

Alexandra Zaharia

**Promoting Emotional
Competencies and Positive
Emotions in Autism, Youth,
and School Contexts**

**Multimethod Approaches and New
Directions for Psychoeducational Tools**

**Faculty of Education and
Educational Sciences**

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Alexandra Zaharia  0000-0001-7023-5700

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Alexandra ZAHARIA

Promoting Emotional Competencies and Positive Emotions in Autism, Youth, and School Contexts

Multimethod Approaches and New Directions for Psychoeducational Tools

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Prof. Andrea C. SAMSON (Université de Fribourg)
Prof. David SANDER (Université de Genève)
Prof. Nicolas RUFFIEUX (Université de Fribourg)
Prof. Sylvie RICHARD (Haute École Pédagogique du Valais)
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“Oh, the places you’ll go! There is fun to be done!

There are points to be scored. There are games to be won. (...)

I’m afraid that sometimes

You’ll play lonely games too.

Games you can’t win

‘cause you’ll play against you. (...)

And will you succeed?

Yes! You will, indeed! (...)

Kid, you’ll move mountains! (...)

So... get on your way!”

(Dr. Seuss, 1990)

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Abstract

The overall aim of this cumulative thesis is to advance new perspectives in education, particularly in understanding and promoting emotional competencies (EC) and positive emotions (PE), essential foundations of adaptive emotional development. In this regard, the research projects adopt multimethod approaches and introduce new psychoeducational tools. This work is structured around two parallel yet complementary research axes addressing these topics in youth across developmental conditions or periods associated with increased vulnerability, notably autistic individuals, as well as in students in school settings.

The first research axis addresses PE and emotion regulation (ER), a particular EC, in autism, using an individual assessment approach. *Study 1* examines early underlying mechanisms of children's sensitivity to cuteness, important in shaping socio-emotional skills, using eye-tracking methodology. Specifically, it investigates how visual attention to cute-featured stimuli intended to induce PE varies with autism symptom severity and social skills in early childhood. Extending the considerations that PE and EC may present differently in neurodivergent conditions, *Study 2* addresses the efficacy and the acceptability of a brief psycho-educational intervention targeting positive emotion regulation (PER) in autistic youth.

The second research axis extends the perspective of psychoeducational tools supporting EC and PE to youth, a developmental stage characterized by a window of both increased vulnerability and great potential, and to collective and naturalistic settings. In this line, *Study 3* and *4* seek to answer local educational public policies needs by proposing new socio-emotional learning (SEL) tools for primary and secondary schools. The articles examine mainly the acceptability of play-based approaches tapping into EC and eliciting PE, in particular of the newly designed *chEERS* board games. Aiming at identifying enablers and barriers of SEL tools, this axis explores students' perspectives and reported experience, also in comparison to other SEL approaches (*Study 4*).

Several key findings emerge across the studies. *Study 1* indicates that autistic children characterized by higher symptom severity show reduced visual attention to cute-featured stimuli prone to trigger PE. *Study 2* provides evidence for the efficacy of a psychoeducational intervention in increasing the use of adaptive PER strategies among autistic youth, while also achieving high satisfaction rates. The two last studies suggest that play-based approaches are highly appreciated by students in schools. Quantitative and qualitative data reveal variations in students' self-reported feedback, while supporting high acceptability of such SEL tools among both primary and secondary school students.

Overall, the present work suggests that while attention to stimuli eliciting PE may be reduced in autistic children with higher symptom severity, PER remains a malleable process that can be supported through psychoeducational intervention. Moreover, the students' satisfactory experience with the new board games addressing EC implemented in school settings highlight their potential to address SEL in classrooms.

The final section discusses the potential contributions of the present research findings to the field of special education and EC, emphasizing the potential of novel psychoeducational tools (i.e., PER program training, *chEERS Games*) and their underlying supportive mechanisms. The new approaches in promoting EC and eliciting PE across diverse implementation settings and populations characterized by heightened vulnerability are discussed. The dissertation further outlines the theoretical and practical implications of the findings, as well as current limitations and directions for future research.

Keywords: emotions, emotional competencies, psychoeducational tools, school, autism, adolescence, play, board games

Preface

Over the years, my research interest has been to develop and to evaluate new tools and methods, in different implementation contexts and to bridge research and theory with practice. To me, questions regarding which tools to use, in which settings, and for what purposes are crucial to explore. Through the different hats I wear and the training I have acquired over time (psychologist, affective scientist, special education researcher, serious game generalist and board game designer), I seek to observe and stimulate the reflection around the use of such tools in field settings and aim to further render them accessible.

The doctoral studies were conducted between 2018 and 2026, as a part-time activity. In parallel with my doctoral research, I was also involved in teaching activities in different universities. The numerous workshops and conferences I have given, nurtured exchanges with other practitioners from different fields (i.e., psychology, game design, special education, teacher training, occupational therapy) and encouraged me to pursue the potential of this work. Since 2021, I engaged in clinical practice as a psychologist, and I first offered support to adolescents experiencing school dropout and in search for a professional project. Currently, I work primarily and closely with children and their parents living in emergency shelters, as well as those who experience couple violence. The support I provide is based on ludic approaches, including play-based parent–child interactions and board game group activities. It is evident that play and board games can serve as shared spaces for interaction across cultures, providing a common ground for mobilizing emotional competencies even in the absence of a shared language. They easily demonstrate their roles as bridges between developmental stages and across generations and cultures, facilitating imitation, knowledge, and skill transfer. I was therefore able to transfer knowledge about autism, play and board games, emotional competencies and positive emotions and apply the tools I have developed during the PhD directly in my professional practice, particularly the *chEERS Games*.

Cross-disciplinary exchanges with other specialists, along with opportunities for practical implementation, allowed me to observe the relevance of emotion-focused and play-based tools and how they align with field needs. The use of these tools in my psychological practice strengthened my conviction regarding the value of the work presented in this dissertation, its clinical relevance, and its potential for meaningful impact, while also reinforcing my motivation to disseminate and apply this work beyond academia.

List of studies

The current doctoral thesis includes the following four studies:

Study 1

Zaharia, A., Kojovic, N., Rojanawisut, T., Sander, D., Schaer, M., & Samson, A. C. (2025).

Examining the link between social affect and visual exploration of cute stimuli in autistic children. *Journal of Autism and Developmental Disorders*, 55, 4212–4225. doi: [10.1007/s10803-024-06504-1](https://doi.org/10.1007/s10803-024-06504-1)

Study 2

Zaharia, A., Noir-Kahlo, K., Bressoud, N., Sander, D., Dukes, D., & Samson, A. (2021). Proof of concept: A brief psycho-educational training program to increase the use of positive emotion regulation strategies in individuals with autism spectrum disorder. *Frontiers in Psychology*, 12, Article 705937, 1-12. doi:[10.3389/fpsyg.2021.705937](https://doi.org/10.3389/fpsyg.2021.705937)

Study 3

Zaharia, A., Savary, V., Sander, D., Bressoud, N., & Samson, A. C. (2025). Jeux de société sur les compétences socio-émotionnelles : l'expérience de jeu avec des prototypes « chEERS Games » auprès d'élèves de 10 à 13 ans [Board games on socio-emotional competencies: the game experience with « chEERS Games » prototypes among 10- to 13-year-old students; Special issue on socio-emotional competencies and education – emotion and cognition]. *Approche Neuropsychologique des Apprentissages chez l'Enfant (A.N.A.E.)*, 37(198), 687-698.

Study 4

Zaharia, A., Mella, N., Rey, G., Piguet, C., Sander, D. & Samson, A. C. (2026). *Youths' perspectives on school-based socio-emotional learning tools: board games, improvisational theater, and mindfulness: acceptability and feasibility*. [Manuscript submitted for publication].

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1 Introduction

Emotional competencies (EC) have been widely recognized as a fundamental domain supporting adaptive functioning across the lifespan and fostering flourishing development (Grund & Holst, 2023; Mikolajczak, 2020; Mikolajczak et al., 2009). Along with the rise of *affectivism* (Dukes et al., 2021), EC have demonstrated the key role they play in building high-quality relationships with others, wellbeing, satisfaction with life, supporting academic and work performance, as well as physical and mental health (Kotsou et al., 2022; Sander, 2025a; Turan, 2021; World Health Organization, 2025). Within the broad field of EC, *emotion regulation* (ER), a central EC present across different theoretical frameworks (Gross, 1998; Koole, 2009; Petrova & Gross, 2023) and *positive emotions* (PE) (Baes et al., 2022) have received increasing attention and have been particularly emphasized in the literature over the past decades. Research on ER has been grounded in theoretical perspectives that attempt to reconcile the historical opposition between emotion and reason and has lately been propelled by the emerging currents reaffirming the central role of the emotions in well-being (Gross, 1998). Additionally, PE and EC have been considered as closely interrelated, and their respective benefits overlap, particularly in relation to mental health, academic outcomes, well-being, life satisfaction, and resilience (Fredrickson, 2000, 2004; Quoidbach et al., 2010, 2015). Development of various EC encompasses both positive and negative emotions (Gross & John, 2003; Quoidbach et al., 2010, 2015). Theory has suggested that PE help broaden individual's thought, behavior, and action repertoires, and build resources and resilience (Fredrickson, 2000, 2004; Garland et al., 2010). Accordingly, PE may be mobilized during the unfolding of EC and may expand one's resources. Thereby the interaction EC and PE may be considered important for emotional development, as they can be viewed as complementary resources that mutually reinforce one another (e.g., Sanchez-Ruiz et al., 2024). However, the empirical research providing clear support about the link between PE and EC remains scarce.

Given their protective role for mental health (Fredrickson, 2000; World Health Organization, 2025), adaptive EC and PE have been typically addressed by interventions and deployed to populations at specific developmental stages (e.g., adolescence) and/or with neurodiverse conditions (e.g., autism) who may be at risk of vulnerability.

In youth, the numerous transitions that occur can represent developmentally sensitive time windows during which both vulnerability and societal demands may increase, such as changing schools (e.g., elementary to secondary school) transitioning from secondary education to working life, or the broader developmental transitions (childhood to adolescence, and to adulthood). The potential risk for vulnerability in youth may be further heightened by factors such as socio-economic status and/or neurodevelopmental conditions (e.g., autism) which is frequently associated with special educational needs (SEN) (Piko & Dudok, 2023; Tadesse et al., 2024). This may lead to increased barriers to inclusion, as well as to academic and professional success. Consequently, these populations are often targeted by interventions meant to support them and promote their EC. Given the variations in definitions across socio-cultural and geographical contexts, we use here the term *youth* to refer to individuals aged 10 to the early 30s, spanning early adolescence to young adulthood (Sawyer et al., 2018; United Nations Department of Economic and Social Affairs, n.d.). Youth is also highlighted as a time of substantial opportunity for growth in which key foundations for adulthood are established. It is then essential to address topics related to developing knowledge and skills, and to managing emotions and relationships (Mastorci et al., 2024; World Health Organization, 2024).

Addressing EC and PE appears to be relevant and central for public policies and practitioners working both with youth and autistic individuals (Doikou, 2024; Qualter et al., 2007). Promoting EC and PE in these populations may rely on an eclectic range of interventions delivered across different settings (e.g., one-to-one sessions, school-based

programs). For instance, educational policies around the world have increasingly promoted recommendations, particularly in English-speaking countries, such as promoting social-emotional learning (SEL) programs (Maxwell & Peplak, 2022; Organisation for Economic Co-operation and Development, 2018; van de Sande et al., 2019). In autism as well, certain emotional difficulties are mentioned in the diagnostic criteria (e.g., difficulties in socio-emotional reciprocity, such as sharing or communicating emotions; reduced facial expression) (American Psychiatric Association; APA, 2022). Emotional difficulties have been also specifically targeted by interventions and accompanying recommendations in autism (Fuentes et al., 2021; García-García et al., 2025).

The current thesis brings together four studies, fruits of successful interdisciplinary collaborations with local autism associations, schools, board game designers, mindfulness and theater practitioners, and other research groups. It bridges disciplines such as special education, psychology, and affective sciences. By integrating these complementary perspectives, the dissertation offers a more comprehensive view of EC and PE and provides novel interdisciplinary insights relevant for application in education.

Building on previous knowledge, the current doctoral thesis aims at exploring the means to support emotional development in youth and at shedding light on the practical use of psychoeducational tools (i.e., psycho-educational intervention program, board games) designed to promote EC and PE in youth navigating sensitive developmental periods. Subsequently, two coupled research axes were pursued under the umbrella of EC and PE in autistic individuals and youth in schools.

The first chapter articulates relevant theoretical concepts about EC and PE within the context of autism and schools. Organized around the two research axes, the thesis consists of four studies, each addressing ongoing questions, emerging needs, and gaps in the field.

The first research axis contributes to the PE and ER findings in autism, one of the most prevalent among neurodevelopmental disorders (e.g., Scandurra et al., 2019), often receiving support from special education (Płatos & Pisula, 2019; Shaw et al., 2025). Autism has been particularly associated with challenges in ER and atypical patterns in responsiveness to stimuli eliciting PE (Cai et al., 2018; Samson et al., 2015; Weiss et al., 2013). This axis adopts a primarily one-to-one assessment by examining how PE and ER are articulated. It may contribute to a better understanding of the emotional development in autism and consists of two studies that were conducted in parallel. *Study 1* (Zaharia, Kojovic, et al., 2025) is a fundamental research study examining visual attention to stimuli designed to elicit positive emotions (i.e., cuteness), with the aim of identifying underlying mechanisms that may influence the experience of positive emotions in autistic individuals. Using eye-tracking methodology, the study investigates how visual attention to cute-feature stimuli varies as a function of autism symptom severity and social skills in early childhood, thereby shedding light on mechanisms that may contribute to and shape later EC development. Building on these developmental underlying mechanisms, *study 2* (Zaharia, Noir-Kahlo, et al., 2021) extends the line of inquiry on PE and ER by examining the efficacy of a novel brief PER intervention program tailored for autistic youth, delivered in individual sessions.

The second research axis extends towards psychoeducational tools promoting EC and PE used in youth and in collective settings within a local context of schools in Switzerland within two different cantons: Valais (primary schools; Study 3; Zaharia, Savary, et al., 2025) and Geneva (secondary schools; *Study 4*). Youth, encompassing adolescence and the transition to adulthood, represents a developmental period characterized by both heightened vulnerability and significant potential for growth (Mastorci et al., 2024; Piguet et al., 2025). Accordingly, this research examines the collective implementation of SEL activities in naturalistic educational environments, with a particular emphasis on play. In contrast with the

individually delivered approaches, these studies place a specific focus on the acceptability and feasibility of the implementation of these new SEL tools in classroom settings. SEL involves developing skills in the socio-emotional domain in order to support EC and social interactions (CASEL, 2013; Cipriano et al., 2023). Currently, local educational policies encourage EC enhancement in classroom, through school curricula (CIIP; Confédération intercantonale de l'instruction publique de la suisse romande et du Tessin, 2010).

In this context, *Studies 3 and 4* aim at examining the acceptability of play-based methods designed to tap into EC and PE in naturalistic environments. Specifically, these studies explore the students' experience with the use of newly designed board games (i.e., *chEERS Games*), thereby enablers and barriers in their implementation across different age groups and educational levels, including primary and upper secondary classes. *Study 4* further extends this investigation by comparing the use of board games with alternative SEL methods (i.e., mindfulness, improvisational theater) and testing the feasibility of their implementation.

The following sections present the key concepts investigated in this dissertation and around which the four studies are structured: EC, including ER, and PE, examined in relation to autism and youth in school contexts.

The discussion then summarizes the main findings, addresses the study's limitations, and outlines future research directions. It also highlights the contribution of the present work to the existing knowledge and theoretical models. Finally, practical implications of the results, particularly in the field of psychoeducational and SEL methods implemented across diverse settings for youth are discussed.

1.1 Emotional Competencies and Positive Emotions in Youth

EC are commonly referred to as a set of abilities that tap into emotion identification, understanding, expression, regulation, and use, and may be mobilized to process one's own (intrapersonal level) and others' (interpersonal level) emotions (Mikolajczak, 2020;

Mikolajczak et al., 2009; Salovey & Mayer, 1990). In relation to the Component Process Model, EC have been conceptualized as abilities that enable individuals to use emotions adaptively in achieving goals and considered to involve three interrelated components: appraisal, regulation, and communication (Scherer, 2007). First, appraisal refers to the accurate evaluation of emotionally relevant events and the elicitation of appropriate emotional responses based on emotion knowledge and understanding. Further, regulation involves a flexible and context-sensitive use, monitoring and updating of ER strategies. Finally, communication encompasses the appropriate use of emotional expression cues, awareness of socio-cultural norms to transmit clear and unambiguous emotional signals and subsequently facilitate understanding and social interaction. Other EC models, used for instance in SEL programs, have also include further components such as empathy and knowledge and attitudes about emotions, as formulated in the Collaborative for Academic, Social, and Emotional Learning (CASEL, 2013, 2020).

However, the construct of EC did not yet reach a consensual definition, and it has been used interchangeably with emotional intelligence in the literature, leading therefore to the debate around EC as a trait or ability (Monnier, 2015). In the literature, EC have often been described under other related labels with which they completely or partially overlap, such as non-cognitive skills, social and behavioral skills, interpersonal sensitivity, emotional skills or socio-emotional skills (Kankaraš & Suarez-Alvarez, 2019; Mikolajczak, 2020; Mikolajczak et al., 2009; Pardo et al., 2025). The difficulty in establishing a consensual definition or drawing clear boundaries between these constructs may stem from the diverse disciplinary domains and geographical contexts in which they are discussed (see Study 3, Zaharia, Savary, et al., 2025). Within educational policy frameworks to improve mental health and wellbeing (Kankaraš & Suarez-Alvarez, 2019; World Health Organization, 2019), EC have mainly been

targeted by SEL approaches and programs and, in the local context of the current thesis (i.e., Switzerland), they are typically referred to as transversal competencies (CIIP, 2010).

As presented above, EC covers a wide range of constructs within EC theoretical frameworks. Among the EC, ER is the skill that refers to how one is able to modify own's or others' emotions depending on context and needs (Kotsou et al., 2022; Mikolajczak, 2020). It has also been defined as a series of processes by which individuals influence which emotions they have, positive or negative, when they have them, and how they experience and express them (Gross, 1998).

To note, *affect* and *emotion* may be easily confused, as they may sometimes be used as synonyms or interchangeably in the literature (Gross, 1998; Sander & Scherer, 2009; Scherer, 1984, 2007; Vittersø, 2025). However, they are differentiated in most of the fine-grained theories. Although debates and controversies still exist across disciplines and époques, affect can be considered as the research object in affective sciences and as an umbrella term including emotions, moods, attitudes, and interpersonal stances, and affect disposition (Sander, 2025b; Sander & Scherer, 2009; Scherer, 2007). The term *affect* commonly refers more to an unspecified mental state with a valence ranging on a continuum from pleasant to unpleasant (Plantin, 2015; Sander & Scherer, 2009; Schneider et al., 2025). For instance, Dukes and colleagues (2021, p. 816) argued that “Nonetheless, it seems that affective processes are typically understood to relate to the notion of (dis) pleasure or valence, to not necessarily be consciously felt, and to mobilize the organism to deal with events that may be important to that organism”. *Emotions* are a more complex phenomenon, a momentary conscious state unifying psychological, context-dependent, neurophysiological, behavioral (changes in expression, actions) and cognitive components (appraisal), defined by valence and arousal (Plantin, 2015; Sander & Scherer, 2009; Scherer, 1984). Based on the circumplex/bidimensional theories of emotion, the distinction between positive and negative

emotions is based on valence, a conceptualization that also found support in neuroscience via the brain's rewards circuitry (Russell et al., 1989; Sander, 2025b). Positive affect can be then conceptualized as the experience of pleasant and positive emotions, such as joy, enthusiasm (Schneider et al., 2025). PE remain one of the core research objects in positive psychology. Over the past decades, research on PE has rapidly evolved and expanded exponentially, helping to reduce the imbalance between the number of positive and negative emotions studied in the literature (Fredrickson, 1998). Indeed, this difference is also reflected in the less extensive vocabulary used to describe and refer to PE and in the less nuanced emotional expression distinguishing PE (Fredrickson, 1998).

Furthermore, since the emergence of the positive psychology field, PE are frequently treated as both targets and outcomes. Drawing on the *broaden-and-build theory*, PE may shape the development of EC by broadening, on short-term, the repertoires of thought, behavior, and action and contributing to resilience and help building, on long-term, new skills and resources (Fredrickson, 2000; Garland et al., 2010). However, although PE have been considered as valuable personal resources (Shahid et al., 2023), there is little evidence regarding the precise relationship between PE and EC and the presumed reciprocal influence. A few studies showed though that higher levels of EC may facilitate the experience and cultivation of PE (Peláez-Fernández et al., 2021; Sanchez-Ruiz et al., 2024; Shahid et al., 2023). Furthermore, it has been suggested that educational programs incorporating elements of positive psychology, such as PE, may help enhance EC (Dimovska, 2018). For example, PE, such as joy, may broaden the repertoire of thought-action tendencies through engaging the individual in play activity (Fredrickson, 1998; Garland et al., 2010); then play will trigger PE, and, on the long-term, this dynamic, may help building new resources (Fredrickson, 1998).

For these reasons, play can be considered an important mean to develop EC, with PE at its core (Zaharia et al., 2022). As an active mechanism of ER, one of the core EC addressed

by theoretical models, PE may have an *undoing effect* on the impact of negative emotions (Garland et al., 2010). In line with this theory, research on PER showed that individuals can intentionally down- or up-regulate, or maintain PE, which in turn supports resilience and adaptive regulation of negative emotional states (Quoidbach et al., 2010, 2015). Across these theoretical perspectives, PE are attributed multiple roles: they constitute emotional states that can be regulated, function as targets and outcomes in interventions on EC, and, ultimately, they are both targeted and act as tools within the ER process (Fredrickson, 1998).

Together, EC and PE are well-recognized for their benefits across multiple life domains and play a crucial role in fostering flourishing development. They both function as protective factors for mental and physical health and wellbeing, foster academic success, support learning processes, promote professional outcomes, contribute to resilience and reduce vulnerability to psychological difficulties, and, last but not the least, establish positive relationships (Abe, 2011; Ambresin et al., 2025; CASEL, 2013; Fredrickson, 1998; Grund & Holst, 2023; Kotsou et al., 2022; Lau & Wu, 2012; Lyubomirsky et al., 2005; McCauley et al., 2025; Mikolajczak et al., 2009; Pardo et al., 2025; Sander, 2025a; Smith et al., 2019).

During vulnerable developmental transitions, EC and PE may be particularly fragilized. Youth, in general, represents a sensitive time frame marked by increased heterogeneity and interindividual differences, for whom EC may be especially susceptible (Mertens et al., 2022). Youths' health and well-being are recognized as key priorities in public health, school-based interventions, and preventive medicine (Kankaraš & Suarez-Alvarez, 2019; Mastorci et al., 2024; Patton et al., 2016; Steponavičius et al., 2023; World Health Organization, 2019). Due to cognitive–emotional asynchrony occurring during these years, they may experience certain challenges, some emerging in the domain of emotion understanding and differentiation; however, this stage also constitutes a pivotal period to cultivate PE and benefit from them (Mastorci et al., 2024). Adolescence represents therefore

both a period of vulnerability and opportunity, as well as a critical developmental window for the implementation of preventive interventions (Mastorci et al., 2024; Piguet et al., 2025). The risk of disadvantage may increase, and vulnerabilities may compound over time between neurodivergent conditions and/or transitional developmental demands (Piko & Dudok, 2023; Tadesse et al., 2024). Therefore, autistic youth, youth enrolled in non-academic or vocational training tracks, or those with a background of special education enrollment may be at risk for greater vulnerability. They may face systemic barriers, stigmatization, marginalization, and social exclusion, as well as challenges in the transition to adulthood and the workplace. Youths with or without special educational needs (SEN) are also targeted for support in both educational and clinical settings (Hassani & Schwab, 2021). Ensuring equitable opportunities to develop EC is essential for supporting harmonious emotional development across the lifespan. This requires not only recognizing disparities in developmental opportunities but also providing supportive environments, appropriate tools, and structured interventions to compensate for reduced access to SEL experiences. Such efforts are particularly critical to provide opportunities for harmonious growth and create conditions that allow individuals at risk for vulnerabilities to practice and strengthen EC, in particular ER, and to experience PE.

