless, this index cannot be interpreted in a standardised manner and is sensitive to the size of the sample [62]. Alternatives standardised fit indices which are less affected by sample size, were therefore used. The CFI yielded a value of .947, which is excellent. The NFI achieved a value of .938 and the IFI a value of .949, both acceptable. The RMSEA yielded an acceptable value of .070.

Estimated values of the structural model parameters for the schoolchildren analysed are showed in Fig. 2 and Table 1. These estimates should be sufficiently large, and their effects should be statistically distinct from zero. Additionally, improper estimates, such as negative variances, should not be obtained. Relationships that were statistically significant were identified at $p < .001$ between all categories of MC and their respective dimensions, which were both positive and direct. The negative, indirect relationship ($r = -.196$) between TC and EC was significant at $p < .01$. Similarly, statistically significant relationships at the $p < .001$ level were identified between EI and its indicators; all associations were positive and direct. Regarding SC and its five dimensions, statistically significant positive and direct relationships at the $p < .001$ level were observed between all of them.

Upon examining the impact of the indicators on each latent variable, it was found that all exhibited statistically significant differences at $p < .005$, with all relationships being positive and direct. In the case of TC, E/I showed the strongest association ($r = .820$), followed by CL ($r = .693$) and IR ($r = .653$). For EC, the strongest association was for UR ($r = .901$), followed by PM ($r = .685$) and MGR ($r = .606$).

Looking at EI, EIER is the indicator showed the strongest relationship ($r = .752$), followed by EIEU ($r = .734$) and EIPE ($r = .650$). Related to SC, the indicator with the strongest association was SSC ($r = .665$), followed by the PSC ($r = .547$), FSC ($r = .539$), ASC ($r = .518$) and ESC ($r = .332$).

Similarly, significant positive and direct associations ($p < .001$) were identified in the relationships established between TC and EI ($r = .735$) and EC and EI ($r = .244$). Statistically significant differences at the $p < .01$ level were also observed between TC and SC, revealing a direct association ($r = .244$). Regarding the association between EC and SC, statistically significant differences at the $p < .001$ level were observed, showing a negative and indirect association ($r = -.300$). No statistically significant associations were found for EI and SC ($p = .600$).

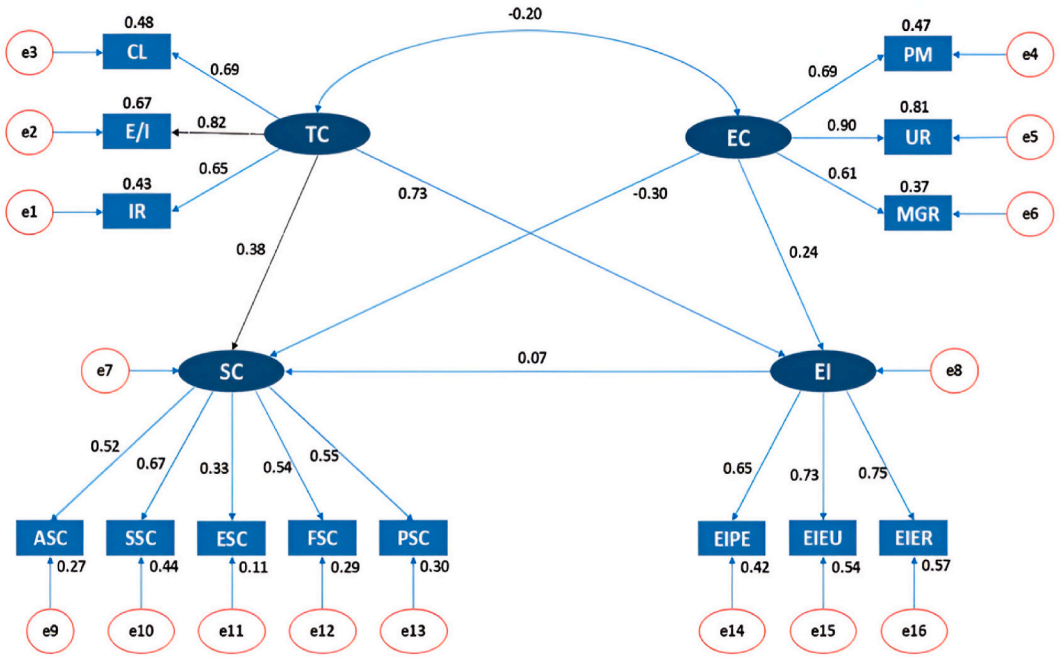

Fig. 2. Structural Equation Model. **Note:** EC = Ego climate; TC = Task climate; SC = Self-Concept; EI = Emotional Intelligence; CL = Cooperative learning; E/I = Effort/improvement; IR = Important role; PM = Punishment for mistakes; UR = Unequal recognition; MGR = Member rivalry; ASC = Academic self-concept; SSC = Social self-concept; ESC = Emotional self-concept; FSC = Family self-concept; PSC = Physical Self-Concept; EIPE = Emotional Perception; EIEU = Emotional Understanding; EIER = Emotional Regulation.

