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Hodnocení klimatu tříd s rozšířenou výukou tělesné výchovy prostřednictvím psychodiagnostických nástrojů a jejich implikace pro hudební výchovu

Assessment of Classroom Climate in Classes with Extended Physical Education Through Psychodiagnostic Instruments and Their Implications for Music Education

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Abstract

This study provides a systematic analysis of classroom climate in primary school classes with extended physical education in the Czech Republic using validated psychodiagnostic instruments. The primary aim is to examine how the psychological and social characteristics of pupils in these classes correspond to the specific demands of music education, with particular emphasis on behavioural regulation, cooperation, and group dynamics in physically active learning environments. A mixed-method pedagogical-psychological research design was employed, incorporating the "d2 Attention Test", the "In Our Class" questionnaire, and the "SOCIOKLIMA" questionnaire. Empirical data were collected from lower secondary school pupils through expert evaluation and questionnaire-based methods. The findings indicate that sport-oriented classes are characterised by a higher work rate, increased error frequency, pronounced group dynamics, and ambivalent patterns of social integration. Elevated levels of impulsivity were also identified, which may negatively affect sustained attention during cognitively demanding musical activities. Furthermore, the formation of exclusive peer subgroups contributes to fragmented social structures and reduced overall class cohesion. The study highlights the potential of music education as an effective pedagogical tool for shaping classroom climate, particularly in the domains of self-regulation, social cohesion, and emotional development. Based on these findings, specific didactic strategies for adapting music education in sport-oriented classes are proposed.

Keywords: Psychological assessment. Music education. Extended physical education. Instructional strategies. Rhythmic activities. Social relationships. Classroom climate.

Introduction

Classroom climate represents a key factor influencing the educational process, pupils' academic achievement, and their psychosocial well-being (Grecmanová, 2008; Lašek, 2001). Research in pedagogy and educational psychology consistently demonstrates that the quality of interpersonal relationships, perceived safety, level of cooperation, and capacity for self-regulation significantly affect learning across educational domains. Classroom climate can therefore be understood as a dynamic construct emerging from the interaction between individual pupil characteristics, group processes, and pedagogical practices.

Although physical education (PE) and music education (ME) have traditionally been conceptualised as distinct educational domains, contemporary research increasingly emphasises their interconnectedness and complementary functions (Kyriazis et al., 2019). Their integration offers important opportunities for supporting pupils' holistic development and enhancing the overall quality of the educational environment.

Ongoing curricular reforms in the Czech Republic, including the revision of the Framework Educational Programme for Primary Education, further highlight the need to reconceptualise the role of music education. It is increasingly recognised not only as a means of developing aesthetic and cultural competences but also as a tool for fostering cognitive development, emotional regulation, and social cohesion (Eerola & Eerola, 2014). Within this framework, music education demonstrates considerable interdisciplinary potential, particularly in relation to physical education.

Classes with extended physical education represent a specific educational context characterised by increased physical activity, strong performance orientation, and pronounced group dynamics. While these characteristics may support motivation, resilience, and teamwork, they may also contribute to heightened impulsivity, competitiveness, and social polarisation (Weinberg & Gould, 2014). In this context, music education may serve an important regulatory and integrative function by fostering cooperation, emotional awareness, and self-regulation through shared musical activities.

This study aims to contribute to scholarly discourse on adapting music education instruction for pupils with a sport-oriented focus and to present didactic proposals consistent with current curricular reforms. The research adopts an empirical-applied approach, prioritizing research inquiry while providing didactic proposals as practical applications **of the findings.**

The research was conducted at the Faculty of Education, Charles University, within the framework of the GA UK project No. 288522: Psychodiagnostics and Musical-Psychological Diagnostics of Pupils in Classes with Extended Physical Education — Empirical Research Methods (doctoral dissertation support).

The research was structured into three interrelated phases to achieve the stated objectives:

- **a)** Theoretical framework — a systematic review of relevant scholarly literature focused on identifying relationships between extended physical education, pupils' cognitive and social development, and the role of music education in relation to these characteristics;
- **b)** Empirical study — data were collected using validated psychodiagnostic instruments: the **d2 Test of Attention**, the **SOCIOKLIMA** questionnaire, and the **In Our Class** questionnaire, administered in five upper-primary classes at a primary school (four sport-oriented classes and one control class);
- **c)** Application to music education — findings from the empirical study were transposed into concrete pedagogical strategies.