Therefore, this doctoral thesis addresses EC and PE in youth with autism, as well as in youth across different developmental stages and in naturalistic school settings. While it examines the underlying mechanisms of PE in autism, it also proposes new psychoeducational tools to promote PE and EC in youth with or without autism that are examined for their efficacy (*Study 2*) and acceptability (*Study 2, 3, and 4*). Through its research questions and empirical studies, this dissertation aims to address existing gaps in the literature while contributing to both theoretical knowledge and providing practical implications to support emotional development.

1.2 First Research Axis: Emotional Competencies and Positive Emotions in Autism

Autism is a neurodivergent condition frequently associated with eligibility for special education. For instance, in the United States of America (USA), it is estimated that more than 65% of autistic children are eligible for special education services (Shaw et al., 2025). In *Study 2*, 50% of the French-speaking sample reported being or having been enrolled in special education (Zaharia, Noir-Kahlo, et al., 2021). In the Diagnostic and Statistical Manual for Mental Disorders (DSM-5-TR)(APA, 2022), autism is classified as a spectrum disorder (ASD) in which the core symptoms are the persistent deficits in social domain (communication and interaction, including difficulties in understanding emotions and socio-emotional reciprocity; reduced interest in approaching or initiating relationships with peers) and the restrictive and repetitive behaviors (RRB), interests or activities. The terminology surrounding autism has evolved in recent years, with increasing adoption of a neurodiversity perspective and terms such as autism spectrum condition (ASC). The articles included in this thesis reflect these ongoing changes as they do not always align with current recommendations. These remain subject to discussion within advocacy communities, as well as in journal guidelines (Amass, 2026; Kenny et al., 2016).

In the USA, the prevalence of the diagnosis in children of 4 to 8 years old is estimated at 1 in 31, where boys are three times more likely to be diagnosed than girls (Shaw et al., 2025). This increase in prevalence over the years is due to multiples reasons, such as the progress in early identification and screening, as well as the raising awareness in Hispanic populations and/or other underserved groups, and female individuals. In Switzerland, no official numbers are available. Some numbers cited by autism associations mention approximatively 80000 autistic persons living in Switzerland, of which about 20% may be children and adolescence (Autismus Deutsche Schweiz, 2022; Schott, 2023; Silfverberg,

2024). This estimation is in line with the global prevalence of autism in the world which was estimated at 1 in 127 in 2021 (Santomauro et al., 2025).

Among the challenges autistic individuals encounter within today's normative social environment, EC constitute an important area of research, as difficulties in this domain are reflected in diagnostic criteria and may place individuals at heightened risk of vulnerability (APA, 2022; Begeer et al., 2008; Žic Ralić et al., 2025). For instance, compared to neurotypical peers, research has indeed revealed difficulties in social competences, emotion understanding, and ER (Gev et al., 2021; Reyes et al., 2020). However, these findings are not always generalizable and remain debated, as results may vary depending on the presence of intellectual disability and the context of assessment (e.g., naturalistic versus laboratory settings) (Begeer et al., 2008). Most interventions for autistic individuals tap into EC, with a majority on emotion recognition, but also ER, and other EC such as emotion expression and understanding (García-García et al., 2025). Autistic adolescents and young adults appear to have fewer intervention opportunities and remain comparatively underserved relative to younger children (Lounds Taylor et al., 2012; Płatos & Pisula, 2019). Accordingly, approximately 72% of interventions on EC have been designed for children (4 to 13 years old), reflecting a strong emphasis on early intervention (García-García et al., 2025). Adolescence (14 to 18 years old) and adulthood (above 18 years old) remain comparatively less addressed. Indeed, during the recruitment of *Study 2* (Zaharia, Noir-Kahlo, et al., 2021), young adult participants expressed their interest in research by referring to the lack of support at their age. In Switzerland, researchers from University of Zurich have acknowledged the increased social needs to which autistic adolescents and adults encounter and propose programs such as KOMPASS to support emotional and social skills, as well as other technology-based interventions on emotion recognition and regulation (Schneebeli et al., 2026).

A closer look on ER shows that challenges in this domain are widely addressed in the literature, as they are considered an inherent feature frequently present in ASC and related to negative outcomes on mental health (Cai et al., 2018; Cai & Samson, 2024; Mazefsky et al., 2013, 2014; Micheel et al., 2026). ER is considered a transdiagnostic process across psychopathological and neurodevelopmental conditions and may partly account for comorbidities in autism too (Cai & Samson, 2024; England-Mason, 2020; E. Sloan et al., 2017). In autism, challenges in effective ER have been associated with both internalizing and externalizing difficulties, reduced social interactions, poorer academic outcomes, and broader negative consequences in daily life (Restoy et al., 2024). Research has suggested that autistic individuals may demonstrate lower frequency and reduced flexibility in the use of ER strategies and may rely more often on strategies considered maladaptive (Cai & Samson, 2025; Conner et al., 2020). Indeed, difficulties may arise at different stages of the ER cycle (i.e., identification, selection, implementation, and monitoring) (Gross, 2015), particularly in the identification of the emotion to be regulated and in the limited repertoire of strategies from which to select (Cai & Samson, 2025). Along with the growing body of research on positive psychology in autism and on PER more broadly (Dykshoorn & Cormier, 2019; Quidbach et al., 2010), emerging evidence showed that autistic individuals may also experience different patterns in regulating PE, compared to neurotypical peers (Cai & Samson, 2024).

To advance our understanding of PER in autism, researchers call for further research with greater attention to the adaptive value and the nature of PE and to the mechanisms underlying their processing, which are currently underexplored (Cai et al., 2018; Moreno, Manfredi, et al., 2026). A recent systematic review found no evidence of a global alteration in PE in autism when compared to neurotypical peers (Moreno, Manfredi, et al., 2026). Accordingly, differences appear to be more nuanced, varying according to the type of positive

emotion, contextual factors, perceptual patterns, and socio-cognitive abilities. Nevertheless, moving the research focus from PE expression and recognition towards promoting experiences that generate PE in autistic individuals may be represent a worthwhile attempt to foster resource building and resilience (Dykshoorn & Cormier, 2019). Beyond the broaden-and-build benefits described in the previous section, PE in early childhood also appear to predict later development by nurturing a sense of belonging, an effect that may emerge prior to longer-term resource-building processes (Fredrickson, 2004; Seehagen et al., 2025). Moreover, Seehagen and colleagues (2025) argue that social interactions are crucial for the experience and expression of PE from infancy. In turn, PE would facilitate the social interactions, suggesting a bidirectional relationship between the two, which resembles with the dynamic play-PE described earlier that is also discussed in autism (Ray-Kaeser et al., 2017). This would suggest that play and social interactions act like both triggers and outcomes of PE in autism (Ray-Kaeser et al., 2017). Play is also known as a domain in which autistic individuals often encounter difficulties (Doernberg et al., 2021; Ray-Kaeser et al., 2017). One early intervention for autism, the Early Start Denver Model (ESDM; Rogers & Dawson, 2013) uses play as a central activity and positive affect as a social reward to promote social interaction and skill acquisition. Another recent study, which I co-authored as part of an external collaboration, also showed promising results of a play- and music-based intervention for autistic children (Dănciulescu & Zaharia, 2023). This particular program (i.e., Piano Therapy) incorporates play activities involving a musical instrument, namely the piano, and eliciting emotions of fun and shared enjoyment. A particularly salient trigger of PE, important in bonding, social interaction, and play, is the cute-featured stimulus (e.g., big eyes, chubby cheeks, round head), also referred to as “baby schema” (Borgi et al., 2014; Borgi & Cirulli, 2013). However, this mechanism remains underexplored in autism, despite its potential

importance for understanding how such socio-affective processes develop over time (Kumazaki et al., 2017; Sasson et al., 2012).

In view of these findings, it may be valuable to: a) better understand the underlying mechanisms of PE by examining how triggers of PE may operate and shape social and affective interactions from early development onward in autism (*Study 1*) (Zaharia, Kojovic, et al., 2025), and b) investigate how PE and EC, in particular PER, can be supported via intervention programs in autistic youth (*Study 2*) (Zaharia, Noir-Kahlo, et al., 2021).

1.3 Second Research Axis: Board Games to Promote Emotional Competencies and Positive Emotions in Schools

“Perhaps the very existence of youth is largely for the sake of play; the animal does not play because he is young, he has a period of youth because he must play.” (Groos, 1898, pp. xx).

This line of research follows up on two previously published works: the first, on the preliminary attempt of developing board game material for school-aged children (Dell’Angela et al., 2020), and, the second, on the role of play and games for emotional development that offers a glimpse on the links between play, PE and ER in the theoretical chapter of the Oxford Handbook of Emotional Development (Zaharia et al., 2022). This research axis focuses on developing tools to promote EC and PE in naturalistic, collective school setting and assessing their acceptability of in primary and secondary schools in order to identify enablers and barriers in the implementation. Here, the move from individual to collective support aligns with an inclusive perspective, especially considering the heterogeneity in development that characterizes youth and classroom populations (Bressoud, 2024). Extending support for emotional development to ecological settings is particularly relevant for youth undergoing transitions which can heighten the risk for vulnerability.

In this regard, SEL methods implemented in school settings may represent a promising avenue to integrate learning about and on EC and PE and create opportunities answering the need to convey knowledge and support emotional development in an environment where youth spend most of their daily time (Durlak et al., 2022; Gray, 2011). Researchers conceptualize SEL as a practical translation of supporting EC, positioning this method as means of addressing the developmental challenges and growing mental health concerns faced by youth (Montgomery et al., 2018). SEL supports competencies that are essential not only for academic success but that are also transferable to other life domains such as relationships and workplace, thereby supporting an adaptive functioning (National Research Council, 2012). As social interactions are highly relevant contexts for adolescents, classrooms settings can be motivating (Crone & Dahl, 2012). Schools are also seen as natural key spaces to promote and strengthen the wellbeing and mental health of young people (Pardo et al., 2025; Van De Sande et al., 2022). In Switzerland, the context of this research axis (*Studies 3 and 4*), curricular frameworks explicitly emphasize the development of these competencies, referring to them as transversal skills (Conférence intercantonale de l’instruction publique de la suisse romande et du Tessin, 2010). These skills substantially overlap with EC and are considered central educational objectives alongside subject-specific knowledge. This policy alignment underscores the importance of fostering EC within the school context. Schools provide therefore an ideal setting for implementing methods to support emotional development. However, SEL programs yield mixed findings, depending on factors such as method, students’ age, geographical and socio-economic context, school culture, and the inclusion of students with SEN (Durlak et al., 2022; Van De Sande et al., 2022; Yeager, 2017). Moreover, a major challenge concerns their efficacy with older students. Research in this field highlights the need to develop innovative approaches to better support youth and enhance their academic and developmental outcomes.

Therefore, it is important to offer support for emotional development at school, not only for young children, but also for *older students*, youths enrolled in secondary school, especially when they have experienced a disruptive school history and a disadvantaged background (Reports Geneva schools; the school context of *Study 4*). Supporting the emotional development of students identified as atypical and/or situated in vulnerable contexts is therefore highly relevant (Montgomery et al., 2018; Pardo et al., 2025). This is of particular importance in contexts with large age variation within the same class, substantial heterogeneity in students' educational backgrounds, and high cultural diversity, as the sample enrolled in *Study 4* (Service de la recherche en éducation, 2024). Addressing different levels of youth development within the same classroom adds complexity to the educational process and increases the challenges faced by teachers. Classrooms are often characterized by heterogeneity among students (e.g., cognitive, emotional, etc.), mirroring the inherent nature of the development (Bressoud, 2024; Mertens et al., 2022). Heterogeneity should not be viewed solely as an obstacle or challenge by teachers and/or policy makers, but also as an opportunity to enrich sharing and promote inclusive approaches that value differences as an asset rather than a constraint (Bressoud, 2024), including the evident cultural diversity in Swiss schools' classrooms (Service de la recherche en éducation, 2024). Therefore, the school settings constitute a particularly suitable context for fostering EC.

As school time increases with age, opportunities for activities crucial to the emotional development such as *play* tend to decrease and may reduce even more in situations with a disadvantaged socio-economic background which may lead to reduced exposure to play and altered play opportunities (Girio-Herrera et al., 2019; Gray, 2011). Indeed, given the intertwined dynamic between play, EC and PE, ludic approaches and opportunities seem indispensable in the school curriculum. Beyond its well-documented benefits for learning, play is highly motivating, and reflects close-to life situations, making it particularly important

for supporting the development of EC (Bucher & Gay, 2018; Hromek & Roffey, 2009; Richard & Gentaz, 2025; Zaharia et al., 2022). Indeed, a recent study demonstrated the efficacy of a school-based training program using pretend play in 5-year-old children for improving EC, in particular in terms of emotion understanding and regulating negative emotions (Richard et al., 2019). Play is sparked by PE, and, in turn, generates further PE, reinforcing the cycle between play and positive emotional experiences (Fredrickson, 2004; Zaharia et al., 2022). Through the experience of PE, the repertoire of actions, thoughts, and behaviors is broadened, and new resources are built (Fredrickson, 2004). From a positive psychology perspective, play may be understood as an urge, or even a thought-action tendency of PE: with play comes the exploration, the savoring, and the building of relationships (Fredrickson, 2004; Zaharia et al., 2022). Moreover, play can be an ER training opportunity but also an ER strategy in itself (Zaharia et al., 2022). Nevertheless, recent reports suggest that play is rather rarely used as a central instructional method within the SEL programs delivered from preschool to high school (S. M. Jones et al., 2021, 2022). In Switzerland, despite the recommendations outlined in the curricula, no clear guidelines are provided to support teachers in fostering transversal skills among students (Zaharia, Savary, et al., 2025).

Subsequently, the main objective of this second line of research is to provide psychoeducational tools that can be easily adapted and implemented across various settings, while fostering reflection on positive emotional experiences, their role in education, as well as the enablers and obstacles in their use. *Board games* are therefore proposed as an innovative method. This form of play has been mainly used to transmit knowledge and address issues such as bullying or other health-related problematic behaviors and may have the potential to answer the field educational needs (Bayeck, 2020; Nakao, 2019; Noda et al., 2019). Although it can be assumed that their use is widespread in schools, fine-grained

research examining their implementation is still scarce. Indeed, board games provide inclusive learning environments and can easily adapt to diverse learner profiles (Bayeck, 2020). In this respect, it seems essential to examine which features are most appealing for students, as well as the challenges that may hinder their engagement (McKown, 2019). Research on board games is expected to capture and transmit the constraints of their application in school settings and investigate what adaptation is needed to make their use more feasible in practice (Kerry & Crooks, 2020). Understanding how students receive and experience the SEL methods is a critical step prior to evaluating learning outcomes, giving students a voice to document whether such methods are perceived as supportive of their EC (Cipriano & McCarthy, 2023). Studying the acceptability of SEL methods, including board games, is important as higher acceptability can facilitate engagement and, further, support learning (Ninaus et al., 2017; Zaharia, Savary, et al., 2025). As data on the acceptability of programs remain limited (Bettini et al., 2019; Mori et al., 2025), identifying potential obstacles and enablers in the implementation of board games in schools appears particularly important.

In the light of these educational needs for emotional development, *chEERS board games* have been developed. Before testing them for acceptability among school students in *Study 3* and *4*, an important amount of work was dedicated to the design and the board game master training which are indispensable steps in this research (Azizi-Soleiman et al., 2023; Gkintoni et al., 2024).

The rigorous design phase of the theory-driven *chEERS games* (Zaharia, Sander, et al., 2021) was successfully achieved thanks to a collaboration involving psychologists, game designers, illustrators, and graphic designers. These new competitive board games focused on several EC and having individual performance proposed in *Study 3* and *4* were built on the previous work in our lab that studied semi-cooperative card games with group performance

(Dell’Angela et al., 2020). Some of the materials used in the current version, particularly the cards depicting emotional events and phrases designed to be associated with emotions, were inspired by the work from Dell’Angela and colleagues (2020). The cards used in *chEERS Games* underwent substantial modifications, including the addition of new content. The emotions used as content in the *chEERS games* were selected after a non-exhaustive examination of the emotions used in the affective sciences literature, with the aim of broadening the emotional vocabulary, in particular for PE (Cordaro et al., 2020; A. Cowen et al., 2019; A. S. Cowen et al., 2019; A. S. Cowen & Keltner, 2017, 2020; Ebesutani et al., 2012; Gaudreau et al., 2006; Laurent et al., 1999; Plutchik, 1980; Scherer, 2005; Scherer et al., 2013; Schlegel et al., 2014; Watson et al., 1988). Content from some of the existent commercial board games and playful material was also screened (M. Berger, n.d.; Bidault & Roubira, 2017; Borgman, 2006; B. Sloan, 2016; Yoon et al., 2015). The board game version addressing ER competency is grounded in James Gross’s process model of ER, includes social ER and humor-based strategies, and incorporates a variety of strategies that have classically been positioned along the adaptative-maladaptive continuum (Gross, 1998; McRae et al., 2012; Reeck et al., 2016).

After design, another important step in the preparation of data collection was the training of the board game masters. The game masters received thorough training prior to the delivery of board game sessions in schools. They were instructed to monitor players’ levels of boredom and perceived competence, and to adjust the level of difficulty accordingly. Their role emphasized non-judgmental attitudes and curiosity, including when addressing behaviors such as cheating. Cheating during play was not sanctioned but approached as an opportunity for discussion. Game masters were also trained to remain flexible, and to facilitate group discussions when relevant. Importantly, players were positioned as “experts” of their own experiences and vocabulary, encouraged to explain emotional terms in their own words,

thereby promoting vicarious and social learning. In this sense, the game master's influence on emotional vocabulary was intentionally limited. The use of informal language or jargon was permitted, acknowledging potential differences between research terminology and lay emotional vocabulary, as well as the influence of multicultural and multilingual contexts on students' vocabulary.

Study 3 tested the acceptability of functional prototypes in four primary classrooms in Valais. *Study 4* was preceded by a pilot phase in which the same functional prototypes were tested with four secondary classrooms; next, the final board games were tested for acceptability in the same secondary school environment, one year later. This sample from Geneva secondary schools integrates youth for whom the curriculum does not grant access to university degree. In the local reports, the population enrolled in these secondary schools is characterized by important school dropout during the year and in between school years, as well as absenteeism (Service de la recherche en éducation, 2024). This school environment addresses potential educational gaps resulting from a fragmented schooling trajectory and provides multi-centered guidance. Some of these classrooms have a particular focus on how to overcome students' difficulties and prevent the emergence of others. For instance, some may offer an interdisciplinary support network on various domains: physical and mental health, social domain, mediation, professional integration, also available for parents, while others offer a particular attention to the students' social and personal competencies (Centre de formation pré-professionnelle, n.d.).

Finally, this second research axis provides insight into the acceptability of a novel SEL method, the *chEERS* board games, designed to promote EC and PE. The games were tested in two different educational settings (primary and secondary) and across two successive game design phases.

2 Aims and Methodological Considerations

2.1 General and Specific Aims

The general aim of the current dissertation is to better understand how EC intertwine with PE within theoretical frameworks presented above, across neurodivergent conditions (i.e., autism) and developmental periods (i.e., youth), associated with increased vulnerability, and across settings ranging from individual to collective levels. Furthermore, this work seeks to develop psychoeducational tools designed to support EC and PE in autistic youth, as well as in students in school settings, and to examine the enablers and barriers in their implementation. The newly proposed tools are assessed in terms of efficacy (*Study 2*), acceptability (*Study 2, 3, and 4*), and feasibility (*Study 4*). See Figure 1 for an overview and the integration of the thesis studies into the proposed theoretical models.

The specific aims of each study are described in Table 1.

2.2 Methodological Considerations

The current dissertation provides an in-depth focus on several projects developed to address the research aims outlined above. The projects are embedded within broader research initiatives and collaborations or represent continuations of previous work, while all maintain a common focus on EC, PE, as well as on the development of psychoeducational tools.

Collectively, all the studies presented in the dissertation required substantial, financial, time, and human resources, along with complex collaborations to ensure their successful execution.

Study 1 is an extension of a master's thesis project (Rojanawisut, 2017), incorporating new data (increased sample) and novel analytical approaches developed during the realization of the doctoral dissertation. The study was developed in collaboration with the research team of Prof. Marie Schaer at the Fondation Pôle Autism in Geneva. The resulting article was

published online in August 2024 and subsequently assigned to the 2025 journal volume (Zaharia, Kojovic, et al., 2025).

Study 2 was started before the enrollment in the PhD and was part of an ampler project developing a 3-session intervention on PER that was delivered in schools in Geneva (group/classroom setting) and with autistic individuals (one-to-one setting), conducted within the Ambizione grant of Prof. Andrea Samson. Recruitment of autistic participants and data collection took place from 2016 to 2018. Recruitment for *Study 2* was challenging, likely due to participants' concurrent involvement in ongoing therapy or support programs and other research studies in the canton, which may indicate a certain research participation fatigue. Recruitment was conducted across several French-speaking cantons and, depending on participants' geographical location, sometimes required remote intervention delivery in distant areas. The analysis and writing of the paper continued under the current dissertation and was published in 2021 (Zaharia, Noir-Kahlo, et al., 2021).

Studies 3 and 4 are a continuation of the previous work that was carried out during at the early stages of the doctoral thesis: the study on the first games on EC developed in our lab (Dell'Angela, et al., 2020), that I have also co-authored, and the theoretical chapter on *Play and Games: Means to support emotional development* (Zaharia et al., 2022). The follow-up *Studies 3 and 4* were impacted by the Coronavirus Disease-19 (COVID-19) pandemic, which required additional precautions, extended preparation and implementation time due to sanitary measures, and the introduction of new instructions for participants. Moreover, in *Study 3*, unforeseen staff-related circumstances necessitated school-level restructuring, which led to replacing the initially recruited school within a short timeframe. *Study 4* was part of a larger inter-institutional project, IMAGINE, involving the contribution and coordination of numerous students, research assistants, and school and project partners (Mella et al., 2020; Sander, 2020). A parallel article, that I co-author, investigating a complementary research

question of the project, namely, the efficacy of different SEL methods (i.e., board games, improvisational theater, and mindfulness), is currently under review (Mella et al., 2026).

Study 4 was preceded by a pilot study conducted in 2020, which led to modifications of the classroom activities in the final study. The pilot was an adaptation of the original plan due to COVID-19–related constraints. In 2020, the planning phase included extensive coordination with school principals, teachers, and external facilitators, but COVID-19–related uncertainty regarding school reopening resulted in the study being postponed to the 2021 school year. For the research in schools, recruitment and approval procedures had to be adapted as they differed across cantons. In both Valais and Geneva, additional institutional actors were involved in supporting the research and granting formal or informal approval.

Taken together, the four studies constituting the dissertation involved data collected from a total of 562 participants, aged 1 – 35 years old, recruited via autism associations (*Study 1* and *2*) and in schools (*Study 3* and *4*).

Within all the research projects presented in this dissertation, six students achieved their masters' thesis, and eleven students were enrolled as interns, from both University of Geneva and UniDistance Suisse, under my co-supervision. Other four lab members, research assistants and external collaborators, helped with data collection and/or delivery of interventions in schools under my coordination.

The studies used different methodologies. See Table 1.

2.2.1 Ethics

All studies were performed in accordance with the Declaration of Helsinki. Written informed consent to participate in all studies was provided by the participants aged 18 or above and by parents for participants aged below 18 years or under guardianship. In *Study 4*, the difficulties in the recruitment and in obtaining consents were due to various reasons: formal refusals, school dropouts or changes, regular absentees, prior participation in the pilot

study, and missing parental consent due to parent's absence or challenging circumstances (e.g., language barriers).