Table 1
Structural model.

Relations between variables			P.R.				P.E.R.
			Estimations	S.E.	C.R.	P	Estimations
EI	←	TC	.814	.094	8.639	***	.735
EI	←	EC	.212	.053	4.000	***	.244
SC	←	TC	.275	.097	2.833	**	.385
SC	←	EC	−3.580	0.402	−8.897	***	−.300
SC	←	EI	.043	.082	.525	.600	.067
IR	←	TC	1.000	–	–	***	.653
E/I	←	TC	1.131	.102	11.127	***	.820
CL	←	TC	1.152	.112	10.290	***	.693
PM	←	EC	1.000	–	–	***	.685
UR	←	EC	1.411	.138	10.218	***	.901
MGR	←	EC	1.014	.102	9.936	***	.606
PSC	←	SC	1.000	–	–	***	.547
FSC	←	SC	1.028	.156	6.587	***	.539
ESC	←	SC	.831	.178	4.668	***	.332
SSC	←	SC	1.224	.171	7.169	***	.665
ASC	←	SC	.968	.151	6.433	***	.518
EIER	←	EI	1.000	–	–	***	.752
EIEU	←	EI	1.015	.090	11.223	***	.734
EIPE	←	EI	.924	.089	10.337	***	.650
EC	↔	TC	−.065	.023	−2.823	**	−.196

Note1: TC, Task Climate; CL, Cooperative Learning; E/I, Effort/Improvement; IR, Important Role; EC, Ego Climate; MGR, Member Group Rivalry; PM, Punishment for mistakes; UR, Unequal recognition; SC, Self-Concept; ASC, Academic Self-Concept; SSC, Social Self-Concept; ESC, Emotional Self-Concept; FMS, Family Self-Concept; PSC, Physical Self-Concept; EI, Emotional Intelligence; EIPE, Emotional Perception; EIEU, Emotional Understanding; EIER, Emotional Regulation.
Note 2: P.R., Regression Weights; S.E.R., Standardised Regression Weights; S.E., Estimated Error; C.R., Critical Ratio.
Note3: $p < 0.05$; $*p < 0.01$; $**p < 0.001$***.

4. Discussion

In the present research, structural equation analysis was developed to contrast the relationships between MC, SC and EI. These were analysed in a mixed-gender, primary school sample. The path model developed yielded good fit indices which indicates that it is a valid explanatory model that allows specification of the existing relationships between motivational, emotional and self-concept factors, following previous research such as Bracho-Amador et al. [6], Castro-Sánchez et al. [63,64], Melguizo-Ibáñez et al. [65] and Soufi et al. [14].

Regarding MC, the path model in this study validated an inverse association between EC and TC. Allowing students who show a greater predisposition towards the task to focus precisely on the tasks with an attitude of effort and self-improvement tend to show low levels of EC, which predisposes them to demonstrate skills or surpass their classmates. These results are congruent with similar models developed in previous studies such as those of Castro-Sánchez et al. [64] and Méndez-Giménez et al. [66]. They also found an inverse relationship between EC and TC that is stronger in girls, who are more task-oriented, compared to boys, who stand out for being more competitive and thus more ego-oriented. Therefore, considering the findings from the current study, hypothesis 1 (H_1) is accepted, whereby it would be beneficial for teachers to support and motivate students throughout the learning process by nurturing a passion for effort, participation, and task completion, irrespective of the outcomes. This approach may help to develop a greater self-determined motivation in pupils.

When analysing the influence of the SC indicators, the social dimension (SSC) has the strongest association, followed by PSC and FSC dimensions, with the ASC and ESC having the least influence. These results are partially consistent with those obtained by Escortell et al. [67], in whose model the highest index weights corresponded to SSC, followed by FSC and PSC. These finding conflicts, however, with those obtained by Castro-Sánchez et al. [68], who found that ASC, FSC and SSC dimensions had the greatest influence on students' general SC, while the physical and emotional dimensions had the least influence. A possible explanation for the higher value given to the social dimension in the students participating in the present study can be explained by the importance they gave to the social acceptance received from the people with whom they live (e.g. classmates, friends, family, teachers); such acceptance becomes more relevant in the final years of primary education [69].

Regarding the influence exerted by the TC indicators, E/I had the strongest association, followed by CL and IR, which was the least influential. In terms of EC, UR had the strongest association, followed by PM and MRG. These findings are consistent with those of recent research such as that developed by Castro-Sánchez et al. [63,70], as well as the contributions made by Harwood et al. [71], whose review of the literature found that the factors influencing the maintenance of a specific classroom climate can shift from moment to the next, varying across sessions, and even change between practice and competition. PE teachers should therefore promote the creation of a TC to achieve greater student satisfaction towards PE [6], as well as greater social adaptation in students [4].

EIER was found to be the indicator related to EI with the strongest association, followed by EIEU and EIPE, with the last dimension showing the lowest rating. These results are partially consistent with those presented by Luque González et al. [33], whose research

carried out with schoolchildren from Spain, Poland and Norway found that emotional repair was the dimension with the highest rating, followed by emotional clarity and emotional attention; in the subsample of Spanish students in that study, emotional repair received the lowest ratings.

