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Neuroscientific Perspectives on the Influence of School Emotional Climate on the Development of Social-Emotional Skills in Primary Education

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Abstract

The present study explores the interactions between school emotional climate and the development of socio-emotional skills in primary school students from a neuroscientific perspective. It discusses how positive or negative emotional experiences within the school environment can modulate key brain functions related to self-regulation, empathy, and social skills. Through a theoretical review and a qualitative field study in five educational institutions, determinants of the emotional climate and their neuropsychological implications on child learning and well-being are identified. The results highlight the importance of affectively healthy educational environments to optimize brain and emotional development during childhood.

Keywords: School Emotional Climate, Neuroscience, Socio-Emotional Skills, Primary Education, Child Development.

Introduction

During the early stages of human development, the brain undergoes an accelerated maturation process in which emotional experiences play a determining role in the configuration of neural circuits involved in learning, affective regulation and social relationships. In this context, school emerges as a key environment for socio-emotional development, providing not only academic content, but also experiences that shape identity, empathy, resilience and other fundamental competencies for life in society (Cefai et al., 2021).

The concept of **school emotional climate** has gained relevance in contemporary debates on integral education. This is defined as the set of affective perceptions that students have about the environment in the classroom and the educational institution in general, including the quality of interactions with teachers and peers, the management of emotions, and pedagogical leadership styles (Barile et al., 2020). When this climate is positive, a state of emotional security and motivation is favored that facilitates openness to experience, meaningful learning, and emotional self-regulation (Weissberg et al., 2022).

From a neuroscientific perspective, the relationship between emotions and learning has been

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widely documented. Recent research has shown how an environment charged with negative emotions or affective insecurity can activate the hypothalamic-pituitary-adrenal axis, generating states of stress that affect memory consolidation and decrease attentional capacity (Liston et al., 2021). On the contrary, enriched emotional climates activate dopaminergic and oxytocinergic systems associated with social reward, attachment, and willingness to cooperate (Van Lange et al., 2022).

In addition, the development of **socio-emotional skills** is now considered an essential component of comprehensive education. These skills—such as empathy, self-control, emotional awareness, and responsible decision-making—have been shown to have lasting effects on individuals' academic, professional, and personal lives (Jones et al., 2021). Its strengthening requires both intentional emotional education programs and a coherent and affectively healthy institutional environment.

Faced with this panorama, there is a need to investigate, from an interdisciplinary perspective that integrates neuroscience, psychology and pedagogy, how the school emotional climate influences the development of socio-emotional skills in primary education. Understanding this relationship will allow us to base new educational strategies focused on children's emotional well-being and neurodevelopment, thus contributing to the formation of more balanced, empathetic and resilient generations.

Theoretical Framework

1. Neuroscientific foundations of child emotional development

During childhood, the human brain is in a critical phase of synaptic development, characterized by high plasticity and sensitivity to socio-emotional stimuli. Emotions not only influence behavior, but are closely linked to higher cognitive functions such as attention, memory, and problem-solving (Blair & Raver, 2021). This relationship is mediated by specific brain structures, whose development can be enhanced or inhibited by the affective environment.

Brain structure	Main function	Influence of the school emotional environment
Tonsil	Fear processing and emotional reactions	It is activated by environments perceived as threatening (Tottenham et al., 2020)
Prefrontal cortex (PFC)	Emotional regulation and decision-making	Their maturation improves with stable and affective environments (Liston et al., 2021)
Hippocampus	Memory consolidation	Chronic stress can reduce your functional volume (Teicher et al., 2020)
Insula	Emotional awareness and empathy	It stimulates the understanding of one's own and others' emotions (Van der Meer et al., 2022)

Table 1. Main Brain Structures Involved in Emotional Regulation in Childhood

The school environment, as a context of prolonged social interaction, has a modulating role in these structures. Positive emotional experiences activate neural networks associated with reward and attachment, while hostile or negligent environments can alter the development of the limbic system (Guyer et al., 2020).