Specifically, *Study 1* was approved by the Ethics commission of the canton, Commission cantonale d'éthique de la recherche - CCER, Geneva, Switzerland, Protocole 12–163/Psy 12–014, referred under the number PB_2016 – 01880, accepted on September 25th, 2012. *Study 2* was approved by the Swiss Ethical Committee Board of Geneva (Date 01.03.2016/No. PB_2016-00750/15-242). *Study 3* was approved by Commission d'éthique d'UniDistance Suisse (n° 2020-05-00001) and received formal approval in principle from HEP-VS and the Service d'enseignement of the Canton of Valais. *Study 4* has been approved in Switzerland by both the Ethics Committee of the Faculty of Psychology and Educational Sciences of the University of Geneva (°PSE-2019-11-04.22), and the Service of Research in Education (Service de la Recherche en Education – SRED) of the State of Geneva.

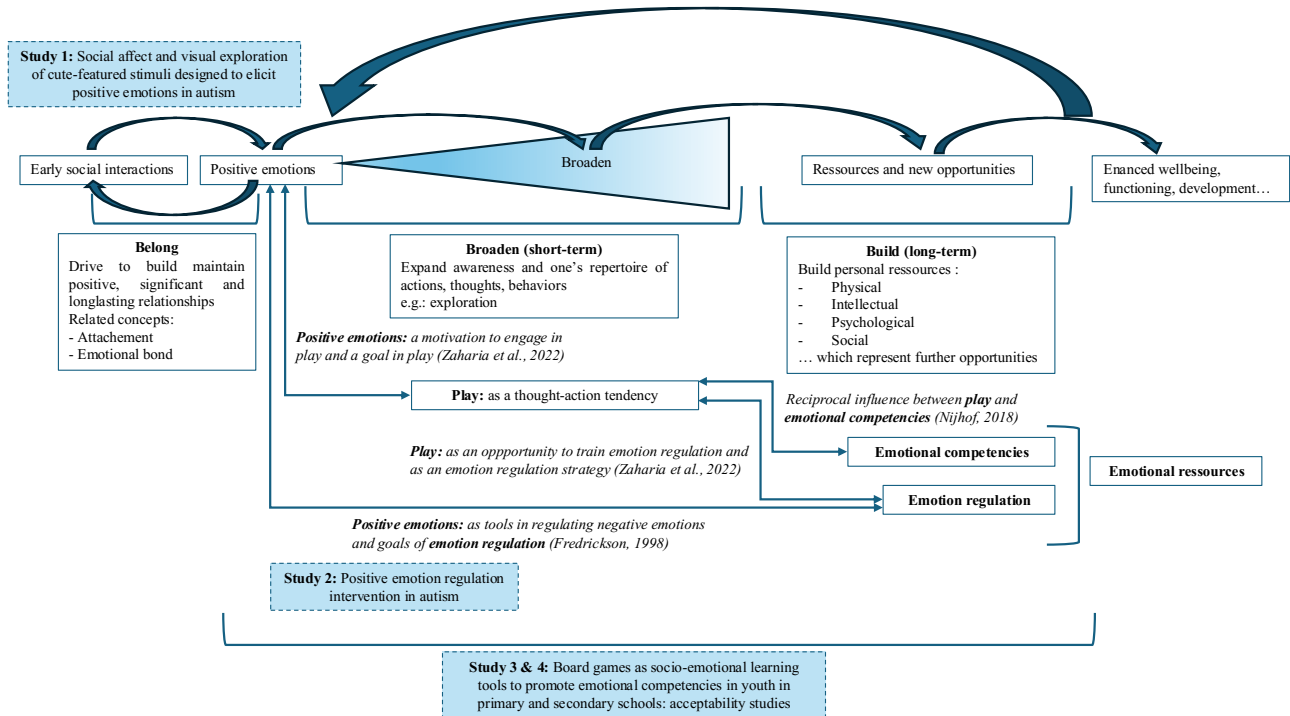
2.2.2 Funding

The studies were funded by various sources.

Study 1 was supported by the Swiss National Science Foundation (Grants 163859, 190084 & 212653 for M.S., PP00P1_176722 for A.C.S., as well as funding from the National Centre of Competence in Research Synapsy (Grant 51NF40–185897) and by the Fondation Pôle Autisme. The open access funding was provided by University of Fribourg. *Study 2* was supported by the Swiss National Science Foundation (SNSF: PA00P1–154937 and PP00P1_176722 for A.C.S., SNSF: P2NEP1–178584 for D.D.) and the Réseau Fribourgeois de Santé Mentale (RFSM), Fribourg, Switzerland (for K.N.-K.). *Study 3* was supported by Service des Hautes Écoles, Département de l'économie et de la formation du Canton de Valais (PInter 08-2025 ; N.B. et A.C.S.) et UniDistance Suisse (A.C.S.). *Study 4* has been supported by the Swiss National Science Foundation (100019_188966) (D.S.) and research funds of UniDistance Suisse (A.C.S.).

Figure 1

The Theoretical Framework Guiding the Empirical Studies Presented in This Dissertation



Note. Figure based on the extended model of Broaden-and-Build theories (Seehagen et al., 2025; Fredrickson, 2004) and modified to present the articulation between the theory and the empirical studies of the thesis. Bidirectional links between play and emotion regulation, play and positive emotions, and play and emotional competencies are illustrated.

2.3 Overview of the Articles

Table 1

Overview of the Articles Presented in the Current Dissertation

Objective	Method	Main Results
<i>Study 1:</i> Examining the link between social affect and visual exploration of cute stimuli in autistic children		
To examine the visual attention towards cute-featured stimuli (i.e., <i>babies</i> ; <i>animals</i>), and its links to symptom severity and social affect in autistic children.	Sample: 94 children (63 diagnosed with ASD) Groups: $N_{TD} = 31$ TD; $N_{HS} = 23$; $N_{LMS} = 40$ Age: 20–83 months ($M = 49.63$, $SD = 13.59$) Task: visual exploration task Eye-tracking measures: fixation percentage, average fixation duration, time to first fixation, and computed variable - baby sensitivity index Symptom severity (ADOS): RRB, SA, Total. Quantitative analyses.	Visual attention oriented to cute-featured stimuli varied with autism symptom severity and social affect: - LMS ASD children and TD spend more time looking at cute-featured stimuli than <i>neutral objects</i>. - HS ASD children spent less time on the <i>cute-featured</i> stimuli than <i>non-cute</i> stimuli.
<i>Study 2:</i> Proof of concept: A brief psycho-educational training program to increase the use of positive emotion regulation strategies in individuals with autism spectrum disorder		
Testing the effects of a psycho-educational training program on positive emotion regulation in autistic youth: a longitudinal study.	Sample: 30 autistic youths Groups: $N_{training} = 14$; $N_{waitlist} = 16$ Age: 10–35 years ($M = 18.11$, $SD = 6.40$) Intervention: 3-session training program Self-reported questionnaires: - use of PER strategies (attentional deployment, cognitive change, response modulation) - Satisfaction: interest, pleasantness, likability. Assessments: 3 timepoints (longitudinal) Quantitative and qualitative analyses.	At Time 1, the training group showed a significant increase in the self-reported use of the ER strategies compared to the waitlist group. Overall, the increase in the use of ER strategies maintained at Time 2. Descriptively, participations show high satisfaction rates.

<i>Study 3: Board games on socio-emotional competencies: the game experience with chEERS Games</i>		
To investigate the acceptability of a newly developed educational tool: the <i>chEERS Games</i> , the functional prototype.	Sample: 73 children (primary schools) Age: 10-13 years ($M = 11.04$; $SD = 0.73$) Board Game Experience Questionnaire (BGEQ ; qualitative): positive affect, negative affect, flow and immersion, difficulty, effort. Open questions: like and dislike (verbatim analysis) Quantitative and qualitative analyses.	The results show a positive user experience and high satisfaction rates, suggesting a high level of acceptability for classroom use of the functional board game prototypes.
<i>Study 4: Youths' perspectives on school-based socio-emotional learning tools: board games, improvisational theater, and mindfulness: acceptability and feasibility</i>		
To compare students' perception of acceptability on three new SEL methods (board games, improv, and mindfulness) delivered in secondary school, and identify potential enablers and barriers in their implementation in classrooms	Sample: 365 students (secondary schools) Groups: $N_{\text{game}} = 90$; $N_{\text{improv}} = 94$; $N_{\text{mindfulness}} = 95$; $N_{\text{control}} = 86$ Age: 15-26 years ($M = 16.94$; $SD = 1.76$) Student reports: Satisfaction questionnaire: motivation, likability, engagement, utility, interest, difficulty Open questions on like and dislike (verbatim analyses, quantitative) Additional variables: Facilitators' and teachers' feedback Quantitative and qualitative analyses.	Board game and improv are liked more than mindfulness and control. Contact with facilitators and teachers is perceived more pleasant in board game than in the control group. Improv is rated more interesting than both mindfulness and control sessions. Improv is rated more difficult, more useful, the contact with classmates more pleasant, and the perception of self-participation higher than mindfulness. Qualitative data suggests a high acceptability of all three SEL methods.

Note. Abbreviations: ADOS = Autism Diagnostic Observation Schedule. ASD = autism

spectrum disorder. HS = high severity. LMS = low-to-moderate severity. RRB = restricted and repeated behavior. SA = social affect SEL = socio-emotional learning. TD = typically developed.

3 Studies

3.1 Study 1¹

Examining the Link Between Social Affect and Visual Exploration of Cute Stimuli in Autistic Children

¹ Reprint of the article: Zaharia, A., Kojovic, N., Rojanawisut, T., Sander, D., Schaer, M., & Samson, A. C. (2025). Examining the link between social affect and visual exploration of cute stimuli in autistic children. *Journal of Autism and Developmental Disorders*, 55, 4212–4225. doi: [10.1007/s10803-024-06504-1](https://doi.org/10.1007/s10803-024-06504-1)

Abstract

Baby schema refers to physical features perceived as cute, known to trigger attention, induce positive emotions, and prompt social interactions. Given the reduced visual attention to social stimuli observed in individuals on the autism spectrum, the current study examines whether the sensitivity to baby schema is also affected. We expected that the looking time towards cute-featured stimuli would vary with symptom severity levels and would be associated with social affect. Ninety-four children (31 typically developing; 63 diagnosed with autism spectrum disorder - ASD) aged 20–83 months ($M=49.63$, $SD=13.59$) completed an eye-tracking visual exploration task. Autistic participants were separated into two groups based on symptom severity: children with high autism severity symptoms (HS ASD; $N=23$) and low-moderate autism symptoms (LMS ASD; $N=40$). Animals and neutral objects were simultaneously presented on the screen along with either human babies (condition 1) or adults (condition 2). The results indicated that visual attention oriented to cute-featured stimuli varied with autism symptom severity: only LMS and TD groups spend more time looking at cute- featured stimuli (*babies; animals*) than *neutral objects*. Moreover, children with higher severity in the social affect domain spent less time on the stimuli depicting cute than non-cute stimuli. These findings suggest that autism symptom severity and social skills are linked to variations in visual attention to cute stimuli. Implications of baby schema sensitivity are discussed in relation to the development of social competencies and play, responsiveness to robot-based interventions, as well as appraised relevance in autistic children.

Keywords: social affect, autism spectrum disorder, cuteness, baby schema, eye-tracking

The baby schema (*Kindchenschema*) refers to a set of features described as cute (round head, big eyes, chubby cheeks, etc.) that naturally triggers interest and attention, caretaking and protection behavior (Lorenz, 1943; Yao et al., 2022). This universal and cross-cultural response to the baby schema is known as the cuteness effect (Lorenz, 1943; Luo et al., 2015; Yao et al., 2022). Cute-featured stimuli, commonly babies and animals, have high emotional content, elicit positive emotions, release oxytocin, decrease anxiety, and promote bonding, social interactions, empathy, prosocial, and play behavior (Borgi et al., 2014; Doebel et al., 2022; Golonka et al., 2023; Levinson, 2022; Takamatsu, 2023; Yao et al., 2022). They also activate dopaminergic reward systems and brain regions related to motor approach behavior, attachment, emotion processing, and theory of mind (Luo et al., 2015). From an evolutionary perspective, survival of vulnerable youngsters may depend on rapidly attracting the attention of adults (Brosch et al., 2007, 2008; Glocker et al., 2009; Lei et al., 2020), but also of other children (Glocker et al., 2009; Saxton et al., 2020). The limited research in children shows that the cuteness response emerges already around the age of two (Borgi & Cirulli, 2013; Doebel et al., 2022; Saxton et al., 2020), and that the baby schema impacts gaze allocation in 3–6 years old children (Borgi et al., 2014). One study indicated that 3- to 12-month-old infants with no sibling or nursery experience show a weak visual preference bias towards infant faces compared to child faces (Damon et al., 2021). Yet, due to the lack of strong evidence, it is unclear whether sensitivity to baby schema can emerge in young toddlers. Finally, sensitivity to baby schema nurtures relationships (e.g., bonding, affiliation) and represents an early marker of social skills.

Exploring the sensitivity to baby schema in children presenting socio-emotional difficulties, such as those on the autism spectrum, could shed light on early processes that potentially impede engagement in social interactions, motivation, and interest (Cai et al., 2019; Hadjikhani et al., 2014; O'Connor et al., 2019). An atypical perception of

environmental cues has been linked to reduced helping behavior in autistic individuals (Komeda et al., 2019). Identifying whether atypical patterns extend to the baby schema could provide insight into the underlying mechanisms of social behavior and appraised relevance. For instance, the nature of attention patterns toward baby schema may indicate alterations in social reward systems or in appraisals of socio-emotional triggers that support bonding, caregiving, and positive relations.

Many studies, mostly using eye-tracking, generally indicate attenuated attention toward social stimuli during visual exploration in autistic individuals (Bast et al., 2021; Chita-Tegmark, 2016; Frazier et al., 2017). Although some studies showed that autistic children are more likely to direct their attention to non-social stimuli that represent circumscribed interests than to social stimuli (i.e., children and adults expressing happy faces in Sasson, Dichter et al., 2012; i.e., emotional faces of adults in Sasson & Touchstone, 2014), others found no differences between autistic and typically developing (TD) children in the time spent on social vs. non-social stimuli (Chita-Tegmark, 2016). These mixed results may be linked to task-related characteristics (e.g., type or quantity of social stimuli, type of interactive agent) and participant-related (e.g., profile heterogeneity, social skills, autism symptom severity) (Bast et al., 2021; Chawarska et al., 2016), and impact potential intervention outcomes. Indeed, the literature seems to suggest that the variations observed in the visual exploration patterns and preferences of social stimuli are often linked to the participants' social skills level. For example, autistic children's socialization and communication skills were positively linked to the time spent on dynamic social stimuli depicting children (Franchini et al., 2017). Also, the children's over- all preference for social stimuli (i.e., animals and human beings) was negatively associated with autism symptom severity (Celani, 2002). Interestingly, the performance in processing adult faces was found to be more strongly linked to autism

symptom severity in the social affect domain than in the repetitive and restricted behavior (RRB) domain (Zagury-Orly et al., 2022).

Regarding attention to cute stimuli in autistic individuals, the evidence is limited. To the best of our knowledge, the only study addressing cuteness sensitivity in autism is an unpublished work (Sasson et al., 2012), in which a behavioral task was administered in a small sample of autistic adults ($N = 9$). The researchers observed that autistic participants perceived less the infant cuteness compared to the TD group, which would suggest the presence of an altered social reward processing. Another study showed that children with lower autism symptoms preferred robots presenting cute features, whereas children with more severe symptoms preferred humanoid-like robots resembling adults (Kumazaki et al., 2017). In a preference-based task (Prothmann et al., 2009), autistic children preferred interacting with dogs, seconded by persons (adults) and then by objects, but the small sample had a large range in intellectual capacities and symptom severity was not controlled. Another study found no differences in the preference for animals vs. inanimate objects in autistic children (Celani, 2002). A recent literature review suggested that, when looking at animals, autistic children's eye gaze patterns are comparable to those with TD, but their visual attention is more biased toward animals than humans (Toutain et al., 2024). Nonetheless, a notable limitation in the findings presented in this article lies in the infrequent reporting of symptom severity across the referenced studies.

Despite these different results, autism profile heterogeneity should be considered when examining social attention. Sensitivity to social stimuli might be linked to symptom severity, particularly, by impairments in social skills (Franchini et al., 2017). The relationship between the social affect and RRB domains in autistic children is still unclear (Chaxiong et al., 2022). It is considered that social affect and RRB contribute independently to the autism diagnosis, present distinct developmental trajectories, and impact differentially the responsiveness to

interventions (Gotham et al., 2007; Hus et al., 2014). Given their different nature and contributions to autistic behaviors and profiles, treating them separately might help to unmask the specific effects and weight that each may have on the visual processing of cute stimuli. Finally, examining visual processing of cute-featured stimuli in groups with varying severity of autism symptoms may help understand how attentional mechanisms affect social skills development.

These overreaching observations point towards an altered perception and processing of social, and perhaps cute, cues in autism, that may appear very early in development (e.g., infancy, see Chita-Tegmark, 2016). The evidence hints at the possibility that cute-featured objects may trigger distinct socio-affective responses, depending on the participants' social skill levels. These responses could be discerned through patterns of visual attention and preference. We then may expect that autistic children exhibit distinct visual patterns when exploring cute stimuli (i.e., human babies and non-human animals) in comparison to their TD peers. Yet, the degree of dissimilarity from their TD peers may fluctuate, as indicated by existing literature, with the autism symptom severity levels, particularly within the domain of social skills. Thus, the current study aimed at examining the attention to stimuli with baby schema features (i.e., [human] babies and [non-human] animals) in autistic children with varying symptom severity (low-moderate versus high) compared to TD children. A novel eye-tracking paradigm was proposed: a brief visual exploration task including social stimuli with cute features (human babies, non-human animals) and without cute features (human adults), and inanimate non-social stimuli (neutral objects). Given the few and ambiguous findings regarding the precise age at which the cuteness response emerges, we expanded the scope of this new study to examine participants with ages between 1 and 6 years old. The study pursued a twofold goal.

First, we investigated the link between the visual patterns of cute stimuli and autism symptoms. We expected that the attentional bias towards cuteness-configured stimuli would vary across groups and depend on the autism symptom severity. Consequently, we assessed the percentage of looking time spent (i.e., *fixation percentage*) on the areas of interest (AOIs), a widely-used eye-tracking parameter (Chita-Tegmark, 2016). We hypothesized that only children with lower symptom severity and TD peers would allocate more time to cute social stimuli (animals, babies), compared to non-cute social stimuli (adults and/or neutral objects). We expected then that the visual attention bias towards cute stimuli is reduced in children with higher autistic symptoms compared to the other two groups. We also explored the engagement with the stimuli (i.e., *average fixation duration*) as well as the initial orientation (i.e., *time to first fixation*) on AOIs.

Second, we examined the link between the sensitivity to cuteness, further labeled as the baby sensitivity index (percentage of looking time spent on all “cute” stimuli versus all “non-cute” stimuli), and symptom severity in the two core domains described in the autism spectrum disorder (ASD) diagnosis (i.e., social affect and RRB). A second baby sensitivity index was calculated specifically on human stimuli (percentage of looking time spent on babies as “cute” humans versus adults as “non-cute” humans) and tested for links with the symptom severity in the social affect and RRB. We expected that increased attention towards cute over non-cute stimuli and babies over adults, respectively, is linked to social affect only.

Methods

Participants

Participants included in the current study are part of a longitudinal autism cohort, that started in 2012 (Geneva Autism Cohort), in which children are invited for assessments every six months for two years, described elsewhere (Franchini et al., 2017; Robain et al., 2020). Children on the autism spectrum were recruited through French and English-speaking parent

associations and clinical centers. TD peers were recruited through local announcements and word-of-mouth. Parents or legal guardians gave their written informed consent for participation. The study was approved by the local ethics committee.

Inclusion criterion for all participants was an age of 1 to 6 years. Moreover, the autistic children were required to satisfy DSM 5 criteria for autism spectrum disorder (ASD; American Psychiatric Association, 2013), and have their clinical diagnosis confirmed using the ADOS (Autism Diagnostic Observation Schedule-Generic; ADOS-G; Lord et al., 2000, Autism Diagnostic Observation schedule, second edition; ADOS-2; 2012; described in the section below). Finally, the TD children were screened for any developmental concerns, autism symptoms (see Table 1), and/or history of ASD in first-degree relatives.

A total of 164 children completed the eye-tracking task. Seventy children (42%) were excluded for attending each of the six frames presented during the visual exploration eye-tracking task for less than 50% of the exposition time. The threshold was chosen based on previous eye-tracking data preparation used in research with autistic toddlers (Pierce et al., 2011, 2016). To our knowledge, no compromise exists yet regarding a viewing time threshold in research on autistic children. The final sample retained for analyses included 63 autistic and 31 TD children.

Table 1

Participants' Socio-Demographic Characteristics and Scores (Mean and Standard Deviation) on Autism Symptoms, Adaptive Behavior and Cognitive Skills

	HS ASD	LMS ASD	TD
<i>N</i> total	23	40	31
Age (months)			
Mean (<i>SD</i>)	45.86 (9.93)	48.93 (12.24)	53.31 (16.73)
Age range	24-59	24-70	20-83

Gender ratio (male/female)	18/5	34/6	21/10
Parents' education			
Primary/Elementary school	1 (4.30%)	2 (5%)	0 (0%)
High school	6 (26.10%)	4 (10%)	3 (9.70%)
University	14 (60.90%)	34 (85%)	28 (90.32%)
NA	2 (8.70%)	0 (0%)	0 (0%)
Autistic symptoms (ADOS; Mean and <i>SD</i>)			
Total CSS	8.74 (0.69)	5.98 (0.95)	1.07 (0.26)
Total CSS Range	8-10	4-7	1-2
Social Affect CSS	7.43 (1.44)	4.70 (1.29)	1.07 (0.26)
RRB CSS	9.39 (1.44)	8.88 (1.24)	2.10 (1.86)
Adaptive behavior (VABS-II; Mean and <i>SD</i>)			
Adaptive Behavior	82.48 (12.39)	83.16 (10.10)	101.77 (9.76)
Communication	84.74 (19.29)	85.46 (12.36)	104.77 (10.18)
Daily Living Skills	84.52 (10.75)	86.76 (10.63)	99.46 (8.08)
Socialization	80.83 (9.41)	81.62 (10.10)	97.15 (8.95)
Motor Skills	88.96 (12.31)	89.43 (10.79)	104.24 (15.00)
Cognitive skills (MSEL)			
Total	74.65 (24.41)	77.59 (21.45)	115.81 (14.88)

Note. Missing data: in the LMS ASD group: VABS-II $N = 3$, MSEL $N = 1$; in the TD group: VABS-II $N = 5$, MSEL $N = 4$, ADOS $N = 1$. Abbreviations: RRB=Repetitive and restrictive behaviors, CSS = Calibrated severity score, HS = High severity autism spectrum disorder, LMS = Low-moderate severity autism spectrum disorder, TD = Typically developing, ADOS = Autism Diagnostic Observation schedule, VABS-II = Vineland Adaptive Behavior Schedule-second edition, MSEL = Mullen Scales of Early Learning, NA = no answer.

Based on the overall ADOS total calibrated severity score (CSS) and the CSS classification and cutoffs indicated in the ADOS-2 manual (Gotham et al., 2009; Hus et al., 2014; Lord et al., 2012), two ASD subgroups were distinguished within the autistic group. The first subgroup included participants with high severity autism symptoms (HS ASD; $N = 23$) who have obtained a total severity score ranging from 8 to 10. The second subgroup (i.e.,

participants having low to moderate autism symptoms; LMS ASD) included participants with scores indicating low (score ranges 3–4; $N = 5$), and moderate severity autism symptoms (score range 5–7; $N=35$). The two groups (HS ASD and LMS ASD) were significantly different only on the ADOS social affect CSS ($t(61) = 7.80, p < .001$). There were no other significant differences ($p > .05$) between the two ASD groups regarding measures of RRB CSS, adaptive behavior (Vineland Adaptive Behavior Schedule-second edition; VABS-II; Sparrow et al., 2005), nor cognitive skills (Mullen Scales of Early Learning; MSEL; Mullen, 1995) (See Table 1). The three groups (HS ASD, LMS ASD, and TD) did not significantly differ in gender ($\chi^2=3.01, p=.22$) or age ($F(2,94)=1.76, p = .18$).