1 Theoretical Framework

1.1 Music and Movement as Interactive Components of Education

The traditional separation of music education and physical education as distinct curricular areas has been increasingly challenged in contemporary pedagogical theory and practice. Recent research emphasises their mutual interdependence and highlights their potential to support the holistic development of pupils (Kyriazis et al., 2019). Both domains share a common rhythmic foundation, and their integration can facilitate not only motor development but also cognitive and socio-emotional processes.

This relationship is often interpreted through the concept of embodied cognition, which posits that cognitive processes are fundamentally grounded in bodily experience. From this perspective, movement is not merely a physical activity but also a medium through which learning and cognitive development are mediated. Consequently, the integration of music and movement may enhance attentional processes, memory, and executive functioning.

Empirical studies further demonstrate that musical activities contribute significantly to the development of cognitive functions, particularly attention, working memory, and executive control, while simultaneously supporting emotional regulation and social interaction (Hallam, 2020). The connection between music and movement is therefore increasingly recognised not only in international research (Phillips-Silver & Trainor, 2021), but also within the Czech pedagogical context (Lachmanová, 2023). These findings suggest that music education, when combined with movement, may represent a particularly effective educational tool in contexts characterised by high levels of physical activity.

1.2 Classroom Climate in Sport-Oriented Classes

Classroom climate, understood as the shared perception of the social and psychological characteristics of the classroom environment, represents a key factor influencing both academic achievement and pupils' psychosocial well-being (Lašek, 2001). It encompasses dimensions such as cohesion, cooperation, competitiveness, conflict, and the perceived support of teachers and peers. Importantly, classroom climate is not a static construct, but a dynamic phenomenon shaped through ongoing interactions between individual characteristics, group processes, and pedagogical practices.

In sport-oriented classes, classroom climate tends to develop in specific ways. The increased emphasis on performance, competition, and group identity may strengthen cohesion within subgroups, especially those defined by athletic ability. At the same time, however, this dynamic may contribute to the fragmentation of the class as a whole and to the emergence of exclusive peer groups (Weinberg & Gould, 2014).

From the perspective of socio-emotional learning, such an environment may lack sufficient support for cooperation, empathy, and mutual respect if these aspects are not intentionally developed (Oberle & Schonert-Reichl, 2020). As a result, pupils who do not achieve high levels of performance may experience reduced social integration, which can negatively affect both their well-being and their engagement in the learning process.

In this context, music education may serve as an important tool for enhancing classroom climate. Shared musical activities require coordination, mutual attention, and synchronisation, thereby creating opportunities for interaction across subgroup boundaries. These processes can contribute to reducing social barriers and fostering a more inclusive classroom environment.

For the purposes of this study, several key concepts are defined as follows. Impulsivity is understood as a tendency to act without sufficient reflection, characterised by reduced inhibitory control over immediate responses (Barkley, 2015). Group dynamics refer to the processes that shape relationships, roles, communication patterns, and power structures within a group, thereby influencing its overall functioning (Forsyth, 2019).

1.3 Cognitive and Socio-Emotional Interactions in the Context of Physical and Music Education

Physical activity has been consistently associated with positive effects on cognitive functions, particularly attention, working memory, and executive functions (Bailey et al., 2013). More recent research confirms these findings and further highlights the relationship between regular physical activity and overall cognitive performance in children and adolescents (Singh et al., 2023).

However, it is also important to consider that highly performance-oriented environments may be associated with increased impulsivity and difficulties in sustaining attention over longer periods. These characteristics may pose challenges in educational contexts that require precision, patience, and sustained cognitive engagement, such as music education.

In contrast, musical activities provide a complementary framework that supports both cognitive and socio-emotional development. Research suggests that music can function as an effective tool for emotional regulation and can contribute to the development of self-regulation skills in adolescents (Saarikallio et al., 2021). Furthermore, collective musical activities promote behavioural synchronisation, empathy, and a sense of belonging, all of which have a direct impact on the quality of social relationships within the classroom.

The interaction between physical and musical activities therefore represents a dynamic and mutually enriching process. While physical education may enhance energy levels, motivation, and group cohesion, music education may contribute to the regulation of these processes, supporting balance, stability, and inclusivity within the classroom environment.