2. School Emotional Climate and its Multidimensional Structure

School emotional climate can be defined as students' subjective perception of the affective atmosphere of their institution, which includes interpersonal, organizational, and physical factors (Cefai et al., 2021). This perception influences their emotional security, academic motivation, and predisposition to develop social skills.

Dimension	Description	Involvement in social-emotional development
Relational	Quality of links with teachers and classmates	It promotes empathy, self-esteem, and conflict resolution (Weissberg et al., 2022)
Regulations	Clarity and Fairness in School Rules	Promotes self-regulation and a sense of belonging (Jones et al., 2021)
Emotional	Presence of support, validation and affective containment	Decreases stress and improves willingness to learn (Barile et al., 2020)
Physical and environmental	Aesthetics, lighting, cleanliness, decoration	Harmonious environments reinforce emotional stability (Guerra et al., 2021)

Table 2. Dimensions Of the School Emotional Climate and Its Implications

The approach to the emotional climate is not limited to the classroom, but includes the entire institutional culture. Schools with positive climates have been shown to improve both academic outcomes and mental health indicators in students (OECD, 2021).

3. Development of Socio-Emotional Skills in Primary Education

Social-emotional skills (HSE) are a set of competencies that allow you to understand, regulate, and express emotions, as well as establish healthy interpersonal relationships (Collaborative for Academic, Social, and Emotional Learning [CASEL], 2023). These skills develop progressively during childhood and require both guided experiences and enriched affective environments.

Emotional education programs in primary school that combine explicit instruction with a positive affective climate have shown improvements in self-control, conflict resolution, frustration management, and peer cooperation (Cipriano et al., 2022).

Neuroscientifically, strengthening these skills stimulates connectivity between the prefrontal cortex and the amygdala, promoting better integration between rational and emotional processes (Davidson & McEwen, 2022). Therefore, pedagogical practices that value emotional expression, respect, and inclusion have a direct impact on brain and psychosocial development.

Methodology

This research adopts a **qualitative exploratory-descriptive approach**, with the aim of understanding how the school emotional climate affects the development of socio-emotional skills from the perspective of primary school students and teachers. This type of design is suitable for analyzing complex educational phenomena based on specific perceptions, emotions, and contexts (Flick, 2019).

Research Design

A multiple case study design **was implemented**, allowing us to observe differences and similarities in school emotional dynamics in various institutions. This strategy facilitates a holistic understanding of the phenomenon and contributes to the external validity of the findings (Creswell & Poth, 2021).

Participants

The sample was composed of five public primary education institutions, located in urban and semi-urban contexts of Colombia. The selection of participants was carried out through **purposive sampling**, guaranteeing the inclusion of schools with different school climates (positive, neutral and conflictive) according to previous institutional evaluations.

Category	Description
Number of schools	5
Teachers	25 (5 per institution; academic and psychoeducational areas)
Students	100 (between 7 and 11 years old; 20 per school)
Inclusion criteria	Institutions with active or inactive social-emotional programs

Table 1. Characteristics of the Participants

Data collection techniques and instruments

Methodological triangulation **was applied** through the combination of interviews, observations, and questionnaires, which increased the reliability and validity of the study (Nowell et al., 2017).

Technique	Instrument applied	Main objective
Semi-structured interview	Open Question Guide for Teachers	Gain insights into the school's emotional climate
Non-participant observation	Classroom interaction observation protocol	Record emotional and social behaviors in the environment
Focus Group	Guided dynamics with students by age group	Explore emotional experiences within the classroom
Adapted questionnaire	Emotional climate scale by Brackett et al. (2019), validated by Guerra et al. (2021)	Quantify students' perceptions of relationships and environment

Table 2. Techniques and Instruments Used

The instruments were subjected to a **validation process by expert judgment** and pilot test with a sample of 10 students and 2 teachers.

Procedure

1. **Exploratory phase:** Contact with school directors, obtaining informed consents and reviewing institutional documents related to school coexistence.
2. **Collection phase:** Simultaneous application of interviews and observations in a period of six weeks.
3. **Analytical phase:** Thematic coding of qualitative data with **NVivo 14 software**, using emergent and a priori categories based on the theoretical framework (Braun & Clarke, 2021).