For a description of participants' socio-demographic characteristics (age, gender, and parents' education level), and scores on autism symptoms, adaptive behavior, and cognitive skills, see Table 1. Following previous research (Wood de Wilde et al., 2023), we used the parents' educational level (highest educational level attained among the two parents) to depict the socio-economic background of our participants. The educational level of parents was summarized along three categories: elementary/primary school, high school, and university. Parents were also asked to provide information regarding their nationality(ies) and the language(s) spoken to the child at home. The present sample illustrates the multicultural diversity of the recruited participants: 34 different nationalities and 17 different spoken languages, which is representative of the geographic region in which the study took place (see Wood de Wilde et al., 2023). Among the 34 nationalities, 13 are European and the 21 left are African, North and South American, Asian, and Australian.

Measures

Autism Symptoms

The ADOS is a semi-structured assessment measuring the overall symptomatology levels and the presence of autism symptoms across two domains: social affect and RRB (Lord

et al., 2000, 2012). In general, social affect items refer to communication and reciprocal social interaction skills. RRB items refer, for example, to stereotyped/idiosyncratic use of words/phrases, unusual sensory interest, mannerisms, and excessive interest in specific topics. To facilitate the comparison of scores from ADOS-G and ADOS-2 versions, the raw scores were transformed into standardized CSS according to previously published procedures (Esler et al., 2015; Gotham et al., 2007, 2009; Hus et al., 2014). Three scores were obtained: an overall total CSS, the social affect CSS, and the RRB CSS. The CSS ranges on a 10-point scale. Based on the theoretical cutoffs and labels from ADOS-2 manual instructions (Lord et al., 2012), a quantitative assessment of autism symptom severity using the CSS classified participants' total scores as following: 1–2 as minimal to no evidence, 3–4 as low severity, 5–7 as moderate severity and 8–10 as high severity.

Adaptive Behavior

Children's adaptive behavior was assessed using the VABS- II (Sparrow et al., 2005), which is a semi-structured standardized parent report interview. Standardized scores were obtained for the following domains: Communication, Daily Living, Socialization Skills, and Motor Skills. An Adaptive Behavior composite score was calculated to obtain an over- all measure of adaptive functioning.

Cognitive Skills

Participants' developmental levels were measured using MSEL (Mullen, 1995). An early learning composite score ($M = 100$, $SD = 15$) was calculated based on four cognitive domains: fine motor, visual reception, receptive language, expressive language scales. The score provides a measure of general cognitive functioning.

Stimuli and Procedure

Our novel eye-tracking Visual Exploration Task (VET) and procedure were inspired by Sasson and colleagues (2008). First, 120 colored static stimuli (i.e., 15 human adults, 15

human babies, 30 animals, and 60 neutral objects) were selected using several sources. The human stimuli were a mix of faces and the upper body of people. Baby faces were selected from the freely available copyright protected *Children Affective Facial Expression* set (LoBue, 2014; LoBue & Thrasher, 2015). Adult faces were selected from the freely available copyright protected resource of *Chicago Faces Database* (Ma et al., 2015). All human stimuli were depicting neutral faces (to exclude any potential emotional attention biases). The animals (cats and dogs only) and neutral objects were retrieved from Google search engine. Age of animals was not controlled. The neutral objects were selected from domains that are not known to represent common circumscribed interest of individuals on the autism spectrum (i.e., these objects are referred to as low autism-interest stimuli such as furniture, bathroom and kitchen objects, office supplies, etc.; see Sasson et al., 2008). Second, to examine the emotional content of the stimuli (see Pool et al., 2016) for the study goal, forty-four adults aged 21–49 years (27 females, 15 males; $M_{\text{age}} = 29.19$, $SD_{\text{age}} = 9.37$) have rated the selected images in terms of cuteness and pleasantness, on a 5-point Likert scale (1= “not cute at all”/ “very unpleasant” and 5= “very cute”/ “very pleasant”) in an online survey. When comparing stimuli depicting *animals* to *human babies*, there were no significant differences in terms of cuteness, nor valence. *Animals* and *human babies* were rated significantly cuter and more pleasant than *adults* and *neutral objects* ($p < .001$). *Adults* were rated significantly cuter and more pleasant than *neutral objects* ($p < .001$). Therefore, the emotional content was found higher in stimuli depicting *babies* and *animals* compared to *adults* and *neutral objects*, as well as in stimuli depicting *adults* compared to *neutral objects* (see Table 2). All rated stimuli were retained for the task.

Table 2

Means (M) and Standard Deviations (SD) for the Cuteness and Pleasantness Ratings for Each Stimuli Category

Stimulus category	Cuteness Mean (SD)	Pleasantness Mean (SD)
Human adults	3.43 (0.29)	3.43 (0.29)
Human babies	3.76 (0.38)	3.40 (0.29)
Animals	3.74 (0.37)	4.12 (0.22)
Neutral objects	1.56 (0.29)	2.95 (0.38)

Next, the 120 stimuli were randomly distributed on six frames on a white background. Each frame contained 20 visual stimuli from the three different categories: ten neutral objects, five animals, and five humans (human adults in Condition 1 and human babies in Condition 2). Although stimuli originated from several sources, luminosity differences between stimuli were expected to have a low impact on attention given the simultaneous presentation of twenty stimuli on the screen. To control for perceptually driven attention biases, patterns on clothes were avoided and saturation was harmonized. Human gender (female, male), ethnicities, animal species (cats, dogs), the type of neutral objects, and the form of stimuli depicting beings (standing persons, face only) were balanced across frames.

Half of the frames (three out of a total of six) included human adult stimuli (condition 1), while the other half included human baby stimuli (condition 2) (see reconstruction of frames with freely available images in Fig. 1). To avoid biases and increase randomization, two versions of the VET were created (A and B). The second version (B) was built using the same 120 stimuli from version A and six new frames were built by obtaining new combinations of the stimuli. The stimuli ratio on each frame was maintained, but their positions on the frame and across the frames were changed.

Figure 1

The Visual Exploration Task



Note. The left image represents an example of a frame adults-animals- neutral (condition 1); The right image represents an example of a frame babies-animals-neutral (condition 2). This is a reconstruction with freely available images with no copyright restrictions, as the images used in the original task are partially copyright protected.

The six frames were presented randomly for 10 s each (the total duration of each 3-frame condition was 30 s). Each frame was preceded by a 500-millisecond fixation target. Overall, the VET lasted 63 s.

The task was implemented in Tobii Studio Software, version 3.2.3, and administered on a Tobii TX300 eye- tracker (Tobii, Sweden, www.tobii.com) with 23-inch display, 1920×1200 resolution (72 dpi), and a sampling rate of 300 Hz. Participants were positioned at approximately 60 cm from the screen. Raw data were filtered using the I-VT filter (default parameters, minimal fixation duration threshold set at 60 milliseconds) (Olsen, 2012). A nine-point calibration procedure was completed before showing the stimuli. To ensure a satisfactory eye gaze data collection, the calibration was performed in operator paced-mode. If any of the 9 calibration points was missed or showed error vectors, the calibration was repeated. The task was administered uniquely if all the calibration points were satisfactory (no

error vectors). In each of the two conditions, the stimuli were divided in three AOIs: humans, animals, and neutral objects.

Participants were randomly assigned to version A or B and instructed to freely look at the screen. For each participant, we collected the fixation percentage (calculated as the sum of fixation durations on a particular AOI divided by the total time of stimuli exposure, which was 30 s per each condition). Additionally, the average fixation duration and the time to the first fixation on the AOI were examined.

A Baby Sensitivity Index (BSI) was calculated as the difference between the fixation percentage on all cute stimuli (*babies, animals*) and the fixation percentage on all non- cute stimuli (*adults, neutral objects*). A high score indicated a preference towards cute stimuli and a low score indicated a preference towards non-cute stimuli. Second, a Human Baby Sensitivity Index (Human BSI) was calculated as the difference between the fixation percentage on *babies* and the fixation percentage on *adults*. A high score indicated a preference towards *babies* and a low score indicated a preference towards *adults*.

Data Analysis

First, to investigate the differences between groups related to each AOI from each condition, repeated measure MANOVAs and post-hoc t-test analyses were run in IBM Statistics version 26. Based on our hypotheses and study design, significant three-way interactions were expected to be driven by greater visual biases of the TD and LMS ASD groups towards cute stimuli within and between conditions, compared to the HS ASD group. The $3 \times 2 \times 3$ repeated measure MANOVAs were separately run on each of the eye- tracking parameters: fixation percentage, average fixation duration, and time to first fixation. Each MANOVA was conducted using a 3-level between-group variable (*group*: HS ASD, LMS ASD, and TD), a 2-level within-group variable (*Type of Frame*: Condition 1 - “Human Adult” and Condition 2 - “Human Baby”), and a 3-level within-group variable (*Stimuli*: humans,

animals, neutral objects). Wilks's lambda F -test statistics are further reported. The post-hoc independent samples t-tests looked into differences between groups on each stimulus type. The paired samples t-tests were run to identify differences within group on the following relevant comparisons: *adults* versus *babies* (between conditions), *adults* versus *animals* (condition 1), *adults* versus *neutral objects* (condition 1), *animals* versus *neutral objects* (condition 1), *babies* versus *animals* (condition 2), *babies* versus *neutral objects* (condition 2), *animals* versus *neutral objects* (condition 2). To control for false discovery rates (FDR) in multiple comparisons, we have applied Benjamini and Hochberg's procedure (1995) to control for the proportion of false discoveries using the MATLAB function *fdr_bh.m* (Groppe, 2015). The Benjamini and Hochberg's FDR correction procedure adjusted the p -value threshold at $p < .012$. The visual graphs were created in Graph Pad Prism, version 8.4.3. To examine the association between BSIs and symptom severity (social affect and RRB), two separated regression analyses were conducted and illustrated graphically using R Studio 1.4.1103.

Results

Fixation Percentage

The $3 \times 2 \times 3$ repeated measure MANOVA showed a significant three-way interaction ($F(4,180) = 3.68, p = .007$, partial $\eta^2 = .08$). The interaction remained significant when age was introduced as covariate ($F(4,178) = 3.34, p = .012$, partial $\eta^2 = .07$). A total of 39 comparisons (independent and paired samples t-tests) in which we expected differences were run.

Next, between-group post-hoc t-tests revealed that the HS ASD group spent significantly more time on *adults* (condition 1) than the LMS ASD group ($t(61) = 2.87, p = .006$), a result which remained significant after applying the Benjamini and Hochberg's correction procedure.

Within-group post-hoc t-tests showed that LMS ASD and TD groups spent more gaze time on stimuli depicting *babies* than those depicting *adults* ($t(39) = 2.51, p = .016$, respectively $t(30) = 2.12, p = .042$), whereas the HS ASD group spent more time on *adults* than *babies* ($t(22) = -2.31, p = .031$). However, after applying the Benjamini and Hochberg's correction procedure, none of these comparisons reached the significance threshold.

In condition 1, the TD group and the HS ASD group spent significantly more time on *adults* rather than *neutral* stimuli ($t(30) = 3.36, p = .002$, respectively, $t(22) = 4.35, p < .001$), which was not significant in the LMS ASD group ($t(39) = 1.98, p = .055$). However, the TD group and the LMS ASD spent significantly more time looking at *animals* rather than *neutral* stimuli ($t(30) = 3.80, p = .001$ and $t(39) = 3.45, p = .001$, respectively). The significant results were maintained after applying the Benjamini and Hochberg's corrected threshold. In the HS ASD, the initial result indicating that the group spent significantly more time on *animals* than *neutral* stimuli ($t(22) = 2.31, p = .031$) did not survive the corrected threshold.

In condition 2, the LMS ASD group spent significantly more time on *babies* and *animals* compared to *neutral* stimuli ($t(39) = 2.70, p = .010$, respectively, $t(39) = 2.68, p = .011$). The same pattern was found in the TD group ($t(30) = 4.64, p < .001$ and $t(30) = 3.72, p = .001$, respectively). These results were also maintained after applying the Benjamini and Hochberg's corrected threshold. Within-group differences were not reproduced in the HS ASD group ($t(22) = 0.88, p > .05$, and $t(22) = 1.39, p > .05$ respectively). See Fig. 2; Table 3.

Table 3

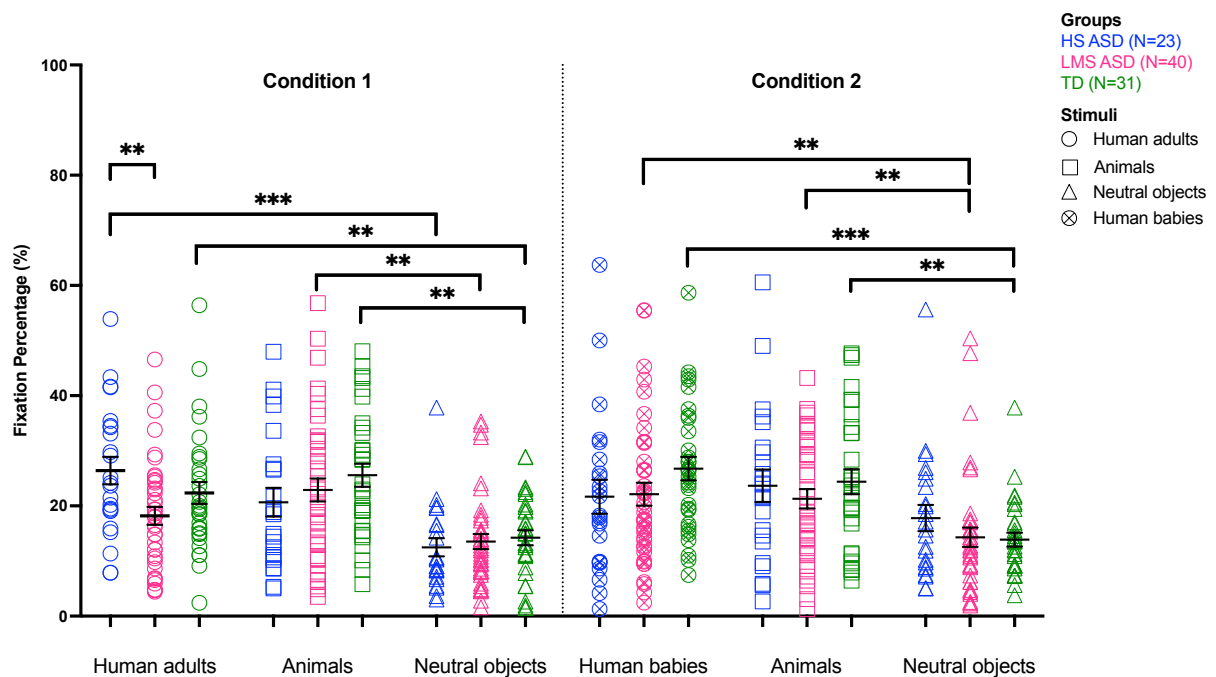
Means and Standard Deviations of the Fixation Percentage on Each AOI, in Each Condition, Across the Three Groups

	Groups		
	HS ASD	LMS ASD	TD
AOIs in Condition 1			
Human Adults	26.42 (11.98)	18.21 (10.30)	22.34 (11.03)
Animals	20.69 (12.43)	22.90 (13.14)	25.56 (11.65)
Neutral objects	12.49 (7.82)	13.54 (8.64)	14.22 (7.61)
AOIs in Condition 2			
Human Babies	21.67 (14.77)	22.13 (13.14)	26.77 (11.79)
Animals	23.66 (14.10)	21.30 (11.14)	24.39 (12.67)
Neutral objects	17.79 (11.42)	14.31 (11.07)	13.87 (6.96)

Note. AOI = area of interest.

Figure 2

Mean Scores of Fixation Percentage for Each Group, across Conditions and Stimuli



Note. Error bars represent standard errors. ** $p < .02$; *** $p < .001$.

Additionally, to better understand the role of age for this particular significant result, Pearson correlations were run to explore potential associations between age and fixation percentages on each of the AOIs, in each group. Therefore, 18 Pearson correlations were run, setting a Bonferroni corrected p -value threshold of .002. The only significant correlation was a negative weak association between age and fixation percentage on stimuli depicting babies in the HS ASD ($r = -.47, p = .025$), which did not survive the Bonferroni correction.

Average Fixation Duration

A $3 \times 2 \times 3$ repeated measure MANOVA showed no significant three-way interaction, $F(4,180) = 2.12, p = .081$, partial $\eta^2 = .05$.

Time to First Fixation

A $3 \times 2 \times 3$ repeated measure MANOVA showed no significant three-way interaction ($F(4,180) = 0.47, p = .76$, partial $\eta^2 = .01$), but only a significant main effect of the stimuli ($F(2,90) = 17.34, p < .001$, partial $\eta^2 = .28$). On average, across frames, the time to first fixation on stimuli depicting *humans* was shorter than compared to *animals* and *neutral objects*.

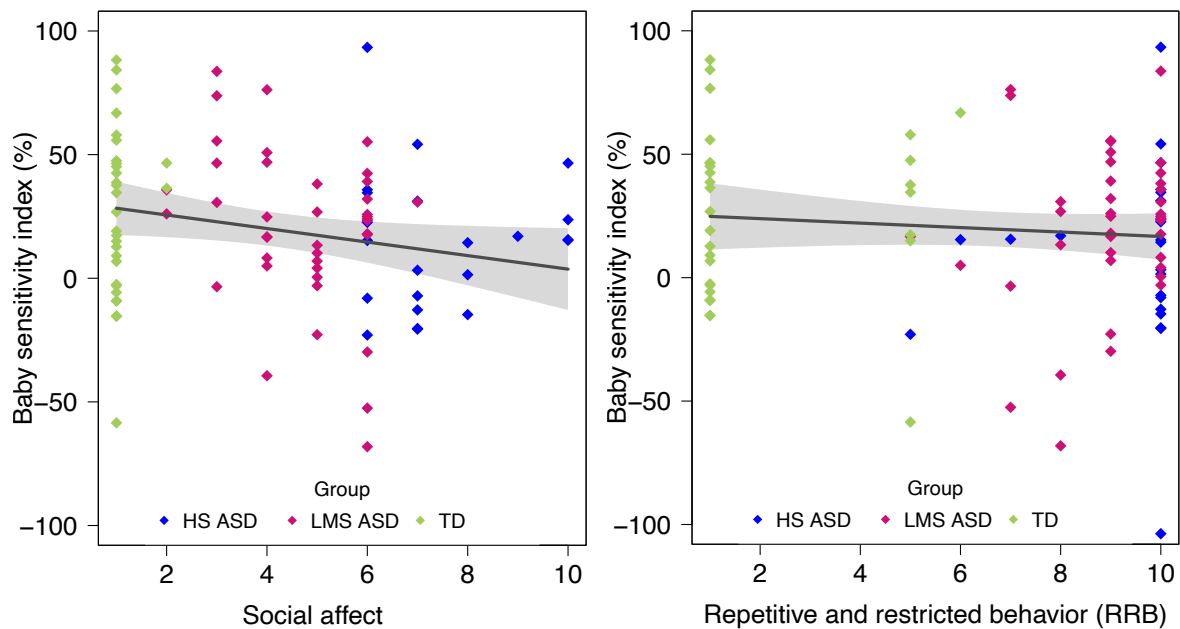
Baby Sensitivity Index

First, social affect significantly predicted the BSI in the entire sample: $B = -2.74, \beta = -.22, t(91) = -2.10, p = .04$. Social affect scores explained a small proportion of variance in BSI: adjusted $R^2 = .04$. When age was introduced in the regression model, the model was still significant ($p = .04$, adjusted $R^2 = .05$) and social affect remained the unique significant predictor: $B = -3.19, \beta = -.25, t(90) = -2.39, p = .02$. With the HS ASD group removed from the sample, social affect is no longer a significant predictor of BSI: $B = -2.95, \beta = -.19, t(68) = -1.56, p = .12$; adjusted $R^2 = .02$). With the TD group removed from the sample, the social affect is not anymore predicting the BSI ($B = -3.97, \beta = -.22, t(61) = -1.75, p = .09$; adjusted $R^2 = .03$) in autistic participants (HS and LMS ASD groups combined). RRB did not

significantly predict BSI: $B = -.91$, $\beta = -.10$, $t(91) = -0.92$, $p = .36$; adjusted $R^2 = -.002$). When the three groups were taken separately, a significant result was found only within the LMS ASD group in relationship with social affect ($p = .048$). See Fig. 3.

Figure 3

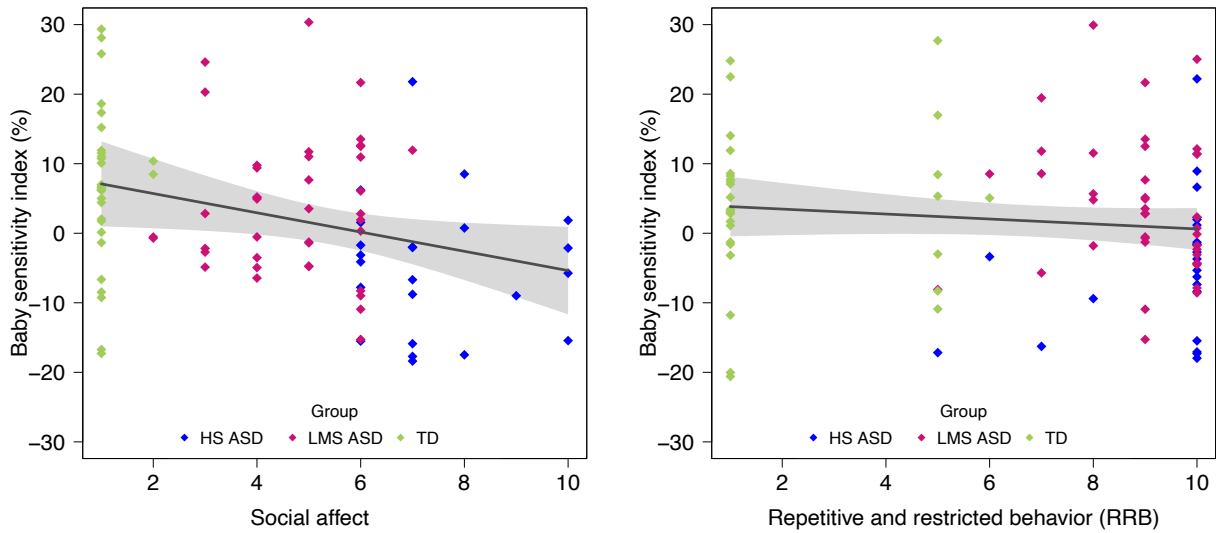
Correlations Between Overall Baby Sensitivity Index (cute versus non-cute stimuli) and Social Affect and Repetitive and Restricted Behavior Calibrated Severity Scores Based on the ADOS Across the Entire Sample ($N = 94$)



Note. X-axis origin = 1. While the groups are color-coded in the graph, the grouping variable was not included the regression model.

Figure 4

Correlations between human baby sensitivity index and social affect and repetitive and restricted behavior calibrated severity scores based on the ADOS across the entire sample (N=94)



Note. X-axis origin = 1. While the groups are color-coded in the graph, the grouping variable was not included the regression model.