2 Research Aims and Research Questions

The primary aim of this study is to identify the specific cognitive and social characteristics of pupils in classes with extended physical education and, based on these findings, to propose didactic strategies for music education that reflect their specific needs and potential.

The following research questions were formulated:

1. What are the characteristics of attention and performance in pupils from sport-oriented classes compared to those from general education classes?
2. What is the nature of classroom climate in these classes, and how is social integration distributed among pupils?
3. Which music education strategies can be effectively applied in response to the identified cognitive and social characteristics?

Based on these questions, the following hypotheses were established:

H1: Pupils in classes with extended physical education will demonstrate a higher work rate in the d2 Attention Test, accompanied by a higher error rate compared to the control group, indicating increased impulsivity and reduced self-control.

H2: The classroom climate in sport-oriented classes will be characterised by a higher degree of social fragmentation and lower overall cohesion compared to the control group, due to performance orientation and the formation of exclusive peer groups.

H3: The identified cognitive and social characteristics can serve as a basis for the development of targeted music-didactic strategies adapted to the needs of pupils in sport-oriented classes.

3 Methodology

3.1 Research Sample

The study involved 106 pupils (61 boys and 45 girls) from five classes at the lower secondary level of a primary school in Prague. Four of these classes followed an extended physical education programme with a focus on volleyball, while one class served as a control group without a specific sport orientation.

3.2 Research Instruments

The d2 Attention Test (Brickenkamp & Zillmer, 2000) is a standardised psychodiagnostic instrument designed to assess attention, concentration, and the speed of visual information processing. Pupils are required to identify and mark target stimuli within a limited time frame, allowing for the measurement of processing speed, accuracy, and concentration performance.

The *In Our Class* questionnaire was used to assess social relationships, perceived classroom atmosphere, and the level of social integration among pupils. It includes items focusing on cooperation, friendship, and the sense of belonging within the class.

The SOCIOKLIMA questionnaire provides a comprehensive assessment of classroom climate from the pupils' perspective. It evaluates dimensions such as cohesion, competitiveness, conflict, teacher support, and peer support, offering a detailed picture of the social processes within the classroom.

4 Results

4.1 Attention and Concentration (d2 Test of Attention)

Sport-oriented classes exhibited a markedly faster working pace compared with the control class. The average rate of stimulus processing in the sport classes was 18% higher than in the control group. At the same time, however, the sport classes showed higher error rates — an average of 15.2% compared with 11.8% in the control class. This disparity suggests a tendency towards impulsivity and reduced self-control in tasks requiring precision. Concentration performance fell within the normative range for the relevant age group; however, attention quality showed irregularities, particularly in

performance fluctuations across test sections. Some sport classes displayed marked variation in sustained attention over a longer time period.

*Table 1: Summary of **d2 Test of Attention** results by class. Ratings are based on professional evaluation of the test and comparison across classes.*

Class	Working Pace	Error Rate	Performance Stability	Typical Performance Profile
6. B	Higher	Increased (predominantly omissions)	Moderate	Fast work with variable accuracy
7. B	Moderate to high	Moderate	Moderate	Less homogeneous performance, inter-pupil variability
8. B	High (initially)	Increased	Low	Fast onset with declining attention
9. B	Very high	High	Low	Discrepancy between speed and accuracy
8. C	Moderate	Low	High	Stable and accurate performance

4.2 Social Relationships and Integration

The results of the *In Our Class* questionnaire reveal a heterogeneous pattern of social integration. While some classes demonstrated strong cohesion and high levels of satisfaction, others exhibited signs of fragmentation. In particular, the formation of exclusive peer groups based on athletic performance was observed.

Pupils with lower levels of athletic achievement reported a reduced sense of belonging, especially in highly competitive environments. Conversely, classes characterised by cooperative rather than competitive dynamics showed higher levels of social integration.