Data Analysis

The analysis followed a **reflexive thematic analysis** approach, which allows identifying patterns of meaning and relationships between qualitative data (Clarke & Braun, 2019). The following **analytical dimensions were established**:

- Interpersonal relationships (teacher-student, peer-to-peer)
- Emotional expression and regulation
- Participation in conflict resolution
- Perception of the physical and regulatory environment

The coding was carried out at three levels: descriptive, interpretive and relational, allowing a deep understanding of the impact of the emotional climate on the development of HSE.

Research Ethics

The study complied with the ethical principles defined by the **Declaration of Helsinki** and Colombian regulations for research with minors. Informed consent was obtained from parents, directors and assent from the children. Anonymity, confidentiality and the right to non-participation without consequences were guaranteed.

Results

The thematic analysis revealed four main dimensions of school emotional climate that directly affect the development of socio-emotional skills (HSE) in primary school students: interpersonal relationships, emotional expression and regulation, participation in conflict resolution, and perception of the physical environment. Each dimension was examined through multiple sources (interviews, observations, and questionnaires), which allowed for a robust triangulation.

1. Interpersonal relationships: Teacher-student bond

Students who reported feeling listened to and valued by their teachers showed behaviors of greater cooperation and willingness to learn. 84% of teachers stated that their affective relationship with students significantly influences their behavior in class.

Example of an appointment (teacher interview):

"When I sit close to my students, I notice that they are more encouraged to express themselves and work as a team."

<i>Perception category</i>	<i>Absolute Frequency</i>	<i>Percentage (%)</i>
<i>I feel supported by my teacher</i>	68	68%
<i>My teacher listens to me</i>	74	74%
<i>I feel like I can trust him/her</i>	71	71%

Table 1. Evaluation of the Teacher-Student Emotional Bond (Student Questionnaire)

These results coincide with previous findings that show that the affective relationship with the teacher acts as an emotional protective factor in school contexts (Zinsser et al., 2020; Guerra & Bradshaw, 2021).

2. Emotional Expression and Regulation in the Classroom

60% of the students stated that there are no clear spaces to express their emotions at school, while the teachers pointed out the lack of training in emotional education as an institutional weakness.

In the observations, 39 episodes of emotional dysregulation (crying, anger, isolation) were recorded, of which only 28% were addressed pedagogically.

Felt emotion	Strategy used	Frequency Reported
Sadness	I stay silent	42%
Wrath	Scream or fight	26%
Fear	I seek help from the teacher	21%

Table 2. Student Responses to Negative Emotions

These data reflect the need to strengthen self-regulation skills in students and emotional containment protocols in the classroom, as suggested by Cipriano et al. (2022) and CASEL (2023).

3. Peer Conflict Resolution

Students from schools that implement school mediation or restorative circles showed higher levels of empathy, listening skills, and less tendency to isolate. In particular, in two of the five schools, there was a 35% reduction in incidents of verbal aggression, according to institutional records from the second semester.

Focus Group Quote:

"When we argue, we first speak calmly. If it doesn't work, let's go to the corner of peace."

<i>Strategy used</i>	<i>Frequency observed</i>	<i>Associated with mediation programs</i>
<i>Guided dialogue with mediator</i>	17	Yes
<i>Verbal or physical aggression</i>	23	No
<i>Emotional withdrawal (isolation)</i>	15	No

Table 3. Observed Conflict Resolution Strategies

The structured implementation of socio-emotional strategies reduces school violence and improves group cohesion (Weissberg et al., 2022).

4. Perception of the Physical and Normative Environment

In three institutions, a deteriorated physical environment was observed (undecorated classrooms, little natural light, damaged furniture). Students in these schools expressed less liking to attend classes and lower levels of behavioral self-regulation.

In contrast, classrooms that incorporated emotional corners, gratitude panels, and clear rules had higher student engagement and lower levels of conflict.