Second, social affect significantly also predicted the human BSI in the entire sample: $B = -.97$, $\beta = -.24$, $t(91) = -2.32$, $p = .02$. Social affect scores explained a small proportion of variance in BSI: adjusted $R^2 = .05$. When age was introduced in the regression model, social affect remained the unique significant predictor: $B = -.94$, $\beta = -.23$, $t(90) = -2.19$, $p = .03$; adjusted $R^2 = .04$. With the HS ASD group removed from the sample, social affect is no longer a significant predictor of BSI ($B = .10$, $\beta = .2$, $t(68) = 0.17$, $p = .87$). With the TD group removed from the sample, the social affect remained a significant predictor of BSI ($B = -1.58$, $\beta = -.28$, $t(61) = -2.28$, $p = .03$; adjusted $R^2 = .06$) in autistic participants (HS and LMS ASD groups combined). RRB did not significantly predict BSI: $B = -.36$, $\beta = -.12$, $t(91) = -1.13$, $p = .26$; adjusted $R^2 = .003$. See Fig. 4. When the three groups were taken separately, no

significant results were found within each group ($p > .05$). As for the overall BSI, these changes occurring when one group is removed or when they are analyzed separately are likely because of the low variance (See Figs. 3 and 4 in this manuscript, and Fig. S4 in the supplementary material).

Discussion

The current study examined whether autism symptom severity in young children is associated with visual exploration of cute social stimuli using a novel eye-tracking task. The task triggered differential visual patterns in relation to the heterogeneity of ASD profiles, supporting the potential of eye-tracking to study autistic traits (Mastergeorge et al., 2021).

As expected, comparisons following the three-way significant interaction suggest that only children with lower autistic symptoms (LMS ASD) and typically developing (TD) children spent significantly more time on cute stimuli than neutral objects. LMS ASD and TD groups looked more at *animals* than at *neutral objects* (condition 1: *adults-animals-neutral*), and more at *babies* and *animals* than at *neutral objects* (condition 2: *babies-animals-neutral*). Although TD participants showed a substantial visual bias towards cute stimuli, they looked significantly more at *adults* than *neutral objects* in condition 1, similar to HS ASD group.

Next, no significant interactions were found regarding children's engagement with stimuli (average fixation duration), nor their initial fixations. All children oriented their initial fixations to stimuli depicting humans significantly faster than to the other stimuli. This result adds to the contradictory evidence about initial orientations in autism (Wang et al., 2020; Wilson et al., 2010). Given that differences in brain network specialization may occur with age (Johnson, 2014), longitudinal studies could examine whether groups gaps may latterly appear.

Finally, the findings indicate a significant correlation between baby sensitivity indexes and autism symptom severity in social affect, but not repetitive and restricted

behaviors: the more social difficulties children had, the less fixation percentage they allocated to *cute stimuli* compared to *non-cute stimuli*, and to *babies* compared to *adults*, respectively.

Overall, our results indicate that autistic symptoms account for the visual patterns toward cute stimuli. Consistent with previous studies (Franchini et al., 2017; Zagury-Orly et al., 2022), social visual exploration in autistic children seems related to symptom severity, particularly to social affect. Social difficulties thus impact not only the preference towards robots (Kumazaki et al., 2017) and face processing (Zagury-Orly et al., 2022) but also visual attention towards cute-featured stimuli. Reduced attraction to baby schema in children with higher autism symptom severity may be negatively linked to affiliative interactions, such as play (e.g., fewer shared experiences, atypical toy play, increased solitary play) and impact, consequently, their socio-emotional development (Elbeltagi et al., 2023; Golonka et al., 2023; Zaharia et al., 2022). Indeed, more social difficulties with peers are reported in children with high autistic levels (Sari et al., 2021). Furthermore, in contrast to previous findings (Grandgeorge et al., 2016), no significant preference for *animals* over *humans* was revealed in autistic children. Thus, it may be worthwhile to consider these findings for the design of agents used in interventions for autistic children (e.g., dolls, virtual agents, robots; e.g., Stallmann et al., 2022; Yao et al., 2022) and their implications for occupational, play, and animal-assisted therapies. Considering the unexpected lack of a significant preferential distinction between *adults* (non-cute) and *animals* (cute) in Condition 1 within both LMS ASD and TD groups, this finding contributes to the mixed results found in the literature. Descriptively, TD and LMS ASD groups show a higher fixation percentage on *animals* than *adults*, but the difference does not reach statistical significance. We posit that stimuli featuring *adults* serve as significant competitors to cute-featured stimuli, and their potential relevance to

participants lies in the depiction of caregiving figures that are crucial for one's survival and response to primary needs.

Given that relevance typically drives attention to baby faces (Brosch et al., 2007, 2008; Pool et al., 2016), these visual patterns may also be explained by group differences in the appraisal of cute stimuli. As alterations in the perception of relevant social targets (Chawarska et al., 2016) and in the appraisal of negative emotions (Sharma et al., 2014) may occur in autistic individuals, our findings suggest that autistic symptom levels could impact the appraised relevance. Considering that little is known about appraisal in atypical development and that children's emotional experience might differ from adult research (Walle & Özden, 2024), the present study may suggest that cute stimuli have lower relevance for the children in the HS ASD group. Eventually, our findings may be partially explained by alterations in social reward processing in autism, which are also expected to depend on the symptom severity (Bottini, 2018).

Furthermore, it has been claimed that the baby schema does not only induce the classical positive cuteness effect but also signals vulnerability and approachability (Sanefuji et al., 2007). This could induce an overarousal in certain autistic individuals, provoking personal distress and willingness to divert attention (Hadjikhani et al., 2014; Sane-fuji et al., 2007). Consequently, cute-featured stimuli may lead to avoidance, possibly explaining the decreased time spent on cute stimuli in the HS ASD group. Therefore, for individuals with severe autistic symptoms, cute objects may represent another set of positive stimuli triggering atypical visual patterns, altering valence perception and disrupting, in such, the pleasant emotional experience (Antezana et al., 2022; Jacques et al., 2022; Zaharia et al., 2021).

Limitations and Future Perspectives

Several limitations should be considered. First, the familiarity and previous exposure to the variety of cute-featured stimuli that children encounter throughout development (e.g.,

younger, or same-age siblings or peers, animals, dolls, cartoons; Damon et al., 2021; Saxton et al., 2020) may intertwine with social skills and attention. Although it is suggested that having siblings can increase the cuteness response in TD participants (Luo et al., 2015; Yao et al., 2022), a precise assessment of all the environmental elements potentially impacting their cuteness responses may be unattainable. Second, it is important to conduct such studies considering diverse cultural and socio-economic backgrounds in both autistic and TD groups (see Wood de Wilde et al., 2023). For instance, the “cute” culture (also known as “kawaii”) and anthropomorphism are widespread in Japan and being frequently exposed to them could lead to different visual preferences and patterns in the exploration of cute versus non-cute, and/or human versus non-human stimuli (Atherton et al., 2023). Next, although age was not found as a moderator in our analyses, future research should investigate these observations in age-matched groups to exclude any potential age-related variability in the gaze patterns (Dalrymple et al., 2018). Also, extending future research on cuteness in children above 6 years old, combined with their self-reported ratings, would help confirm the presence of a cuteness response and clarify the exact nature of differences between the groups. Moreover, the current study implemented a categorical approach to separate autistic participants into groups supported by ADOS-2 manual instructions and theoretical categorizations and the lack of density for some value ranges (see Fig. S4, supplementary material). Hence, the present data adds to the dimensional versus categorical debate around the nature of autism (Lefort-Besnard et al., 2020; Roberts et al., 2018). For instance, a recent brain study suggests the possibility of a reconciliation between these two approaches (Tang et al., 2020). For a more comprehensive understanding of heterogeneity, future studies should incorporate larger samples of autistic individuals. Another limitation is that the cuteness conceptualization used in this study is limited to only one facet of a multidimensional model (Doebel et al., 2022). Hence, the processing of other cute attributes (e.g., sounds, behavior; Golonka et al., 2023;

Kringelbach et al., 2016) in autistic children should be further investigated. Worthy to note, although evaluated as cute, the age of animals was not controlled in the current study. To better understand these results and the generalization of baby schema sensitivity across species, it would be recommended to test the visual exploration of human babies versus human adults while presenting the stimuli simultaneously, as well as of cute animals versus non-cute animals by manipulating their physical traits (see Borgi et al., 2014). Further, responses to baby schema may depend on the stimuli characteristics (i.e., static, dynamic, real-world) (Chevallier et al., 2015; Klin et al., 2002; Mouga et al., 2021), rendering generalizations difficult. For example, a tactile interface allowing interaction with stimuli (Lio et al., 2019) might increase the ecological relevance of the findings and the robustness of eye-tracking measures. Using multi-method approaches to examine simultaneously attentional processes and the subjective experience towards cute stimuli may provide additional insight. Finally, an important methodological limitation refers to the Tobii Studio software which provides only a qualitative visual verification of the calibration accuracy and precision. Using software providing a quantitative procedure to evaluate the eye-tracking metrics quality for each participant would improve the validity of the findings and conclusions (Dalrymple et al., 2018).

Conclusion

The current study provides evidence for an altered attentional bias toward baby schema in children with high autism severity and suggests that the decreased attention to cute stimuli may be related to social difficulties. These findings might help better understand the appraised relevance, social reward processing, and emotional experience during the exploration of cute stimuli across the autism spectrum. Variations linked to the symptom severity observed in the cuteness responses may have important implications in considering individualized approaches in therapies or in the design of interactive agents used in

interventions for autistic children. Future studies should examine the extent to which the emotional reward learning of baby schema (Kinard et al., 2020; Stussi et al., 2018) and the sensitivity to other cute features (Golonka et al., 2023) are affected in autism. Finally, it is worthy to examine how baby schema sensitivity concretely contributes to the unfolding of social interactions and prosocial behavior across development.

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Data Availability: The datasets analyzed during the current study are available in the Open Science Framework repository, DOI <https://doi.org/10.17605/OSF.IO/CA8VU>

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3.2 Study 2²

Proof of concept: A brief psycho-educational training program to increase the use of positive emotion regulation strategies in individuals with autism spectrum disorder

² Reprint of the article: Zaharia, A., Noir-Kahlo, K., Bressoud, N., Sander, D., Dukes, D., & Samson, A. (2021). Proof of concept: A brief psycho-educational training program to increase the use of positive emotion regulation strategies in individuals with autism spectrum disorder. *Frontiers in Psychology*, 12, Article 705937, 1-12. doi:[10.3389/fpsyg.2021.705937](https://doi.org/10.3389/fpsyg.2021.705937)

Abstract

Attenuated positive emotions and difficulties in regulating emotions are frequently observed in individuals with autism spectrum disorders (ASD) and are linked to increased risk of affective disorders, problematic behaviors, and impaired socio-emotional functioning. As such, interventions specifically focused on positive emotion regulation (ER) skills could be very valuable for individuals with ASD, their caregivers, and therapists. However, the field of positive ER in ASD is under-researched. The present study aimed at testing the practical potential and the preliminary effects of a brief novel psycho-educational training program on positive ER for individuals with ASD. Thirty male participants with ASD (aged 10–35 years; $N_{\text{training}} = 14$, $N_{\text{waitlist}} = 16$) underwent a three-session program on the use of adaptive positive ER strategies (i.e., attentional deployment, cognitive change, and response modulation). Participants rated the program as easy to understand, interesting, pleasant, and likable. No dropouts or adverse effects were observed. The training group showed a significant increase in the self-reported use of the ER strategies compared to the waitlist group. The increase in the use of ER strategies maintained up to 7 weeks in the overall sample. Having reached high satisfaction rates and the intended effects in this proof of concept study, this novel program represents a promising tool to support ER. Future research should next investigate the efficacy of the intervention on day-to-day emotional experience and wellbeing.

Keywords: autism spectrum disorder, psycho-educational intervention, positive emotion regulation, emotion regulation strategies, behavioral intervention

Clinical Trial Registration: ClinicalTrials.gov # NCT02898298

Introduction

Emotion-related difficulties, such as affective disorders (anxiety and depression) and problematic behaviors (tantrums and aggression), are highly prevalent in individuals with autism spectrum disorder (ASD) and persist across the life span (Gotham et al., 2015; Mikita et al., 2015; Patel et al., 2017; Hollocks et al., 2018; Hudson et al., 2019). These difficulties, identified as markers of emotion regulation impairments (Mazefsky et al., 2013; Richey et al., 2015; Berkovits et al., 2017), are linked to maladaptive behavior, negative mental health outcomes, and impaired socio-emotional functioning in individuals with ASD, affecting not only school inclusion and transition into professional life (Ashburner et al., 2010; Fage, 2015; Marsh et al., 2017) but also their own and their families' quality of life (Mazefsky and White, 2014; Samson et al., 2014b; Hurd, 2017; Cai et al., 2018; Nuske et al., 2018). Emotion regulation (ER) can be defined as the attempt to influence which emotions one has, when one has them and how one experiences and expresses them (Gross, 1998). ER plays a key role in socio-emotional development, and the few interventions designed to strengthen this skill have been beneficial for individuals with ASD (Reyes et al., 2019; Sandbank et al., 2020). Inspired by an apparent increasing awareness among researchers and clinicians regarding the need to attenuate ER impairments in individuals with ASD and the few but beneficial interventions, this study describes the development and the first evidence of a training program to increase adaptive positive ER strategies, i.e., strategies that aim at upregulating positive emotions.

Research studies and interventions mainly focus on downregulating negative emotions and much less on upregulating positive emotions. However, researchers have begun to recognize the benefits of positive ER, such as alleviating the undesirable effects of negative emotions, broadening the repertoire of resources, promoting resilience, and contributing to wellbeing (Fredrickson, 2004; Gross et al., 2006; Tugade and Fredrickson, 2007; Livingstone and Srivastava, 2012; Carl et al., 2013; Hechtman et al., 2013). Although a nascent field,

several positive ER interventions have shown favorable outcomes in clinical (depression and anxiety) and non-clinical populations (Hechtman et al., 2013; Weytens et al., 2014; Fussner et al., 2015; Quoidbach et al., 2015; Taylor et al., 2016). Certain ER strategies have been found to support positive ER (Langston, 1994; Bryant, 2003; Gable et al., 2004; Quoidbach et al., 2010, 2015). First, attentional deployment strategies (e.g., immersion in the present moment, savoring, and vivid visualization of pleasant activities) seem to be efficient in increasing positive emotions and life satisfaction. Second, cognitive change strategies (e.g., positive appraising of events and looking at the bright side of an event by minimizing its negative effects) were highly efficient in inducing or increasing the intensity of positive emotions. Finally, response modulation strategies (e.g., smiling, laughing, and capitalizing – sharing with others) have also had encouraging outcomes. Response modulation strategies occur after the activation of the emotional response and directly impact the physiological, behavioral, or experiential component of the emotion (for a review, see Quoidbach et al., 2015).

In addition, humor can also be used as a distinct strategy to regulate emotions (Samson and Gross, 2012; Horn et al., 2018; Perchtold et al., 2019), either as a way of distracting oneself from negative emotions (i.e., an attentional deployment strategy; Strick et al., 2009), or as a way to reappraise events (i.e., as a cognitive change strategy; Samson et al., 2014a; Kugler and Kuhbandner, 2015). Therefore, humor can be considered a multifaceted adaptive strategy to regulate emotions, sharing characteristics with different ER strategy categories. In the current paper, however, the use of humor is referred to as a separate strategy meant to attain positive ER goals.

Using various methodologies, cognitive reappraisal (a cognitive change strategy aiming at reinterpreting the meaning of an emotional situation in order to change the subsequent emotion) and expressive suppression (a response modulation strategy aiming at not displaying any emotional response) are the most studied ER strategies in ASD. The use of

cognitive reappraisal is linked to long-term beneficial outcomes, whereas the frequent use of expression suppression is linked to long-term detrimental outcomes including higher levels of distress or depression (Gross and John, 2003; Aldao et al., 2010; Schäfer et al., 2017).

Individuals with ASD seem to use cognitive reappraisal less spontaneously and with reduced efficacy than typically developing individuals (Samson et al., 2012, 2015b,c). Some studies show a more frequent use of expressive suppression in ASD (Samson et al., 2012, 2015c), while others show similar levels compared to typically developing participants (Samson et al., 2015a,b).

Only a few studies have explored positive emotions in ASD, reporting that the experience and expression of positive emotions in individuals with ASD is attenuated (Dawson et al., 1990; Jaedicke et al., 1994; Hirschler-Guttenberg et al., 2015) and might even be linked to symptom severity (Macari et al., 2018). Parent reports have indicated that children with ASD experience less amusement than their typically developing peers (Samson et al., 2015c). However, adult participants with ASD reported similar levels of positive emotions compared to typically developing participants (Samson et al., 2012). Authors assumed that this unanticipated result was due to the use of emotion- related questions that were context free (and not only limited to social contexts, in which comparatively lower levels of positive emotions could be expected in ASD). To our knowledge, only one study has investigated both the experience of positive emotions and ER in youth with ASD (Samson et al., 2015c). Therefore, any conclusions about the link between these two concepts are still hard to be drawn.

These inconsistent findings on ER strategies and positive emotions may be explained not only by individual differences in the general ASD population, but also by methodological differences between studies including the differences between self and caregivers' reports (Cai et al., 2018). The difficulty to reliably report the emotional experience and expression of

individuals with ASD might partially be related to the reduced emotional coherence (i.e., coordinated changes across emotional response systems: subjective experience, expression, and physiology) found in individuals with ASD in experimental paradigms inducing negative emotions (Costa et al., 2017). Emotional response incoherence in ASD is also observable in the context of positive emotions, or more explicitly, in relation to amusement and laughter toward humorous stimuli (Weiss et al., 2013). Several other studies support the idea of the presence of emotional incoherence in ASD. It has been shown that individuals with ASD tend to have flat affect (Yirmiya et al., 1989) and portray reduced facial expressivity of emotions (Owada et al., 2018), which may at times be perceived as unusual (Grossman et al., 2013; Faso et al., 2014), or as less context-appropriate (Begeer, 2005; Weiss et al., 2013; Costa et al., 2017). Given these rather atypical characteristics, individuals with ASD may benefit from interventions focused on positive ER strategies (e.g., response modulation), helping them enrich their emotional experience (Cai et al., 2018), and engage in and savor positive activities (Carl et al., 2013; Bower, 2015; Taylor et al., 2016).

Interventions incorporating an ER component, such as mindfulness, cognitive behavioral therapy, and dialectic behavioral therapy, have been shown to be beneficial to individuals with ASD, but mostly in young children (Scarpa and Reyes, 2011; Weston et al., 2016; e.g., Conner et al., 2019; Factor et al., 2019; Hartmann et al., 2019; Rispoli et al., 2019). Primarily oriented to reduce negative emotions (e.g., anxiety and anger), these programs implicitly employ strategies linked to attentional deployment and cognitive change (Moyal et al., 2014). Yet, to our knowledge, positive ER tools have not been tested in individuals with ASD.

The goal of the current proof of concept study was to develop a psycho-educational program to explicitly train adaptive positive ER strategies in individuals with ASD and provide the first data testing its practical potential and efficacy. The three-session multimedia

program sought to broaden the ER repertoire with a particular focus on positive emotions. Three main adaptive ER strategies were targeted as: attentional deployment, cognitive change, and response modulation. Additionally, the training briefly presented humor as an ER strategy. Our first goal was to test acceptability of the program: Participants' satisfaction with the program was assessed after each session, and dropouts and aversive events were reported throughout the sessions as indicators of acceptability of the training program. Second, we examined the preliminary effects of the program on the subsequent use of ER strategies: We expected increased self-reported use of the three main strategies post-training and hypothesized that this increase would maintain over time. We have also examined exploratorily the effect of the program on the use of humor as an ER strategy.

Material and methods

Participants

Thirty French-speaking male participants with ASD took part in the study ($N_{\text{training}} = 14$; $N_{\text{waitlist}} = 16$) without compensation. Groups did not differ significantly in age, socioeconomic status (i.e., the average of parents' income and education level), participants' educational background, or enrollment in therapies, nor on parent-reported symptom severity (Social Responsive Scale-2, SRS-2; Constantino and Gruber, 2012) or autistic traits (Autism Spectrum Quotient Short; AQ-short; Hoekstra et al., 2011, Bastien (n.d.), unpublished). Participants were either enrolled in school ($N = 18$), apprenticeship programs ($N = 8$), and university ($N = 2$) or were in a transition period after finishing school ($N = 2$). See Table 1 for more details.

Table 1*Sample Characteristics*

	Training group (N = 14)	Waitlist group (N = 16)	
	M (SD)	M (SD)	Statistics
Age (years)	17.79 (6.52)	18.44 (6.37)	$t(28) = -0.28, ns.$
SRS-2 (T-score)	74.14 (10.20)	78.31 (7.37)	$t(28) = -1.30, ns.$
AQ-Short (Total Score)	78.79 (11.64)	82.75 (6.22)	$t(28) = -1.18, ns.$
Parents' education level ^a	3.32 (0.61)	3.02 (0.88)	$t(28) = 1.03, ns.$
Parents' income level (CHF) ^b	5.38 (1.66)	5.29 (2.13)	$t(25) = 0.13, ns.$
Participants' educational background (N)^c			
General/Special	7/7	8/8	$\chi^2(1,30) = 0, ns.$
Therapy (N)^d			
Yes/No	10/4	10/6	$\chi^2(1,30) = 0.27, ns.$
Assistance during intervention (N)			
Experimenter/Alone	10/4	13/3	$\chi^2(1,30) = 0.40, ns.$

^aAnswers choices ranged from 1 = compulsory education to 4 = university.

^bData available for 27 participants ($N_{\text{training}} = 13$; $N_{\text{waitlist}} = 14$). Three parents chose to not answer the question. Answers choices ranged from 1 = less than 15000CHF to 10 = more than 240000CHF.

^cGiven the variability of practices across participants and country regions, special education represents here the number of participants who have had one of the following interventions at any time during their education: special education classroom, special education teacher or aide, adapted curriculum or program, reduced number of students in classroom, or inclusive classroom.

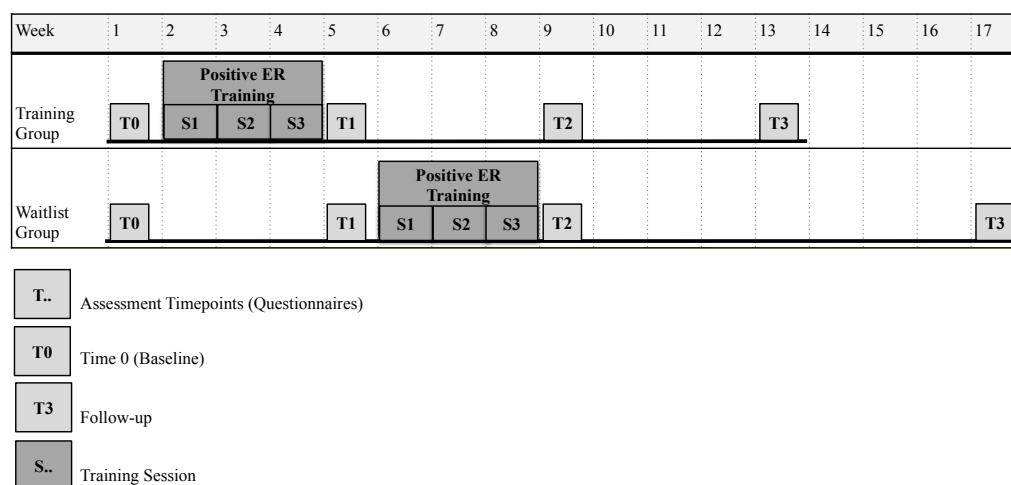
^dThe types of therapy that participants were following at the moment of the intervention include one or more of the following types: occupational therapy, speech therapy, psychological or psychiatric counseling or psychotherapy, or/and psychomotor education. One participant completed the self-reported forms.