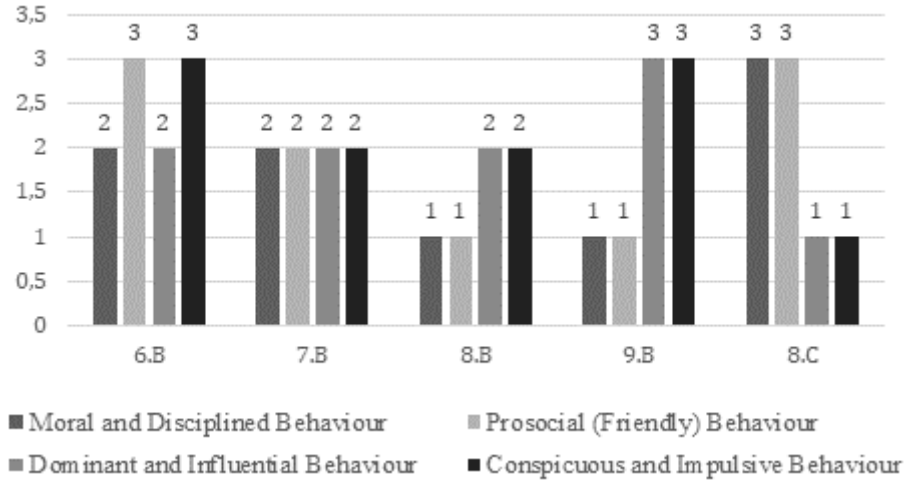

*Figure 1: Relative prevalence of selected types of behaviour in classes according to the **In Our Class questionnaire**. Values are expressed using a three-point index (1 = low, 2 = moderate, 3 = high prevalence).*

4.3 Classroom Climate

The SOCIOKLIMA questionnaire confirmed the presence of strong group dynamics in sport-oriented classes, with a tendency towards increased competitiveness. Teacher support was consistently evaluated positively, indicating a high level of pedagogical guidance.

However, overall class cohesion was lower in some sport-oriented classes compared to the control group, which corresponds with the observed fragmentation of social relationships. These findings suggest that the social structure of sport-oriented classes is complex and may require targeted pedagogical interventions.

Table 2: Characteristics of classroom social climate by class according to the SOCIOKLIMA questionnaire. Ratings are based on the overall profile of cohesion, relational structure, and stability of social bonds.

Class	Class Cohesion	Fragmentation of Relationships	Stability of Bonds	Overall Assessment
6. B	Moderate	Moderate	Low to moderate	Relatively stable climate
7. B	Moderate to high	Low to moderate	Moderate	Relatively stable climate
8. B	Lower	Higher	Low	Fragmented climate
9. B	Low	High	Low	Polarised and unstable
8. C	Higher	Low	Higher	Stable and cohesive

5 Discussion

5.1 Interpretation of Findings: Attention and Cognitive Performance

The findings of this study indicate that pupils in sport-oriented classes demonstrate a higher processing speed in the d2 Attention Test, accompanied by an increased error rate. This pattern suggests a trade-off between speed and accuracy, which may be interpreted as an indicator of heightened impulsivity and reduced inhibitory control. These results are consistent with previous research highlighting the positive influence of physical activity on cognitive activation and processing speed (Bailey et al., 2013), while also pointing to potential limitations in sustained attention and precision.

At the same time, the observed fluctuations in performance across test segments suggest difficulties in maintaining stable attention over longer periods. This is particularly relevant in the context of music education, where tasks often require prolonged concentration, fine motor control, and attentional consistency. The discrepancy between rapid task engagement and reduced accuracy may therefore represent a specific cognitive profile associated with sport-oriented educational environments.

However, it is important to note that these findings do not imply a general deficit in cognitive functioning. Rather, they indicate a specific pattern of cognitive processing that reflects the interaction between physical activity, motivational factors, and task demands. Further research, particularly of a longitudinal nature, would be necessary to determine whether these characteristics are stable over time or context dependent.

5.2 Social Dynamics and Classroom Climate

The findings related to social relationships and classroom climate indicate a complex and partly ambivalent structure. While some sport-oriented classes demonstrated strong internal cohesion, this cohesion was often limited to performance-based subgroups. At the same time, a tendency towards overall class fragmentation was observed, which corresponds with findings in sport psychology (Weinberg & Gould, 2014).

This pattern can be interpreted within the framework of social identity theory, according to which strong group identification may lead to the formation of boundaries between in-groups and out-groups (Forsyth, 2019). In performance-oriented environments, such processes may result in unequal levels of social integration among pupils.

From the perspective of classroom climate research, reduced cohesion represents a potential risk factor, as it has been associated with lower engagement and less favourable psychosocial outcomes (Lašek, 2001; Wang & Degol, 2020). This tendency was particularly evident in classes characterised by strong competitive dynamics.