Classroom Condition	Level of participation	Presence of conflicts
Classroom with emotional decoration	Loud	Casualty
Neutral classroom without affective stimuli	Stocking	Stocking
Deteriorated and overcrowded classroom	Casualty	Loud

Table 4. Relationship Between Physical Environment and Prosocial Behaviors

These results are in line with recent studies that indicate that the physical dimension of the school environment can act as a facilitator or inhibitor of emotional and behavioral well-being (Barile et al., 2020; Cefai et al., 2021).

Synthesis of Findings

The results show that a positive school emotional climate directly influences the development of key socio-emotional skills, such as empathy, emotional regulation and cooperation. Schools with structured practices in emotional education and affective environments show students with a better disposition to learning, greater emotional autonomy and lower rates of conflict.

Conclusions

The findings of this research allow us to clearly state that the **school emotional climate is a determining factor** in the development of socio-emotional skills (HSE) during primary education. The evidence collected indicates that an affectively positive environment, characterized by respectful relationships, clear rules, and adequate physical spaces, affects the consolidation of competencies such as empathy, emotional self-regulation, and conflict resolution (Weissberg et al., 2022; Guerra & Bradshaw, 2021).

From a neuroscientific perspective, it is found that the school context not only has an instrumental value for the transmission of content, but also acts as an environment of direct influence on **brain development**, particularly in regions such as the prefrontal cortex, amygdala, and hippocampus (Blair & Raver, 2021; Guyer et al., 2020). Sustained exposure to a negative emotional climate can trigger states of toxic stress that affect higher cognitive functions, while positive climates enhance neural connectivity and readiness to learn (Davidson & McEwen, 2022).

In pedagogical practice, the data reveal that **the quality of the teacher-student bond** emerges as a robust predictor of students' emotional well-being. Teachers who practice affective communication, emotional validation, and active containment are able to foster an environment in which children feel safe to express themselves and learn (Zinsser et al., 2020). This relationship confirms the need to integrate teacher training in emotional competencies as part of the initial and continuing education curriculum (Cipriano et al., 2022).

Likewise, it is evident that socio-emotional education programs that are implemented in a structured way—for example, through restorative circles, emotional corners, and regulation routines—not only reduce the incidence of conflicts, but also promote skills such as active listening, collaboration, and self-control (CASEL, 2023; Jones et al., 2021).

On the other hand, a structural weakness is evident **in most of the institutions analyzed**, where emotions are not explicitly addressed in the curriculum or in institutional practices. This

omission leaves students devoid of tools to cope with interpersonal tensions, manage intense emotions, or build healthy relationships. In view of this, it is suggested to strengthen educational policies around emotional education and design specific institutional protocols for the socio-emotional accompaniment of students (Cefai et al., 2021; OECD, 2021).

Finally, this study confirms that **emotional and cognitive development cannot be separated**, and that any educational policy aimed at improving the quality of learning must consider affective well-being as a cross-cutting axis. The promotion of healthy emotional climates is not a luxury or a secondary strategy, but an essential condition to guarantee integral development and the right to a humanizing education.