Procedure

Participants and, when available, parents were interviewed and participants were screened for inclusion criteria, such as comprehension of verbal instructions, ASD diagnosis established by a qualified healthcare provider, and confirmation of ASD symptomatology (SRS-2 and AQ-short). Twenty-eight participants fell within the clinical range on both scales, the two other participants on one. Using a waitlist control group design, participants were quasi-randomly attributed to either a training group or waitlist group, depending on their time schedule availability. Written informed consent was obtained by participants aged 18 or above and by the parents for participants aged below 18 years old or under guardianship. The study was approved by the local ethics committee. The three interactive sessions of 45min each were presented on a computer and administered individually. After each session, participants reported their satisfaction with training and received handouts with examples of exercises that they had tried during training and could also be practiced at home. Participants completed the self-report questionnaires (at four time points; see Figure 1): The training group completed the questionnaires at 7 days before training, and at 7, 35, and 63 days after training; the waitlist group completed the questionnaires at 35 and 7 days before training, and at 7 days and 63 days after training. As shown in Figure 1, the training group started the three-session intervention the following week after their first self-report questionnaire assessment (right after T0), and the waitlist group started it the following week after the second self-report questionnaire assessment (after T1). The training sessions were completed with experimenters' assistance only (face-to-face or online) or alone, at home or in our laboratory, depending on each participant's preference, geographical location, and/or their availabilities. The waitlist group received the intervention after the second self-report assessment (see Figure 1). The study was conducted between 2016 and 2018, before the sanitary restrictions imposed by the coronavirus (COVID-19) pandemic.

Figure 1

Study Timeline of Training Sessions and Questionnaires Administered over the Weeks



Material

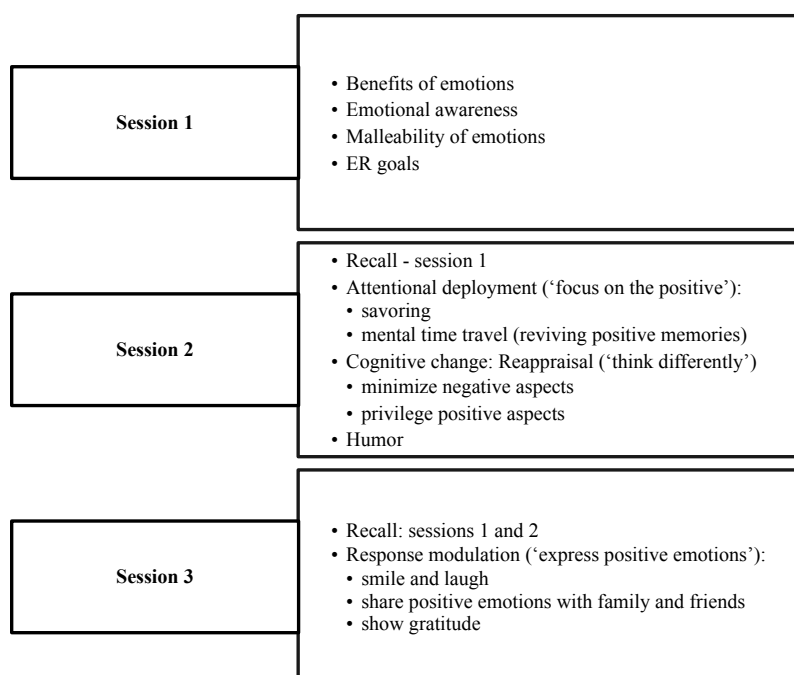
Psycho-Educational Training Program

The training program included a child and an adult version that contained appropriate examples for each developmental age range.

Content. During the first session, participants learned about emotional awareness, malleability of emotions, and ER goals, such as trying to regulate emotions that are unpleasant and unhelpful in a particular context. They learned how emotions emerge, what triggers them, and about their functions and benefits. The second session focused on attentional deployment (referred to as “focus on the positive”) and on cognitive change strategies (oriented on cognitive reappraisal – “think differently”), as well as on humor. The third session discussed response modulation strategies (“express positive emotions”). The different techniques used for each strategy are shown in Figure 2.

Figure 2

Session Content of the Positive Emotion Regulation Training Program



Structure. Each session included theoretical background material, examples, and practical exercises. To facilitate comprehension and render the training interactive, the sessions contained text, images, and animated cartoons created using the online platforms (Moovly - Animation Maker, 2017) and GoAnimate for Schools (Stratton et al., 2014). Examples representing concrete applications of ER in relevant daily life situations (e.g., at school/workplace, with family, or friends) were also shown. Practical exercises included elaborating on participants' own emotional experiences. For example, they were asked to report situations eliciting positive emotions, or to recall positive memories, and were invited to implement ER strategies retrospectively.

Acceptability Measures

After each session, participants were asked to provide feedback about the training program. They evaluated how difficult, interesting, pleasant, and likable the session was.

Participants also evaluated the novelty of the exercises, i.e., how often they practice such exercises, as the ones presented in the session, in their daily life. The Likert scale ranged from 1 = “not at all” to 5 = “very much.” Dropouts and adverse events were recorded.

Efficacy Measures of ER Strategy Use

Different self-reported subscales were used to assess the use of the three main *ER Strategies*: the Attentional Deployment subscale (six items, $\alpha = 0.89$) of the Attentional deployment/ Suppression Questionnaire (e.g., “When I want to feel less negative emotion, I fantasize about doing activities that I really enjoy.”; Barros, 2005); the Cognitive Reappraisal subscale (six items, $\alpha = 0.74$) of the Emotion Regulation Questionnaire (e.g., “When I want to feel more positive emotions, I change the way I’m thinking about the situation.”; Gross and John, 2003; Gosling et al., 2018); and the Response Modulation subscale (six items; $\alpha = 0.49$) which includes two items from the Berkeley Expressivity Questionnaire (Gross and John, 1997), two from the Emotional Expressiveness Questionnaire (King and Emmons, 1990), and two new items specifically assessing positive response modulation (e.g., “Whenever I feel positive emotions, people can easily see what I am feeling”). Regarding the exploratory hypothesis, *Humor* was assessed with four new items ($\alpha = 0.51$; e.g., “When I go through negative or unpleasant events, I try to find something funny about the situation to feel better”). The Likert scale used for the responses ranged from 1 = “not at all true” to 5 = “definitely true.” Given the low Cronbach’s α values at T0 and the higher values obtained at T1 ($\alpha > 0.61$), Response Modulation and Humor should be considered with caution.

Data Analysis

Repeated measure MANOVAs, chi-squared, and *t*-tests were run in IBM SPSS Statistics version 26. Multilevel modeling follow-up analyses and standardized coefficients were run in R software, version 3.6 (R Core Team, 2017), using *lmer4*, *lmerTest*, and *parameters* packages (Bates et al., 2014; Kuznetsova et al., 2017; Lüdtke et al., 2020).

Results

Acceptability Indicators

Descriptively, participants rated the training as below scale average on Difficulty ($M = 2.26$, $SD = 0.99$) and Novelty ($M = 2.06$, $SD = 0.98$) and above average for Interest ($M = 3.54$, $SD = 0.83$), Pleasantness ($M = 3.36$, $SD = 0.99$), and Likability ($M = 3.46$, $SD = 1.02$).

Repeated measures ANOVAs run for each question showed no effect of session or group. No dropout nor adverse events were observed during the sessions.

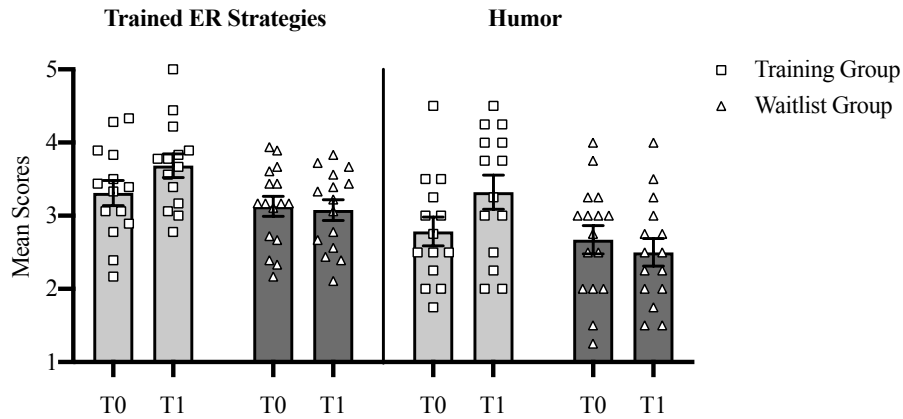
ER Strategy Use

Training Group vs. Waitlist Group (T0 and T1)

First, we expected an interaction effect reflecting increases on the efficacy scores only in the training group. Self-reports for both time points were available for 29 participants ($N_{\text{training}} = 14$; $N_{\text{waitlist}} = 15$). Two separate $2 \times 2 \times 3$ MANOVA with two within-subject factors (strategy and time point T0-T1) and one between-subject factor (group) revealed a significant interaction Time point $\times$ Group for the main ER strategies ($F(1,27) = 4.31$, $p = 0.048$, $\eta^2_p = 0.14$) and humor ($F(1,27) = 6.61$, $p = 0.016$, $\eta^2_p = 0.20$). *Post-hoc* between-group analyses showed that the training group reported a more frequent use of the main ER strategies ($M_{\text{training}} = 3.68$, $SD = 0.60$; $M_{\text{waitlist}} = 3.08$, $SD = 0.55$, $t(27) = 2.83$, $p = 0.009$, $d = 1.04$) and humor ($M_{\text{training}} = 3.32$, $SD = 0.87$; $M_{\text{waitlist}} = 2.50$, $SD = 0.73$, $t(27) = 2.76$, $p = 0.01$, $d = 1.02$) than the waitlist group at T1. *Post-hoc* within-group analyses showed that, in the training group, the increase in the use of the three main strategies from T0 to T1 was only marginally significant ($M_{T0} = 3.31$, $SD_{T0} = 0.64$, $M_{T1} = 3.68$, $SD_{T1} = 0.60$, $t(13) = -1.89$, $p = 0.08$, $d = 0.60$), whereas the increase in the use of humor was significant ($M_{T0} = 2.79$, $SD_{T0} = 0.74$, $M_{T1} = 3.32$, $SD_{T1} = 0.87$, $t(13) = -3.05$, $p = 0.009$, $d = 0.66$). See Figure 3.

Figure 3

Mean Scores of Self-Reported Use of Main ER Strategies and Humor in Training versus Waitlist Group



Note. Error bars represent standard errors.

Entire Sample – Pre- vs. Post-training

Next, we expected an increase in the efficacy scores in the entire sample from pre- (combined T0_{training} and T1_{waitlist}) to post-training scores (combined T1_{training} and T2_{waitlist}). Self-reports for both time points were available for 28 participants ($N_{\text{training}} = 14$; $N_{\text{waitlist}} = 14$). The two separate MANOVAs showed a significant main effect of time point (pre- and post-training) on the main ER strategies ($F(1,26) = 8.51, p = 0.007, \eta^2_p = 0.25$; Figure 4) and humor ($F(1,26) = 8.21, p = 0.008, \eta^2_p = 0.24$; Figure 5), indicating an overall increase from pre- (7 days before) to post-training (7 days after).

Figure 4

Positive ER Training Effects over Time on Use of Main ER Strategies for all the Available Time Points of the Entire Sample

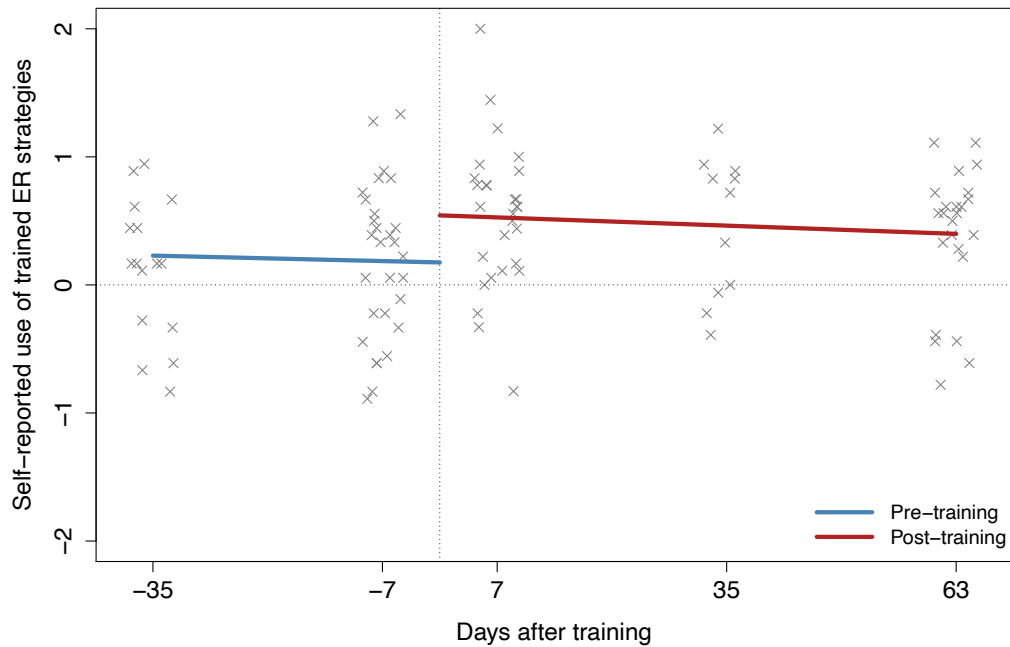
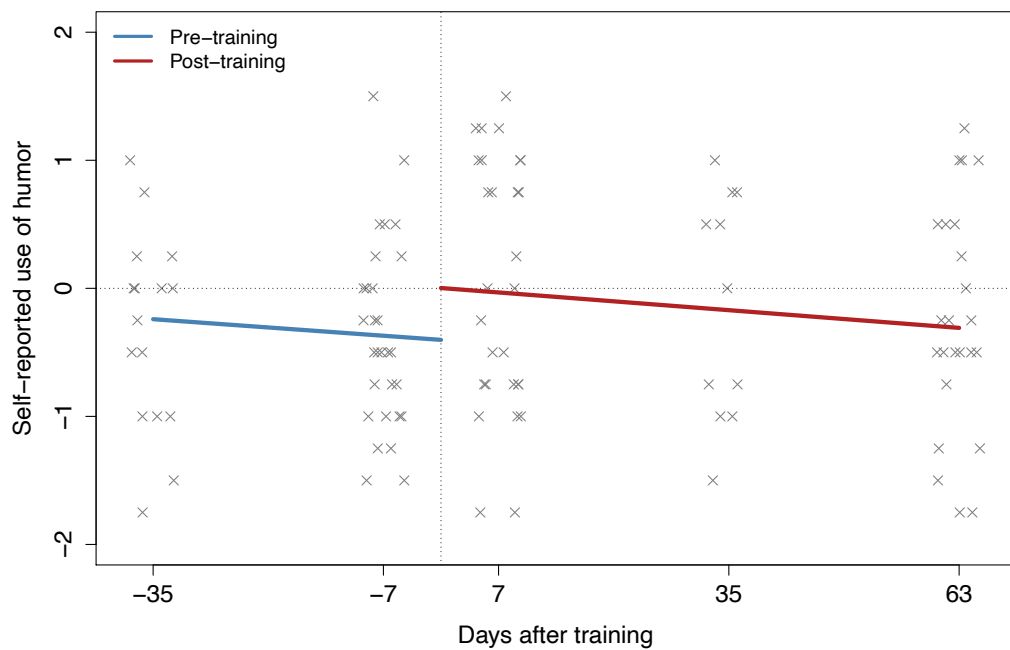


Figure 5

Positive ER Training Effects over Time on Use of Humor for all the Available Time Points of the Entire Sample



Multilevel Analyses – The Intervention Effect Over Time

Finally, we hypothesized that intervention effects would persist over time. Based on the overfit evaluation (Akaike information criterion), a multilevel linear model (MLM) including time (i.e., the intervention effect) as a two-level categorical variable (i.e., first level, pre-training, including combined data from 35 and 7 days before training; second level, post-training, including combined data from 7, 35, and 63 days after training) with a main effect of continuous time (two parallel slopes) was retained. The analyses included all available participants' time points ($N = 108$). The results showed a main effect of the intervention on the use of the main ER strategies ($F(1,40.65) = 10.17, p = 0.003, \beta_z = 0.65$; Figure 4). Comparison analyses indicated a significant increase at 7 days ($p = 0.004, \beta_z = 0.59$; confirming the previous MANOVAs' results) and 35 days ($p = 0.021, \beta_z = 0.51$) after training, and a marginally significant increase 63 days later ($p = 0.068, \beta_z = 0.37$) compared to 7 days before training. A total of 77% of participants (23 out of 30) reported an increase in the use of the main ER strategies post-training. The intervention effect was also significant for humor: $F(1,78.93) = 6.08, p = 0.015, \beta_z = 0.51$ (Figure 5). The only significant increase in the use of humor was found 7 days after training ($p = 0.017, \beta_z = 0.44$). Both analyses showed a main effect of continuous time at pre- and post-intervention on the main ER strategies: $F(1,48.86) = 5.15, p = 0.003, \beta_z = -0.12$ and humor: $F(1,80.15) = 4.01, p = 0.049, \beta_z = -0.19$, which could be due to differences in the sample size (35 vs. 7 days before intervention). The results did not change when age was introduced as a covariate.

Discussion

Main Findings

Acceptability

Overall, the program has received high evaluations and was proven to be adequate in terms of acceptability. Participants mainly rated the program as easy to understand,

interesting, pleasant, and likable. On average, participants indicated that they do not usually use these strategies in their daily lives. The novelty of the information presented during the training program might have contributed to the interest that participants have reported throughout the sessions and might explain the full adherence to the program. As no dropouts or adverse effects were observed during sessions, this brief program has proven to have exemplary attrition and safety rates. Although these observations could probably be explained by the brevity of the intervention, they nonetheless encourage further use of such training programs with individuals with ASD.

ER Strategy Use

The current study revealed promising effects of using this psycho-educational training program on positive ER in individuals with ASD. As expected, participants used the three main ER strategy types (attentional deployment, cognitive change, and response modulation) more frequently post-training. This result was confirmed in a larger sample with both groups pooled together when we measured the changes immediately before and after the intervention. Importantly, despite the brevity of the program, the observed effects on the use of the main ER strategies were maintained until at least 7 weeks later. Our findings indicate that individuals with ASD are able to learn new strategies promoting positive emotions. This suggests that they can benefit from interventions targeting the improvement of positive ER skills.

An exploratory analysis also revealed an increase in the self-reported use of humor as an adaptive ER strategy. While this may be interesting, this result should be considered with caution given the unstable Cronbach's alpha of the humor scale which shows low reliability at T0 and high reliability at T1. The change in scale reliability (T0 vs. T1) could be explained by various factors often observed in educational research: the sample homogeneity at T0, the intervention effects (changes between measurements), or the measurement process (activation

of new insights about the question; e.g., Taber, 2018). Future research should assess the use of humor as an ER strategy using more reliable scales.

Limitations and Future Perspectives

First, several methodological limitations are worthy of note. One limitation is the relatively small sample size. Yet, although for a proof of concept study, a small sample is appropriate, the intervention should be more rigorously tested in larger samples in order to see whether these initial findings generalize as well as in order to increase the statistical power in the analyses. However, importantly, the effect sizes of the cross-sectional analyses, as well as the standardized coefficients of the MLM analyses (β_z), indicate medium to strong effects of the intervention on the use of the main positive ER strategies and humor. Another methodological limitation is the waitlist control group design. Certain researchers recommend the use of “stronger” designs (e.g., active control groups) which can limit the potential participants’ expectation biases and control for non-specific intervention effects (see Kinser and Robins, 2013). However, a waitlist control group design has important advantages: It is more cost-effective, especially in the first phases of testing a new intervention program, and it is more suitable for ethical considerations, as all participants can eventually benefit from the intervention (see Moore and Ledbetter, 2020). Finally, although the researchers ensured that the subscales contain items easy to understand at all ages, these measures, taken together, should be further validated in young samples and in samples with ASD. For instance, only the Cognitive Reappraisal scale has already been validated in a typically developing child and adolescent population within an age range from 8 to 16 years old (Gosling et al., 2018), whereas the Berkeley Expressivity Questionnaire and the Emotional Expressiveness Questionnaire have been used with children of 14 years of age and older (e.g., Doostian et al., 2015; Akkuş Çutuk, 2021). Overall, the present participants did not report difficulties in understanding the content of the self-reported measures, but they did sometimes report a

certain lack of motivation toward the completion of the questionnaire and its repetitiveness over the four time points.

A second limitation is that ASD diagnosis was not confirmed using the gold standards (e.g., ADOS-2; Lord et al., 2012) and neither cognitive skills nor adaptive functioning were objectively assessed. Nonetheless, we believe that our program was proven to be suitable for verbally fluent individuals with ASD, whereas assistive technologies (e.g., smartwatch; Torrado et al., 2017) may be more appropriate for minimally verbal individuals with ASD.

Third, gender and age differences may be important. Extending this research to females could improve understanding of ER in individuals with ASD (Trubanova et al., 2014; Cai et al., 2018). Not only is ASD under-identified in females (Rynkiewicz et al., 2016), but it has also been suggested that emotion dysregulation could represent a key factor contributing to the unrepresentative ASD symptomatology in females (Trubanova et al., 2014). Differences between males and females in the use of ER strategies have also been found in typically developing populations (Cai et al., 2018). To date, only one study has examined this topic and found that females with ASD had slightly more emotion regulation difficulties compared to males with ASD: They were more prone to experience dysphoria and faced more impairments related to high emotional intensity (Wieckowski et al., 2020). Future studies should explore the efficacy of such interventions in female individuals with ASD. Furthermore, as ER patterns change with age (Samson et al., 2012; Cai et al., 2018), identifying the most frequently used ER strategies and the specific ER impairments at each developmental stage could help provide a more individualized use of interventions. Although the literature suggests that the adaptive ER strategies are the same across development (Aldao et al., 2010; Schäfer et al., 2017), we would expect certain developmental differences in the frequency of use and efficacy of these strategies (Garnefski et al., 2002).

Also, while the data indicate a more frequent use of ER strategies after the training, it remains unknown how well people successfully completed the ER phases in their daily life (e.g., strategy selection and implementation; Gross, 2015). Previous research has shown that the flexible use of ER strategies is worthy of further investigation, as it might be a key factor contributing to an adaptive ER and influence ER efficacy (Aldao et al., 2015; Ford et al., 2019; Kobylińska and Kusev, 2019). Multi-method approaches using performance tasks (Samson et al., 2015b), virtual reality (e.g., Ip et al., 2018), and physiological measures as well as daily diaries or ecological momentary assessments could be of help to test the flexible use of various ER strategies across different contexts in individuals with ASD (Cai et al., 2018).

While this study shows high acceptability rates and promising first effects on the increased use of adaptive positive ER strategies post-training, future research should examine the impact on proximal and distal outcome measures (e.g., emotion experience, wellbeing, and socio-emotional functioning) with appropriate scales to capture changes (Samson et al., 2012; Vermeulen, 2014) in larger efficacy studies. A higher and more improved impact of the intervention is expected to occur after upgrading the current version into an intensive program with an increased number of sessions, while considering the likelihood that the dropout rates might increase. A closely monitored practice between sessions could also be more impactful and help measure adherence to the program, in addition to the acceptability measures that have already shown highly satisfactory results. Finally, adapting the program into a caregiver-mediated intervention could also contribute to obtaining better outcomes, especially in younger participants (Rispoli et al., 2019).

Conclusion

This first version of our positive ER training has been shown to be participant-friendly and appropriated for individuals with ASD and indicated promising preliminary effects on the

participants' self-reported use of adaptive ER strategies after the training program. This new program could be a valuable tool for practitioners and clinicians to train ER skills. It could also supplement the need for online intervention tools, not only in times when sanitary restrictions require the implementation of remote sessions to support patients with developmental disorders (e.g., COVID-19; Grumi et al., 2020), but also to facilitate, in general, the delivery of care beyond it (Jeste et al., 2020). The findings of the current proof of concept warrant future research on this topic, which could shed more light on the generalizability of the outcomes and the role that positive ER plays in the onset, manifestation, and development of challenging behaviors in individuals with ASD. Importantly, it will be necessary to examine the impact of the training on positive emotions in individuals with ASD. Adaptive emotion regulation skills as well as positive emotions may play an important role in social and adaptive functioning including school inclusion, education, and transition into a professional life as well as wellbeing in individuals with ASD.