At the same time, teacher support was evaluated positively across all classes, suggesting that the observed fragmentation cannot be attributed solely to pedagogical factors, but rather emerges from group dynamics (Oberle & Schonert-Reichl, 2020).

These findings highlight the importance of supporting inclusive practices that foster interaction across subgroups and strengthen overall class cohesion.

5.3 The Potential of Music Education as a Regulatory Instrument

The findings suggest that music education may serve as a valuable regulatory and integrative tool in sport-oriented classes. Musical activities, particularly those based on synchronisation and collective performance, require sustained attention, coordination, and responsiveness to others, thereby supporting the development of self-regulation and inhibitory control. At the same time, they provide a context that differs from performance-based competition, allowing pupils to engage in cooperative processes that may help reduce social fragmentation. From a socio-emotional perspective, shared musical activities can foster empathy, cooperation, and a sense of belonging,

contributing to improved classroom climate (Hallam, 2020; Saarikallio et al., 2021). However, these conclusions should be interpreted with caution, as the present study does not provide direct causal evidence, and further research is needed to verify the effectiveness of music-based interventions in this context.

5.4 Evaluation of Research Hypotheses

Based on the empirical findings, the following conclusions can be drawn regarding the formulated hypotheses.

Hypothesis H1 — that pupils in classes with extended physical education would demonstrate a higher working pace in the d2 Attention Test accompanied by a higher error rate compared to the control group — was **confirmed**. Sport-oriented classes exhibited a processing pace that was on average 18% higher than that of the control group, while simultaneously showing elevated error rates (15.2% on average, compared to 11.8% in the control class). This pattern is consistent with a tendency towards impulsivity and reduced self-control, particularly in tasks requiring precision and sustained effort. Performance fluctuations across test segments further corroborate difficulties in maintaining attention over time, with this tendency being most pronounced in class 9.B.

Hypothesis H2 — that the social climate of sport-oriented classes would be characterised by greater relational fragmentation and lower overall class cohesion compared to the control group — was **partially confirmed**. The SOCIOKLIMA and *In Our Class* questionnaires revealed considerable variation across the sport-oriented classes: while classes 8.B and 9.B displayed clear relational fragmentation, low stability of social bonds, and a polarised climate, classes 6.B and 7.B showed a relatively stable climate comparable to the control class 8.C. The hypothesis therefore, holds for a subset of the sample but cannot be generalised to all classes with extended physical education. The degree of competitive orientation within a class, rather than sport specialisation per se, appears to be the key moderating factor.

Hypothesis H3 — that the identified cognitive and social profile of pupils could serve as a basis for the development of targeted music-didactic strategies — was **confirmed** at the level of applied research. The observed characteristics (elevated impulsivity, fast working pace, and tendencies towards relational fragmentation) provide a sufficient empirical foundation for the formulation of concrete didactic recommendations, which are elaborated in Chapter 6. It should be noted, however, that the present study does not evaluate the effectiveness of these proposed interventions in pedagogical practice; assessing their impact remains a task for future research.

5.5 Didactic Implications

The findings of this study have several implications for pedagogical practice, particularly in the context of music education in sport-oriented classes. First, the integration of rhythmic and movement-based activities may provide an effective way of channelling pupils' natural energy while simultaneously developing attention and self-regulation. Such activities allow pupils to engage physically while gradually introducing elements of control and precision.

Second, collaborative musical tasks should be emphasised to promote interaction across subgroup boundaries. Activities that require joint performance, coordination, and shared responsibility may contribute to strengthening whole-class cohesion and reducing social fragmentation.

Third, music education offers a valuable space for emotional expression and reflection. In performance-oriented environments, where pressure and competition are prevalent, structured opportunities for expressing and processing emotions may support pupils' overall well-being and contribute to a more balanced classroom climate.

Finally, the structure of music lessons should take into account the specific attentional profile of pupils in sport-oriented classes. Alternating shorter, more dynamic activities with gradually extended periods of focused engagement may support the development of sustained attention and self-regulation over time.

These conclusions highlight the importance of targeted pedagogical work within the dynamics of sport-oriented classes and suggest the potential of music education to support self-regulation and social cohesion. However, these approaches are based on an interpretation of the obtained data and should therefore be considered within the broader context of their possible limitations.