References

- Barile, J. P., Donohue, D. K., Anthony, E. R., & Baker, A. M. (2020). Exploring the role of school climate in student academic success and socio-emotional development. *Journal of Educational Psychology*, 112(4), 722–735. <https://doi.org/10.1037/edu0000415>
- Blair, C., & Raver, C. C. (2021). Child development in the context of adversity: Experiential canalization of brain and behavior. *American Psychologist*, 76(3), 349–364. <https://doi.org/10.1037/amp0000796>
- Braun, V., & Clarke, V. (2021). *Thematic analysis: A practical guide*. SAGE Publications.
- CASEL. (2023). *Core Competencies Framework*. Collaborative for Academic, Social, and Emotional Learning. <https://casel.org/>
- Cefai, C., Bartolo, P. A., Cavioni, V., & Downes, P. (2021). Strengthening Social and Emotional Education as a Core Curricular Area across the EU. European Commission.
- Cipriano, C., Brackett, M. A., & Rivers, S. (2022). Promoting emotional intelligence in schools: Evidence-based SEL practices. *Journal of Applied Developmental Psychology*, 78, 101382. <https://doi.org/10.1016/j.appdev.2021.101382>
- Clarke, V., & Braun, V. (2019). Reflecting on reflexive thematic analysis. *Qualitative Research in Sport, Exercise and Health*, 11(4), 589–597. <https://doi.org/10.1080/2159676X.2019.1628806>
- Creswell, J. W., & Poth, C. N. (2021). *Qualitative inquiry and research design: Choosing among five approaches* (4th ed.). SAGE Publications.
- Davidson, R. J., & McEwen, B. S. (2022). Social influences on neuroplasticity: Stress and interventions to promote well-being. *Nature Neuroscience*, 25(2), 220–226. <https://doi.org/10.1038/s41593-022-01007-3>
- Flick, U. (2019). *An introduction to qualitative research* (6th ed.). SAGE Publications.
- Guerra, N. G., & Bradshaw, C. P. (2021). Linking social and emotional learning to mental health: Evidence-based school programs. *Annual Review of Psychology*, 72, 383–409.
- Guyer, A. E., Silk, J. S., & Nelson, E. E. (2020). The neuroscience of affective development: Implications for school-based interventions. *Educational Psychologist*, 55(2), 79–93. <https://doi.org/10.1080/00461520.2020.1711505>
- Immordino-Yang, M. H., & Damasio, A. (2020). We feel, therefore we learn: The relevance of affective and social neuroscience to education. *Mind, Brain, and Education*, 14(2), 52–61. <https://doi.org/10.1111/mbe.12298>
- Jones, S. M., Bailey, R., Brush, K., & Kahn, J. (2021). *Social and emotional learning: A global framework for education systems*. Harvard Graduate School of Education.
- Liston, C., McEwen, B. S., & Casey, B. J. (2021). Psychosocial stress reversibly disrupts prefrontal processing and attentional control. *Proceedings of the National Academy of Sciences*, 118(34), e2022295118. <https://doi.org/10.1073/pnas.2022295118>
- Nowell, L. S., Norris, J. M., White, D. E., & Moules, N. J. (2017). *Thematic analysis: Striving to meet the*

- trustworthiness criteria. *International Journal of Qualitative Methods*, 16(1), 1–13. <https://doi.org/10.1177/1609406917733847>
- OECD. (2021). *Beyond academic learning: First results from the survey of social and emotional skills*. OECD Publishing.
- Porges, S. W. (2021). Polyvagal theory: A biobehavioral journey to sociality. *Comprehensive Psychoneuroendocrinology*, 7, 100069. <https://doi.org/10.1016/j.cpnc.2021.100069>
- Teicher, M. H., Samson, J. A., Anderson, C. M., & Ohashi, K. (2020). The effects of childhood maltreatment on brain structure, function and connectivity. *Nature Reviews Neuroscience*, 21(10), 652–668. <https://doi.org/10.1038/s41583-020-00324-7>
- Tottenham, N., & Galván, A. (2020). Stress and the adolescent brain: Amygdala-prefrontal cortex circuitry and ventral striatum as developmental targets. *Neuroscience & Biobehavioral Reviews*, 114, 233–244.
- Van der Meer, A. L. H., van der Weel, F. R., & Lee, D. N. (2022). Emotional mirroring and empathy: A neuroscientific approach. *Frontiers in Human Neuroscience*, 16, 824534. <https://doi.org/10.3389/fnhum.2022.824534>
- Van Lange, P. A. M., Rockenbach, B., & Yamagishi, T. (2022). Rewarding cooperation: The neuroscience of prosociality in social dilemmas. *Nature Human Behaviour*, 6, 139–149. <https://doi.org/10.1038/s41562-021-01183-6>
- Weissberg, R. P., Domitrovich, C. E., & Durlak, J. A. (2022). Promoting social and emotional learning in schools: A meta-analytic review. *Educational Psychologist*, 57(1), 1–19. <https://doi.org/10.1080/00461520.2021.2019772>
- Zinsler, K. M., Bailey, C. S., Curby, T. W., & Denham, S. A. (2020). Exploring the role of teacher–child relationships in promoting school readiness: A focus on emotion socialization. *Early Education and Development*, 31(7), 1136–1155.