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3.3 Study 3³

Jeux de société sur les compétences socio-émotionnelles : l'expérience de jeu avec des prototypes « *chEERS Games* » auprès d'élèves de 10 à 13 ans

³ Reprint of the article: Zaharia, A., Savary, V., Sander, D., Bressoud, N., & Samson, A. C. (2025b). Jeux de société sur les compétences socio-émotionnelles : l'expérience de jeu avec des prototypes « *chEERS Games* » auprès d'élèves de 10 à 13 ans [Board games on socio-emotional competencies: the game experience with « *chEERS Games* » prototypes among 10- to 13-year-old students; Special issue on socio-emotional competencies and education – emotion and cognition]. *Approche Neuropsychologique des Apprentissages chez l'Enfant (A.N.A.E.)*, 37(198), 687-698.

Résumé

En Suisse, les approches pour soutenir les compétences socio-émotionnelles (CSE) prévues par le Plan d'études romand restent variables. Renforcer les CSE en fin d'école primaire est crucial pour cet âge développemental. Cette étude explore l'expérience de jeu de 73 élèves (10-13 ans) avec un nouvel outil éducatif : le kit de jeux de société chEERS. Les résultats montrent une expérience positive et une forte satisfaction, suggérant un haut niveau d'acceptabilité et le potentiel d'usage en classe.

Mots clés : jeu de société, émotions, école primaire, compétences socio-émotionnelles, expérience de jeu.

Summary

In Switzerland, approaches to supporting the socio-emotional competencies (SEC) outlined in the Plan d'études romand remain variable. Strengthening SEC at the end of primary school is crucial at this stage of development. This study explores the board game experience of 73 students (ages 10-13) with a new educational tool: the chEERS board game kit. The results show a positive experience and high satisfaction, suggesting a high level of acceptability and strong potential for classroom use.

Keywords: board games, emotions, elementary school, socio-emotional competencies, game experience.

Introduction

En Suisse, le Plan d'études romand (CIIP ; Conférence intercantonale de l'instruction publique, 2024) et le Lehrplan 21 (*Deutschschweizer Erziehungsdirektoren-Konferenz*, 2015) soulignent l'importance de développer les compétences transversales à l'école, au-delà des strictes approches par disciplines scolaires. Ces compétences sont aussi nommées *softskills*, compétences psychosociales ou compétences socio-émotionnelles (CSE), selon les différents domaines et contextes d'étude (Schneider, 2024 ; Wyss *et al.*, 2003). Elles se réfèrent à un ensemble de compétences liées au *vivre ensemble*, soutenant la performance scolaire et l'apprentissage, promouvant la santé mentale, favorisant la résilience, la communication et les interactions sociales positives, élargissant le répertoire de pensées et qui s'appliqueraient au-delà de l'école (Jones *et al.*, 2021 ; Malsert & Gentaz, 2023 ; Schneider, 2024 ; *World Health Organization*, 2014 ; Wyss *et al.*, 2003). Les CSE sont visées habituellement par des programmes d'apprentissage socio-émotionnel (en anglais : *socio-emotional learning* ; SEL) (Jones *et al.*, 2021). De nombreux programmes SEL ont été créés pour les enfants entre 4 à 12 ans (Jones *et al.*, 2021). Vers la fin de l'école primaire (à 12-13 ans), les élèves approchent la transition vers les études secondaires, ainsi que l'adolescence, période marquée par des changements bio-psycho-sociaux et critique pour le développement des CSE (Cès *et al.*, 2025 ; *World Health Organization*, 2014). La compréhension des émotions intra- et interpersonnelles devient davantage sollicitée et les nouveaux acquis sont mis en œuvre dans les nouvelles relations et situations sociales qui se complexifient (Jones *et al.*, 2017 ; *World Health Organization*, 2014).

Alors que des mises à jour dans les systèmes éducatifs sont globalement requises, en Suisse, la CIIP (2024) ne propose pas de programme spécifique ni de méthode pédagogique particulière pour le soutien des compétences transversales, ce qui mène les enseignants à choisir librement leurs approches (Cès *et al.*, 2025 ; Malsert & Gentaz, 2023 ; Vita-Barrull *et*

al., 2024). Les méthodes pédagogiques fréquemment utilisées dans les programmes SEL en classes primaires sont la discussion, les supports visuels et l'enseignement didactique, ce dernier faisant référence à des définitions et à des informations ou instructions pour comprendre un concept ou une compétence (Jones *et al.*, 2021).

Le jeu est une autre méthode particulièrement prometteuse pour le développement des CSE, en raison de sa nature et des bénéfices qu'il procure (Bubikova-Moan *et al.*, 2019). Faute de consensus sur sa définition, le jeu est caractérisé de manière récurrente par l'expérience d'émotions positives, la motivation intrinsèque, l'espace sécurisant et l'immersion (soit un engagement complet sans effort considérable, marqué par une atténuation de la conscience de soi et du temps) (Sweetser & Wyeth, 2005 ; Zaharia *et al.*, 2022). Toutefois, des experts alarment sur un déclin de l'occurrence du jeu chez les enfants. Avec l'âge, le temps dédié aux activités de jeu diminue et celui dédié aux tâches scolaires augmente, ce qui pourrait contribuer à l'émergence de difficultés psychologiques (Cès *et al.*, 2025 ; Gray, 2011). Les professionnels sont ainsi encouragés davantage à utiliser le jeu avant l'âge de 8 ans (Bubikova-Moan *et al.*, 2019). D'ailleurs, une étude menée en Suisse romande a montré que le jeu de faire semblant améliore la compréhension des émotions et la régulation des émotions négatives des élèves de 5-6 ans (Richard *et al.*, 2019). Une revue récente montre que, parmi 33 programmes SEL pour les écoles primaires analysés, la composante jeu est utilisée comme méthode pédagogique en moyenne à 7 %, avec une variation entre 0 à 46 % (Jones *et al.*, 2021). En Suisse alémanique, le programme *Promoting Alternative Thinking Strategies* (PATHS), intégrant le jeu de rôle comme méthode, a été adapté, déployé à large échelle dans des écoles primaires et a montré des améliorations des CSE à long terme (Eisner *et al.*, 2023).

Une autre forme particulière de jeu, identifiée comme outil SEL, est le jeu de société (Hassinger-das *et al.*, 2017 ; Hromek & Roffey, 2009). Le jeu de société est un jeu avec des

règles qui crée des opportunités d'interaction sociale et des micro-représentations de la vie réelle, induisant de nouvelles expériences émotionnelles (Cès *et al.*, 2025 ; Gauthier *et al.*, 2019 ; Zaharia *et al.*, 2022). Un jeu de société réussi devrait susciter des émotions positives et maintenir le *flow* – un modèle expliquant le plaisir dans le jeu, englobant des éléments tels que l'immersion, la concentration soutenue, le sentiment de contrôle et un alignement entre les compétences du joueur et les défis du jeu (Dell'Angela *et al.*, 2020 ; IJsselsteijn *et al.*, 2008 ; Sweetser & Wyeth, 2005 ; Zaharia *et al.*, 2022). Les études montrent que les jeux de société éducatifs ont de nombreux bénéfices pour la santé physique et mentale ainsi que le développement psychosocial (Gauthier *et al.*, 2019 ; Gilliam *et al.*, 2019 ; Nieh & Wu, 2018 ; Viggiano *et al.*, 2015). Ils facilitent les discussions sur des sujets sensibles d'une manière ludique (van der Stege *et al.*, 2010 ; Wiener *et al.*, 2011) et soutiennent le SEL par les interactions sociales (Hassinger-das *et al.*, 2017 ; Hromek & Roffey, 2009). Chez les enfants, les jeux de société peuvent soutenir les compétences émotionnelles en réduisant les comportements perturbateurs, en augmentant les interactions sociales et leur diversité, en apprenant à gérer la perte ou l'imprédictibilité (Cès *et al.*, 2024 ; Zaharia *et al.*, 2022). Ils aident les élèves à apprendre par l'action, stimulent le processus de réflexion, soutiennent l'intérêt, la participation et l'engagement en classe (Vita-Barrull *et al.*, 2024). Le recours à des jeux de société constituerait une piste pertinente pour soutenir les CSE mises en avant par les politiques publiques. En effet, ils sont souvent recommandés et utilisés de manière intuitive et implicite dans de nombreux pays, y compris la Suisse, mais sans évaluation rigoureuse (Fundación Botín, 2015 ; Réseau Canopé, n.d.). Un projet mené en Valais (HEP-VS) teste actuellement le rôle des jeux focalisés sur les fonctions exécutives dans le soutien des compétences transversales chez les 6-7 ans (Rime, 2024). À partir de 8 ans, l'intérêt pour le jeu de règles augmente et l'attention se porte sur la compétition, la performance et la relation avec les pairs (Nijhof *et al.*, 2018). Au vu des transitions scolaires et du déclin du jeu, les

bénéfices des jeux de société paraissent d'autant plus pertinents pour les élèves traversant la période située entre l'enfance et l'adolescence.

En Suisse francophone, dans le contexte de cette étude, quelques formations continues mais optionnelles proposent aux enseignants l'utilisation de diverses formes de jeu (symbolique, de société, *escape game*) et de la *gamification* pour l'apprentissage des connaissances (Département d'instruction publique de la République et canton de Genève, 2025 ; Haute École Pédagogique BEJUNE, 2025b, 2025c ; Université de Fribourg, 2025). Quant au soutien des compétences transversales par le jeu pour les élèves en fin de primaire, les formations semblent plus rares (Haute École Pédagogique BEJUNE, 2025d, 2025a). Pourtant, cette période s'avère sensible pour le développement des CSE car se prolonge par un passage au secondaire (en Suisse romande : cycle d'orientation) et, souvent, par un changement de classe et/ou d'établissement.

Finalement, nous constatons que le jeu de société adressant les CSE chez les enfants en fin de classe primaire (10-13 ans) en Suisse romande reste sous-exploité. En effet, les observations récoltées autant sur le plan local qu'international montrent que le jeu mériterait une place renforcée comme outil de promotion des CSE chez ces élèves. Pour assurer son succès, il est nécessaire de documenter systématiquement son usage à l'école, par l'articulation entre la théorie et les données robustes issues des sciences affectives et de l'éducation, ou encore avec des études visant le design des jeux de société et les techniques d'implémentation (Dell'Angela *et al.*, 2020 ; Zaharia *et al.*, 2022). L'analyse de l'expérience des joueurs pour mieux comprendre comment le jeu fonctionne auprès des populations ciblées s'avère une étape essentielle avant de proposer cet outil aux enseignants (Dell'Angela *et al.*, 2020 ; Vita-Barrull *et al.*, 2024).

Par conséquent, nous proposons un nouvel outil pour répondre aux besoins des enseignants dans l'application des directives officielles : le kit de jeux de société *chEERS*

incluant trois prototypes fonctionnels (Zaharia *et al.*, 2021), inventé dans le cadre du laboratoire de recherche *Swiss Emotion Experience, Regulation, and Support (chEERS Lab)*. Avant une future étape d'évaluation de l'efficacité potentielle de ces jeux promouvant les CSE, il nous paraît important d'examiner leur acceptabilité auprès d'élèves. Ceci nous permettrait d'identifier les points forts et faibles de leur implémentation en classe et de réfléchir aux adaptations nécessaires pour chacun des jeux. À notre connaissance, ceci est la première étude qui explore, en combinant des méthodes qualitatives et quantitatives, l'expérience de jeu des élèves de 10 à 13 ans par rapport à un nouvel outil traitant le sujet des CSE.

Méthode

Population

L'étude a été approuvée par la Commission d'éthique d'UniDistance Suisse (demande n° 2020-05-00001) et a reçu l'approbation de principe de la part de la HEP-VS et du Service de l'enseignement du Canton de Valais. Ainsi, 4 classes d'élèves d'une école du canton de Valais (1 classe de 7e HarmoS, 10-11 ans, et 3 classes de 8e HarmoS, 12-13 ans) nous ont été proposées, avec l'accord de la direction de l'établissement scolaire. L'étude a été présentée aux enseignants des classes par les chercheuses. Les parents des 87 élèves ont reçu les lettres d'information sur l'objectif et déroulement de l'étude et les déclarations de consentement éclairé. Un questionnaire socio-démographique a été joint au courrier, si participation consentie.

Soixante-treize enfants francophones âgés de 10 à 13 ans ont accepté d'y participer et été retenus pour les analyses, soit 84 % de la liste initiale. Douze enfants n'ont pas transmis les formulaires de consentement signés et 2 autres ont décroché durant l'étude. La taille est modeste et indique les contraintes pratiques, mais elle reste adaptée pour le but exploratoire de l'étude. Sur le plan socio-démographique, l'échantillon présente une mixité culturelle, avec

un total de 14 langues parlées. La plupart des parents avaient achevé une formation professionnelle. Au niveau professionnel, la plupart exerçaient un emploi qualifié. Pour ces estimations, le niveau d'études et la situation professionnelle les plus élevés parmi les deux parents ont été pris en compte (*tableau 1*).

Tableau 1

Caractéristiques socio-démographiques de l'échantillon

Variable	N (%)	M (ET)
Classe scolaire		
7 ^{ème} HarmoS	17 (23.3 %)	—
8 ^{ème} HarmoS	56 (76.7 %)	—
Âge (en années)	—	11.04 (0.73)
Genre		
Filles	33 (45.2 %)	—
Garçons	40 (54.8 %)	—
Jeux de société		
Appréciation générale au quotidien ^a	—	3.32 (1.07)
Fréquence générale au quotidien ^b	—	3.04 (0.70)
Cours de théâtre		
Oui	11 (15.1 %)	—
Non	62 (84.9 %)	—
Langues parlées à la maison		
1 langue	34 (46.6 %)	—
2 langues	35 (47.9 %)	—
3 langues	2 (2.7 %)	—
4 langues	2 (2.7 %)	—
Fratrie		
Aucune	8 (11.1 %)	—
1 frère/sœur	34 (47.2 %)	—
2 frères/sœurs	21 (29.2 %)	—
3 frères/sœurs	6 (8.3 %)	—
≥ 5 frères/sœurs	2 (2.8 %)	—
Niveau d'étude des parents		
École obligatoire	7 (9.6 %)	—
Formation pré-professionnelle	17 (23.3 %)	—
Formation professionnelle	35 (47.9 %)	—
Formation supérieur/université	14 (19.2 %)	—
Situation professionnelle des parents		
Emploi non-qualifié	12 (16.7 %)	—

Emploi qualifié	27 (37.5 %)	—
Petit patron	5 (6.9 %)	—
Indépendant/profession libérale	9 (12.5 %)	—
Sans emploi/parent au foyer	19 (26.4 %)	—

Note. ^aScore sur une échelle Likert à 5 points : 1 = pas du tout à 5 = extrêmement. ^bScore sur une échelle Likert à 4 points : 1 = jamais à 4 = toujours.

Matériel

Les prototypes des jeux

Les prototypes fonctionnels non colorés du kit de jeux *chEERS* ont été créés en Suisse par des psychologues (Zaharia *et al.*, 2021), avec le conseil et l'édition de la coopérative locale *Entrée de Jeux*. Le kit inclut trois jeux compétitifs différents. Le but de chaque jeu est d'obtenir le plus de points sur des pistes de scores, chacune correspondant à une compétence émotionnelle différente.

Le premier jeu, *Le théâtre des émotions (TDE)*, vise à stimuler des compétences telles que l'expression et la reconnaissance des émotions. À son tour, chaque participant incarne le rôle d'*acteur* pendant que les autres joueurs prennent le rôle du public (les *spectateurs*). En tant qu'*acteur*, le joueur lance son dé à 6 faces et exprime à travers la voix, les gestes et l'expression faciale l'émotion indiquée le dé parmi les 6 émotions présentes sur le plateau (3 émotions agréables et 3 émotions désagréables). Simultanément, l'*acteur* lit à haute voix une phrase choisie aléatoirement de la pioche de cartes *réplique* (p. ex., *J'ai un cafard dans mon burger*). Les autres joueurs, les *spectateurs*, doivent deviner l'émotion de l'*acteur*. Sur la piste de points de l'*acteur* (correspondant à l'expression des émotions), le joueur obtient un nombre de points correspondant au nombre de joueurs qui devinent son émotion. En parallèle, sur la piste de points des *spectateurs* (correspondant à la reconnaissance des émotions), les autres joueurs obtiennent chacun un point si leur réponse est correcte. À la fin du tour de table, les cartes *émotion* et *réplique* sont défaussées. La carte *émotion* est remplacée par une émotion de la même valence.

Le deuxième jeu, *La cuisine des émotions – version 1 (CDE1)*, vise des compétences telles que la différenciation de ses propres émotions et la compréhension des émotions des autres. À son tour, chaque participant aura le rôle de *chef cuisiner* pendant que les autres joueurs incarnent le rôle des *gastronomes*. En tant que *chef*, le joueur lance son dé correspondant au nombre de *situations-plat* à faire deviner (6, 9 ou 12, selon le tour de table) et fait deviner aux autres le *plat* indiqué par son dé. Pour ceci, le *chef* dit à haute voix un seul indice qui est une *émotion-épice* choisie d’une liste non-exhaustive (p. ex., *inquiétude*, *surprise*). Les autres joueurs, les *gastronomes*, doivent deviner le *plat* (p. ex., *on se moque de moi ; manger une glace*). Sur la piste de points du *chef* (correspondant à la différenciation des émotions), le joueur obtient un nombre de points correspondant au nombre de *gastronomes* qui devinent sa *situation-plat*. En parallèle, sur la piste de points des *gastronomes* (correspondant à la compréhension des émotions des autres), chaque joueur obtient un point si leur réponse est correcte. À la fin du tour de table, la carte *plat* est défaussée et remplacée par une nouvelle carte.

Le troisième jeu, *La cuisine des émotions – version 2 (CDE2)*, vise des compétences telles que la compréhension de ses propres émotions (en passant par la différenciation et des connaissances de régulation des émotions) et la compréhension des émotions des autres. Dans cette version, le *chef* doit rajouter un nouvel indice qui est l’*ustensile*, correspondant à une stratégie de régulation des émotions (p. ex., *cacher mes émotions*, *chercher du réconfort*), choisi parmi une liste exhaustive de 16 stratégies. Ainsi, le *chef* donne deux indices pour faire deviner son *plat* : une *épice* (émotion) et un *ustensile* (stratégie de régulation des émotions). Le comptage des points est identique à la version 1.

Mesures

Le questionnaire *Board Game Experience Questionnaire* (BGEQ) mesure l’expérience de jeu (Dell’Angela *et al.*, 2020 ; adapté de IJsselsteijn *et al.*, 2013). Les participants doivent

répondre, en utilisant une échelle de Likert à 5 points (1 = Pas du tout vrai à 5 = Tout à fait vrai), à chacun des items répartis dans cinq sous-échelles : *affect positif* (5 items ; « *J'étais content* » ; $\alpha = .86$), *affect négatif* (4 items ; « *Je me suis ennuyé* » ; $\alpha = .64$), *flow et immersion* (5 items ; « *J'ai tout oublié autour de moi* » ; $\alpha = .63$), *difficulté* (3 items ; « *Je pensais que le jeu était dur* » ; $\alpha = .50$) et *effort* (4 items ; « *J'ai investi beaucoup d'effort* » ; $\alpha = .57$). Les coefficients alpha de Cronbach observés diffèrent partiellement de ceux de l'étude originale (.63 à .90) (Dell'Angela *et al.*, 2020).

En plus, 3 questions ouvertes ont évalué l'expérience de jeu au niveau qualitatif à partir des réponses libres des élèves : « *Ce que j'ai aimé* », « *Ce que je n'ai pas aimé* », « *Ce que je changerais* ».

Procédure

Chaque séance de jeu s'est déroulée sur 2 périodes scolaires consécutives, pour un total de 90 minutes. Les 3 séances ont été menées par l'équipe de recherche : assistantes de recherche, psychologues et étudiantes en Faculté de Psychologie. Chaque facilitatrice a été formée à l'animation comme maître de jeu auprès de A.Z., selon un guide comprenant l'explication des règles et les étapes dans l'animation. Tous les élèves ont joué à chaque jeu, dans l'ordre suivant : *TDE*, *CDE1*, *CDE2* (un jeu par séance). L'ordre choisi favorise une montée progressive en complexité des compétences. Les premières 15 minutes ont été dédiées aux aspects organisationnels : accueil des élèves, vérification des présences, distribution des codes individuels, formation des groupes (de 4-5 élèves), choix du pion, explication des règles. Ensuite, la maîtresse de jeu a réalisé une démonstration du déroulement d'un tour et chaque joueur a fait un tour d'essai. Les parties de jeu se sont déroulées pendant environ 60 minutes, pour 4 à 6 tours de table. Dans les dernières 15 minutes, les enfants ont répondu au questionnaire BGEQ et aux 3 questions ouvertes, sous format papier-crayon.

Analyse de données

Afin d'examiner l'effet du type de jeu sur les dimensions du BGEQ, des modèles linéaires mixtes (MLM) ont été ajustés séparément pour chacune des cinq sous-échelles : *affect positif*, *affect négatif*, *flow et immersion*, *difficulté*, et *effort*. Les MLM ont été choisis en raison de leur capacité à gérer les données manquantes, à modéliser la structure hiérarchique des données (mesures répétées au sein des participants) et à inclure simultanément plusieurs covariables continues et des effets fixes et aléatoires (Baayen *et al.*, 2008 ; Barr *et al.*, 2013 ; Bates *et al.*, 2015). Pour chaque variable dépendante, le type de jeu (*TDE*, *CDE1*, *CDE2*) a été inclus comme prédicteur principal, en contrôlant plusieurs caractéristiques individuelles (covariables) : l'appréciation des jeux de société dans la vie quotidienne, la fréquence de jeu, la participation à des cours de théâtre, le genre et le nombre de frères et sœurs. La classe (A, B, C, D) a été ajoutée comme effet fixe pour examiner son influence sur l'expérience de jeu. Un intercept aléatoire par participant a été intégré pour tenir compte de la dépendance des mesures répétées. Les analyses ont été réalisées à l'aide du package *lmerTest* (Kuznetsova *et al.*, 2017), dans le logiciel *R* (*R Core Team*, 2024), basé sur *lme4* (Bates *et al.*, 2015). Des comparaisons *post-hoc* entre types de jeu ont été effectuées à partir des moyennes marginales estimées (*emmeans* ; Lenth *et al.*, 2024), avec ajustement des valeurs de *p* selon la méthode de Tukey. Les vérifications n'ont révélé aucune violation majeure de la normalité, d'homogénéité des variances, ou de colinéarité. Les observations présentant un effet disproportionné (détectées à l'aide de distances de Cook) ont été exclues afin d'assurer la robustesse du modèle (entre 3 à 10 données aberrantes identifiées à travers les sous-échelles et les jeux).

Les verbatims ont été analysés selon une approche inductive inspirée de l'analyse thématique (Braun & Clarke, 2006). Dans un premier temps, l'ensemble des verbatims issus des 3 questions ouvertes a été lu de manière itérative afin d'identifier des unités de sens

récurrentes. Ces unités ont ensuite été regroupées en catégories conceptuelles distinctes (*tableau 2*). Un guide de codage a été créé, comprenant les définitions opérationnelles des catégories et des exemples issus des données. Deux évaluateurs indépendants ont codé les verbatims. Les indices d'accord ont été calculés à l'aide du κ de Cohen et de la proportion d'accord observé (Po). La fiabilité inter-juge était très élevée pour l'ensemble des trois jeux, avec des Po supérieurs à 97 % pour toutes les catégories et des κ allant d'un accord modéré à parfait (.395 à 1), indiquant la robustesse du codage, la consistance de la procédure et la validité des analyses. Les rares variations s'expliquent plus par la distribution inégale des réponses (biais de fréquence) que par de véritables divergences systématiques inter-juge (McHugh, 2012). Pour chaque jeu, l'occurrence de chaque catégorie a ensuite été quantifiée à l'aide du pourcentage du total des catégories codées pour chaque question ouverte (après la résolution de conflits inter-juge par un troisième évaluateur).