The findings of this study should be interpreted with caution. Due to the cross-sectional design, causal relationships cannot be inferred, and the observed associations may be influenced by additional factors such as pupil selection or specific school context. The interpretation of increased error rates as an indicator of impulsivity represents only one possible explanation. The proposed didactic strategies are derived from the interpretation of the findings and have not been empirically tested within this study.

6 Didactic Strategies for Music Education

6.1 Rhythmic Activities and Movement Integration

Teaching strategies incorporating rhythmic and movement-based activities represent an effective way of responding to the needs of pupils

in sport-oriented classes. Activities such as body percussion, the use of Orff instruments, and simple rhythmic exercises enable a natural integration of music and movement, while simultaneously supporting coordination, attention, and self-regulation. A key principle is the gradual increase in the complexity of rhythmic structures, which contributes to the development of concentration and control. Practical applications may include rhythmic ostinato patterns, improvisation, movement-based interpretation of music, and the use of body sounds such as clapping or stamping.

6.2 Ensemble Music-Making and Social Cohesion

Ensemble-based activities, including group singing and instrumental performance, provide important opportunities for strengthening social cohesion. These activities require synchronisation, mutual attention, and cooperation across the entire class, regardless of pupils' athletic performance. As such, they can help to overcome divisions between subgroups and support a more inclusive classroom climate. Emphasis should be placed on collaborative processes rather than competition, for example, through group compositions, shared musical projects, or collective improvisation.

6.3 Emotional Expression and Self-Regulation

Music education offers a valuable space for emotional expression and the development of self-regulation. Activities such as improvisation, composition, and guided reflection allow pupils to express emotions in a structured and constructive way. In performance-oriented environments, this may help to reduce tension associated with competition and support emotional balance. Additionally, the inclusion of relaxation-oriented activities, such as attentive listening or simple vocal exercises, may further contribute to the development of self-regulatory skills.

6.4 Adaptation of Lesson Structure

Lesson structure should respect pupils' fast-paced working by alternating activities dynamically, whilst progressively extending tasks that require concentration and patience. The use of short, intensive activities (5–10 minutes) combined with progressively longer, quieter segments (15–20 minutes) helps to develop the capacity for sustained concentration. Recommended lesson structure: activating rhythmic activity (5–7 min) → ensemble music-making or singing (15–20 min) → listening with reflection or creative activity (10–15 min) → concluding relaxation (3–5 min).

Conclusion

This study has shown that classes with extended physical education exhibit specific cognitive and social characteristics, particularly a higher working pace, increased impulsivity, and pronounced group dynamics, which may lead to the formation of exclusive subgroups. At the same time, these classes demonstrate a high level of energy, motivation, and potential for active engagement in the learning process.

The findings suggest that music education may represent an effective means of supporting classroom climate in this context. Through rhythmic activities, collective music-making, and opportunities for emotional expression, it can contribute to the development of self-regulation, social cohesion, and more balanced group interaction. In this respect, music education may extend beyond its traditional aesthetic function and serve as a supportive pedagogical tool in addressing social and behavioural aspects of classroom life.

The proposed didactic strategies reflect the identified characteristics of pupils in sport-oriented classes and offer practical guidance for adapting music education to their needs. However, these conclusions should be interpreted with caution, as the present study does not provide direct evidence of the effectiveness of specific interventions.

Further research should therefore focus on longitudinal approaches, a broader range of sport specialisations, and a more detailed examination of the implementation of these strategies in educational practice. It would also be beneficial to explore their potential impact on pupils' academic performance, psychosocial well-being, and overall classroom climate.

Limitations of the Study

The study has several limitations that should be taken into account when interpreting the findings. The first limitation concerns the research sample, which was restricted to a single primary school with four classes specialising in volleyball. The results may therefore not be generalisable to other types of sport specialisation or to schools in different socio-cultural contexts.

A further limitation is the study's cross-sectional design, which does not allow examination of changes in classroom climate over time or causal interpretation of the observed relationships.

Finally, the psychodiagnostic instruments used capture pupils' performance at a specific moment and may be influenced by situational factors, such as the time of day, the period within the school year, or the pupils' current psychological state.

These limitations indicate the need for further research, particularly longitudinal studies conducted on larger and more diverse samples.

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