On the other hand, these results differ from those found by Castro-Sánchez et al. [63] and Sánchez-Ortega and Chacón-Cuberos [45], where the emotional perception dimension had the greatest associative strength. There are many possible reasons for the higher value of EIER in the present study, and it may be due to the fact that students close to adolescence are acquiring a greater awareness and ability to regulate their own and others' emotions [33], as well as to control negative emotions, while at the same time, they can enhance positive ones [43] which allows them to put into practice emotional use, empathy and social skills [30,34].

One of the key findings that emerged from this study was the positive and direct relationship between the MC and EI, which revealed a stronger association in a TC, compared to that obtained for an EC. These results confirm hypothesis 2 (H_2), while they are consistent with those from previous investigations, such as those carried out by Arias et al. [34], Castro-Sánchez et al. [63], González-Valero et al. [72] and Méndez-Giménez et al. [66], where a positive and direct predictive effect was found between the most self-determined types of motivation (TC) and levels of EI. The present results suggest that the children participating in this study tend to practise physical activity from a more hedonistic perspective, showing a greater acceptance of the role they play in each group [72], as well as a greater awareness of their own emotions during the development of the games [66].

Analysing the degree of association between MC and SC, while the TC category shows a positive and direct association with SC, SC shows a negative association with EC. These findings are in line with those obtained by Castro-Sánchez et al. [70], Méndez-Giménez et al. [73] and Soufi et al. [14], who found that TC, which is aligned with a more self-determined level of motivation, contributes to overcoming personal challenges, greater effort and self-confidence, thus influencing the development of positive SC in the individual. Based on these findings, Hypothesis 3 (H_3) is accepted, suggesting that PE teachers should design educational plans that facilitate the establishment of a TC, which contributes to maximising the experiences of fun, confidence and satisfaction in the class [6,34,73] to improve the development of SC in schoolchildren.

Finally, there did not appear to be any relationship between the constructs of EI and SC, so hypothesis 4 (H_4) cannot be accepted. These results of the theoretical model developed are contradictory to the explanatory model presented by Salvador-Ferrer [74], in which the three components of EI exerted a positive, direct predictive effect on SC. Despite the absence of a statistical association between the two variables in the current study, it cannot be denied that an adequate understanding and regulation of the emotional components of EI can positively affect any subject's self-evaluative processes; therefore, as Schutte et al. [75] argued, it would be interesting for future research to analyse the relationship between EI and SC in schoolchildren in greater depth.

The present research has several limitations, which must be taken into account when considering its findings. On one hand, most of the subjects participating in the study were between 10 and 12 years of age and came from only two primary schools. So, the results presented thus only refer to the age range corresponding to the last three years of primary education. Caution should be used when generalising about the current results and extrapolating them to other age groups and educational contexts. On second hand, while the sample size was sufficiently large, employing a descriptive and cross-sectional design may have biased the results obtained. Furthermore, the use of self-reports reflects the individual's perception of their behaviour or feelings, which can differ significantly from objective reality. Consequently, it is thus necessary for future research to corroborate the results found in different cultural contexts and age groups. Finally, in view of the absence of a statistical association between EI and SC in the present study, future research should analyse the relationship between these variables in depth among pupils belonging to different levels of primary school.

Despite its limitations, the findings of this study are significant as it is the first to provide an in-depth examination of the connections between MC, SC, and EI in primary school students. Among the practical implications of the present research, it is noted that PE teachers can focus on the relevant factors for creating a MC conducive to learning and social interaction. Additionally, it guides teachers in fostering a positive SC in students, as well as it encourages implementing strategies for developing the emotional skills necessary for rewarding participation in games and other motor activities.

5. Concluding remarks

The path model created yielded good fit indices which indicates that it is a valid explanatory model that allows specification the presence of a positive and direct relationship among the most self-determined types of motivation (TC) and the levels of EI and SC in children. An inverse relationship was found between EC and SC. Furthermore, there is an inverse association between EC and TC, so students who show a greater predisposition towards a task-oriented climate tend to show lower levels of being disposed towards an ego-oriented climate. Girls tend to show more task-oriented motivation compared to boys, who show higher ego-oriented motivation. Indicators with great associative strength were the social dimension for SC; E/I for TC; UR for EC; and EIER for EI. No statistical association was found between EI and SC. Based on the findings of this study, PE teachers should focus on fostering a TC that emphasizes effort over competition and comparison to achieve greater satisfaction towards physical education and improve students' EI and SC. Additionally, incorporating activities that enhance emotional regulation skills is essential for better interaction and performance during the practice of games and physical activities.

CRediT authorship contribution statement

Guillermo Moreno-Rosa: Writing – original draft, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Carlos Javier López-Gutiérrez:** Writing – review & editing, Supervision, Investigation, Conceptualization. **Manuel Castro-Sánchez:** Writing – review & editing, Supervision, Methodology, Investigation, Formal analysis, Conceptualization.

Data availability statement

Data will be made available on request.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.heliyon.2024.e40214.

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