Tableau 2

Catégories émergentes et exemples de réponse libre

Catégorie	Exemple de verbatim
Satisfaction globale	<i>J'ai tout aimé.</i>
Insatisfaction globale	<i>Je n'ai rien aimé.</i>
Expérience émotionnelle positive	<i>C'était très amusant.</i>
Expérience émotionnelle négative	<i>C'était stressant.</i>
Mécanique générale du jeu	<i>Les règles.</i>
Contenu du jeu	<i>Les situations.</i>
Matériel de jeu	<i>Le plateau, pion, gobelet.</i>
Expression de soi	<i>Faire des gestes pour montrer nos émotions.</i>
Originalité	<i>Il était original.</i>
Créativité	<i>Utiliser notre imagination pour inventer des phrases.</i>
Compétition	<i>Gagner.</i>
Jeu en coopération	<i>Jouer en équipe.</i>
Interaction sociale	<i>Jouer avec les amis.</i>
Apprentissage des CSE	<i>Apprendre plein de choses sur les autres joueurs.</i>
Durée du jeu	<i>Faire plus de tours de jeu.</i>
Rythme du jeu	<i>Attendre mon tour.</i>
Incertitude	<i>Je ne sais pas.</i>
Autres	<i>Non-classable dans les catégories précédentes.</i>
Pas codable	<i>Pas de réponse ou réponse incompréhensible.</i>

Résultats

Expérience de jeu : BGEQ

Globalement, les élèves ont obtenu des moyennes très élevées pour l'échelle d'*affect positif* ($M = 4.33$; $ET = 0.66$) et faibles pour l'*affect négatif* ($M = 1.48$; $ET = 0.65$) et la *difficulté* ($M = 1.98$, $ET = 0.71$). Les dimensions *effort* ($M = 3.24$; $ET = 0.73$) et *flow et immersion* ($M = 3.64$, $ET = 0.69$) présentent des scores moyens (tableau 3).

Affect positif

Les scores étaient significativement plus faibles pour les jeux *CDE1* ($\beta = -0.29$, erreur standard (ES) = 0.08, $t(131.9) = -3.47$, $p = .001$) et *CDE2* ($\beta = -0.42$, $ES = 0.08$, $t(130.1) = -5.07$, $p < .001$) comparés au *TDE*. Aucune différence significative n'a été observée entre *CDE1* et *CDE2*. Concernant les covariables individuelles, aucune n'a montré d'effet significatif. Enfin, des différences significatives sont apparues entre les classes : comparées à la Classe A, la Classe B ($\beta = -0.39$, $ES = 0.15$, $t(62.1) = -2.66$, $p = .010$) et la Classe C ($\beta = -0.40$, $ES = 0.14$, $t(62.9) = -2.89$, $p = .005$) rapportaient moins d'affect positif. La Classe D ne différait pas significativement de la Classe A ($\beta = 0.10$, $ES = 0.14$, $t(63.3) = 0.69$, $p = .496$).

Affect négatif

Comparé au *TDE*, les enfants rapportent des scores significativement plus élevés aux jeux *CDE1* ($\beta = 0.30$, $ES = 0.09$, $t(132.8) = 3.53$, $p < .001$) et *CDE2* ($\beta = 0.30$, $ES = 0.09$, $t(131.5) = 3.56$, $p < .001$). Concernant les classes, les enfants de la Classe C ont rapporté davantage d'affect négatif que ceux de la Classe A ($\beta = 0.32$, $ES = 0.13$, $t(63.2) = 2.40$, $p = .019$). Les Classes B et D ne différaient pas de la Classe A. Les variables individuelles n'étaient pas significatives.

Flow et immersion

Les scores rapportés étaient significativement plus bas pour *CDE1* ($\beta = -0.27$, $ES = 0.09$, $t(133) = -3.00$, $p = .003$) et *CDE2* ($\beta = -0.28$, $ES = 0.09$, $t(131.7) = -3.08$, $p = .003$) que

pour le jeu *TDE*, sans différence significative entre *CDE1* et *CDE2*. Aucun effet significatif des classes ni des covariables individuelles n'a été observé.

Difficulté

Les enfants ont perçu la *CDE1* comme significativement moins difficile que le *TDE* ($\beta = -0.22$, $ES = 0.09$, $t(129.2) = -2.53$, $p = .013$). La *CDE2* tend à être perçu comme moins difficile que le *TDE*, mais le résultat restait non-significatif ($p = .081$). *CDE1* et *CDE2* ne différaient pas entre eux. Par ailleurs, les enfants de la Classe B ($\beta = -0.41$, $ES = 0.19$, $t(62.2) = -2.13$, $p = .037$) et de la Classe D ($\beta = -0.38$, $ES = 0.18$, $t(62.8) = -2.03$, $p = .047$) rapportaient une difficulté plus faible que ceux de la Classe A. Les caractéristiques individuelles n'étaient pas significatives.

Effort

Les analyses montrent que les enfants rapportaient moins d'effort dans les jeux *CDE1* ($\beta = -0.38$, $ES = 0.09$, $t(124.9) = -4.21$, $p < .001$) et *CDE2* ($\beta = -0.49$, $ES = 0.09$, $t(123.6) = -5.38$, $p < .001$), comparés au *TDE*. Aucune différence n'a été observée entre *CDE1* et *CDE2*. Ni la classe ni les variables individuelles n'expliquaient significativement l'effort.

Tableau 3

Moyennes, écart-types, minimum et maximum des scores aux sous-échelles du BGEQ

	TDE	CDE1	CDE1
<i>N</i>	68	69	69
Affect positif			
<i>M (ET)</i>	4.57 (0.48)	4.32 (0.63)	4.12 (0.76)
Minimum-Maximum	3.20-5.00	2.60-5.00	1.00-5.00
Affect négatif			
<i>M (ET)</i>	1.27 (0.53)	1.57 (0.67)	1.59 (0.70)
Minimum-Maximum	1.00-3.67	1.00-4.00	1.00-3.67
Flow et immersion			
<i>M (ET)</i>	3.82 (0.65)		3.54 (0.73)
Minimum-Maximum	1.80-5.00	3.57 (0.68)	1.20-5.00
		2.20-5.00	
Difficulté			
<i>M (ET)</i>	2.09 (0.64)	1.88 (0.73)	1.96 (0.76)
Minimum-Maximum	1.00-3.50	1.00-4.25	1.00-4.25

Effort			
<i>M (ET)</i>	3.52 (0.57)	3.16 (0.73)	3.04 (0.8)
Minimum-Maximum	2.00-4.50	1.50-4.75	1.00-5.00

Expérience de jeu : verbatim

De manière descriptive, pour la question ouverte « *Ce que j'ai aimé* » dans le *TDE*, les catégories *Expérience émotionnelle positive*, *Expression de soi* et *Satisfaction globale* ont eu des occurrences élevées (> 16 %). Dans la *CDE1*, les catégories codées fréquemment (> 11 %) ont été : *Satisfaction globale*, *Expérience émotionnelle positive* et l'*Apprentissage des CSE*. Dans la *CDE2*, les catégories fréquentes (> 12 %) ont été : *Satisfaction globale*, *Expérience émotionnelle positive* et *Contenu* (notamment les situations-plat). Seulement 4 réponses ont été codées sous *Insatisfaction globale* (*CDE1* et *CDE2*).

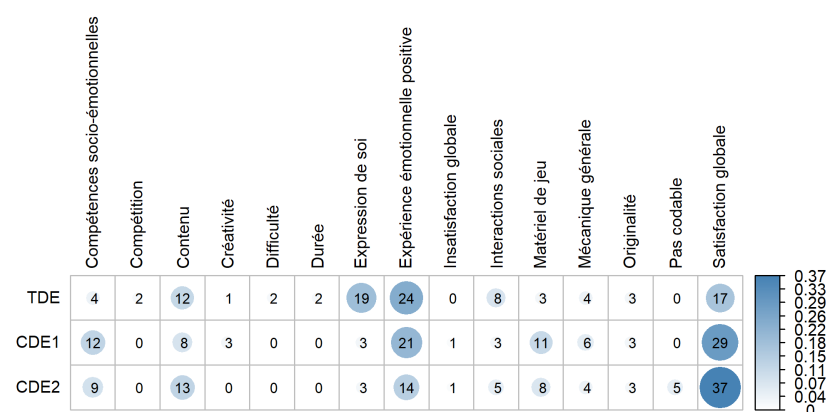
Pour la question ouverte « *Ce que je n'ai pas aimé* », dans chaque jeu, la majorité des réponses ont été codées sous *Satisfaction globale* (> 54 %). Dans la *CDE2*, 8 % de réponses indiquent une insatisfaction avec le *Contenu*, notamment les *ustensiles* – stratégies de régulation des émotions, et 10 % avec le *Matériel* (p. ex., esthétique du plateau, les pions, les gobelets). Seulement 2 élèves ont indiqué une expérience émotionnelle négative, illustrée « *stress* » (*TDE*) et « *ennui* » (*CDE1*).

Pour la question ouverte « *Ce que je changerais* », la plupart des réponses dans jeu a été codée sous *Satisfaction globale* (> 44 %). Ensuite, entre 15-17 % de réponses dans chaque jeu ont été codées sous *Matériel*, en mentionnant : le plateau (p. ex., rajouter des couleurs, accentuer la visibilité des éléments visuels du plateau), les gobelets, les pions (*figure 1*).

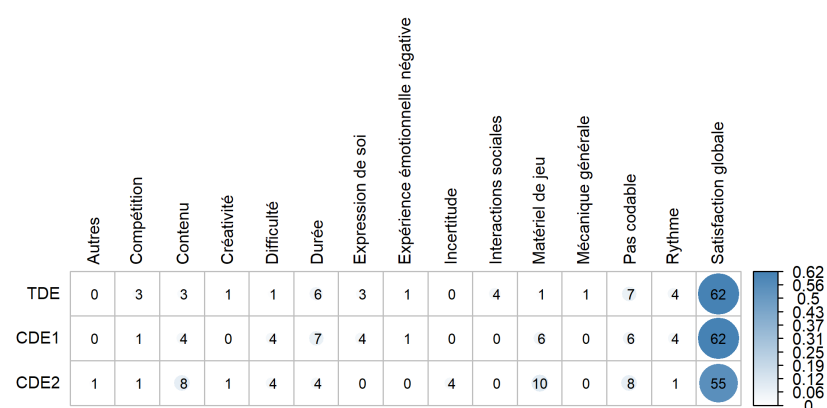
Figure 1

Distribution en pourcentage des catégories de réponses selon question et jeu

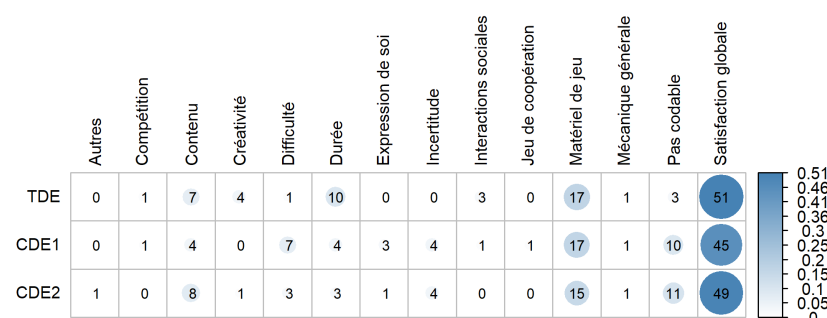
A « Ce que j'ai aimé... »



B « Ce que je n'ai pas aimé... »



C « Ce que je changerais... »



Note. Les tailles des cercles représentent la proportion de réponses par catégorie et par jeu, exprimée en pourcentage.

Discussion

Cette étude explore simultanément des données qualitatives et quantitatives sur l'expérience des jeux « *chEERS* » des élèves de classe primaire. De manière descriptive, les résultats suggèrent une expérience de jeu cohérente avec les travaux antérieurs sur des jeux de société commerciaux *versus* éducatifs (Dell'Angela *et al.*, 2020). Globalement, les élèves ont évalué l'expérience de jeu comme agréable, immersive et satisfaisante, indiquant un haut degré d'acceptabilité des prototypes de jeux « *chEERS* ». Plus précisément, les enfants ont rapporté des niveaux élevés d'affect positif, moyens de *flow* et immersion et d'effort et faibles d'affect négatif et de difficulté. En accord avec la littérature, alors que les affects négatifs sont inévitables et attendus lors du jeu, les affects positifs, le *flow* et immersion, ainsi que l'effort restent des dimensions proéminentes dans l'expérience des jeux « *chEERS* » (Cès *et al.*, 2025 ; Poels *et al.*, 2007 ; Sweetser & Wyeth, 2005). Une perception de l'effort au niveau modéré permet de maintenir l'engagement, le *flow* et une stimulation optimale des compétences des élèves (Sweetser & Wyeth, 2005). Cependant, le niveau modéré de *flow* et immersion n'est pas surprenant. Dans les jeux de société, cette dimension serait plus flexible et moins soutenue que dans les jeux vidéo, en absence des stimuli audio-visuels continus (Farkas *et al.*, 2020).

Des différences entre les jeux *TDE* et *CDE* ont été observées. Le *TDE* a suscité davantage d'affects positifs, de *flow* et immersion et d'effort que les deux versions de la *CDE*. De plus, le *TDE* a suscité moins d'affect négatif que les deux versions *CDE*. Cependant, *TDE* a été jugé plus difficile que *CDE1*. La difficulté perçue dans le *TDE* ne semble pas aller à l'encontre d'une expérience positive et immersive des joueurs. Il se peut que le niveau de difficulté ait été adéquatement calibré aux compétences des élèves lors du *TDE*, tout en maintenant le *flow* (Sweetser & Wyeth, 2005). L'effort fourni pour s'engager dans une mise en scène de type jeu de rôle (*faire l'acteur*) semblerait agréablement investi en contribuant à

un niveau de *flow* et immersion satisfaisant (Pujol *et al.*, 2024). Dans le *CDE*, il est possible qu'il y ait un désengagement de l'effort ainsi qu'une perception d'une difficulté moindre, car il manque l'aspect de mise en scène. Par exemple, un participant a suggéré d'inclure une composante de mime dans le jeu : « *Mimer les choses car c'est plus marrant* ». De plus, la *CDE* sollicite des ressources cognitives pour la lecture, compréhension et intégration de nouveaux concepts qui pourraient interférer avec l'expérience de jeu, en réduisant le *flow* et l'immersion. Pour mieux comprendre le lien entre l'effort auto-rapporté et réellement mobilisé (Pujol *et al.*, 2024), l'utilisation des mesures objectives (p. ex., physiologiques) pourrait être envisagée. Dans la future phase de développement de la *CDE*, une révision de la quantité de lecture nous paraît nécessaire pour assurer à la fois une expérience agréable et immersive et la stimulation des compétences visées.

Alors que les variables individuelles, telles que le genre, n'ont pas exercé d'effet significatif sur ces résultats, certaines classes diffèrent dans les affects et la difficulté perçue. Ce résultat peut être expliqué par un effet du climat de classe, aspect utile à considérer dans les travaux futurs (Singla *et al.*, 2021 ; Wang *et al.*, 2020). L'analyse qualitative, présentant une fiabilité inter-juges très satisfaisante, montre globalement une satisfaction quasi unanime des élèves par rapport aux jeux.

En termes d'éléments appréciés, l'expérience émotionnelle positive est une catégorie récurrente parmi les réponses des élèves. Ici, les élèves se réfèrent principalement à l'*amusement*. Ce résultat concorde avec les données quantitatives démontrant une prédominance de l'élément *amusement* dans les jeux « *chEERS* » qui assurerait une expérience ludique et une immersion efficace (Poels *et al.*, 2007). De plus, ces opportunités à expérimenter des émotions positives mènent à élargir le répertoire de pensées et de comportements, réduire les émotions négatives et soutenir le bien-être (Fredrickson, 2000 ;

Garland *et al.*, 2010), faisant des jeux « *chEERS* » des outils prometteurs pour atteindre les objectifs éducationnels et soutenir les compétences transversales.

Les réponses des élèves mettent aussi en avant l'appréciation de *l'expression de soi* dans le *TDE* : se mettre en scène, faire l'acteur, exprimer ses émotions. Cette composante, similaire au jeu de rôle, semble répondre aux besoins des élèves du primaire (Celume *et al.*, 2020).

Certaines réponses indiquent aussi une appréciation du contenu, notamment les émotions et les répliques du *TDE* et les situations de la *CDE*. Ceci suggère un certain engagement avec le contenu et l'univers de jeu, aspect essentiel dans l'apprentissage (Iten & Petko, 2016).

Dans les deux versions de la *CDE*, certains élèves ont apprécié l'apprentissage des CSE, notamment l'expression et la compréhension de leurs émotions, ainsi que celles de leurs camarades. Il est probable que la *CDE* soit moins ludique et plus pédagogique, suscitant une prise de conscience autour de la compréhension des émotions des autres et les différences interindividuelles dans l'interprétation des situations.

Un élément moins apprécié dans le *CDE2*, mais rarement rapporté, a été la liste de stratégies de régulation des émotions. Pour certains, le rajout de ce deuxième indice augmente la quantité de lecture nécessaire pour associer les informations présentées simultanément (les situations, la liste d'émotions et de stratégies), ce qui peut renvoyer à un exercice plutôt rébarbatif. Les stratégies peuvent être perçues comme abstraites sans une mise en scène concrète et engageante comme dans le *TDE*. Ainsi, des listes d'*ustensiles* plus courtes ont été élaborées avec la possibilité de jouer en plusieurs reprises pour les explorer graduellement (Zaharia *et al.*, 2021). Rajouter une composante de jeu de mime pourrait renforcer le plaisir d'apprendre sur les stratégies de régulation des émotions.

Parmi les suggestions d'amélioration, les élèves ont ciblé le plus souvent le matériel. Ceci est un résultat attendu, étant donné la forme prototypique fonctionnelle des jeux, où l'esthétique n'a pas encore été intégrée et certains objets, tels que les gobelets, étaient fragiles. En vue de ces retours, l'étape suivante a mené à des modifications du matériel, y compris le graphisme (Zaharia *et al.*, 2021). D'autres ont réclamé la réduction du nombre de cartes sur le plateau. En pratique, le nombre de cartes peut être librement adapté en fonction du niveau de lecture des joueurs, ce qui permet de maintenir le *flow*.

D'autres ont proposé de rajouter de nouvelles émotions et/ou situations au niveau du contenu, donc présenter du nouveau contenu pour plus de variété. Étant donné l'appréciation de l'expression de soi dans le *TDE*, une autre amélioration dans la *CDE* serait de rajouter leurs propres cartes situation. Dans le *TDE*, 10 % de réponses indiquent un souhait d'augmenter le temps de jeu. Cette suggestion montrerait une immersion efficace. Toutefois, à retenir que la prolongation du temps de jeu peut faire émerger l'ennui. Suite à ces retours, une étude en cours (Moreno *et al.*, en préparation) s'intéresse à adapter les jeux pour un usage en classe plus adéquat avec l'aide d'un guide pédagogique réalisé par des enseignants. Quelques élèves ont mentionné l'appréciation des interactions sociales pendant les jeux, surtout pour le *TDE*. Comme l'interaction sociale est une caractéristique inhérente des jeux de société, y compris des jeux « *chEERS* », il se peut qu'elle soit confondue par d'autres catégories impliquant le lien social : expression de soi, mécanique du jeu, compétition, apprentissage des CSE. Une orientation excessive sur interactions sociales est peu désirable car elle perturberait le *flow* (Sweetser & Wyeth, 2015).

Limites

Une limite importante de cette étude est son caractère exploratoire. N'étant pas l'objectif de cette étude, notre étude ne permet pas de conclure sur l'efficacité des jeux « *chEERS* » dans l'apprentissage des CSE. De futures études devraient comparer cet outil avec

d'autres outils SEL ou jeux adressant les CSE et de mesurer son effet sur les CSE dans un design expérimental d'intervention.

De plus, au vu des différences culturelles dans les perceptions des jeux de société (Bar & Otterbring, 2021) et des différentes régions linguistiques et culturelles en Suisse, nos observations sur l'expérience de jeu des élèves restent limitées et ne sont pas généralisables. De même, les réponses des élèves ont pu être influencées par leur profil de joueur, par exemple *compétiteur*, *accomplisseur*, *socialisateur*, *explorateur* (Bartle, 1996). Cette caractéristique peut impacter les objectifs de chaque joueur et mener à des variations dans l'expérience de jeu.

En outre, la mesure de l'expérience de jeu est une adaptation d'un questionnaire dédiée aux jeux vidéo et aux adultes (Ijsselsteijn *et al.*, 2013). Bien que la consistance interne a été satisfaisante dans l'étude initiale (Dell'Angela *et al.*, 2020), les échelles de *difficulté* et d'*effort* de notre étude doivent être interprétées avec précaution. Puisque le BGEQ n'a pas encore fait l'objet d'une validation chez des enfants francophones, le développement futur des mesures fiables apparaît nécessaire.

Enfin, notre source d'information, bien que riche, a été représentée uniquement par les auto-évaluations des élèves. Sans les hétéro-évaluations des enseignants, nos conclusions restent limitées. Rajouter des interviews et des groupes de discussions (*focus groups*) avec enfants et enseignants éclairciraient mieux les résultats actuels et fourniraient une vue plus compréhensible sur l'expérience de jeu (Silva *et al.*, 2023).

Perspectives futures

Une prochaine étape devrait s'intéresser à une évaluation longitudinale, sous forme d'inter- vention, pour étudier l'impact effectif des jeux « *chEERS* » sur l'apprentissage des CSE. Ce type d'étude requiert des efforts substantiels et une gestion exigeante en temps et en ressources pour les chercheurs comme pour les enseignants (Bubikova-Moan *et al.*, 2019 ;

Cès *et al.*, 2025 ; Girio-Herrera *et al.*, 2019), mais s'avère indispensable pour confirmer l'efficacité de nouveaux outils. Alors qu'un haut niveau d'acceptabilité favorise l'apprentissage des compétences (Ninaus *et al.*, 2017), le *fun* ne prédit pas toujours le succès de l'apprentissage (Iten & Petko, 2016).

Par ailleurs, pour un impact plus efficace d'une éventuelle intervention, il serait pertinent d'impliquer les enseignants de la classe (Richard & Gentaz, 2025) au lieu de facilitateurs externes. L'intégration de ces outils devrait s'aligner aux pratiques des enseignants, aux besoins de la classe et aux objectifs pédagogiques. Il serait d'abord important de former les enseignants au contenu et à l'animation de ces outils (Wyss *et al.*, 2003). Ensuite, il serait éclairant de collecter leur retour sur l'usage des jeux « *chEERS* » en classe pour renforcer la validité écologique. De plus, par une approche participative, les enseignants contribueraient au développement des outils pédagogiques complémentaires, comme la création d'un guide pédagogique à partir de leurs observations sur le terrain.

Finalement, il serait pertinent d'élargir cette investigation de l'expérience de jeu chez des élèves issus de différents contextes et âges scolaires, par exemple chez les élèves provenant des milieux socio-économiques défavorisés, plus vulnérables, où les opportunités de jeu peuvent être réduites et donc le SEL impacté (Girio-Herrera *et al.*, 2019). D'ailleurs, il est suggéré que les enfants avec plus de difficultés peuvent bénéficier davantage des jeux (Moya-Higueras *et al.*, 2023). Finalement, en rajoutant une procédure pour des classes inclusives, les jeux « *chEERS* » favoriseraient des opportunités d'interaction entre des enfants avec et sans besoins spécifiques (Davis-Temple *et al.*, 2014).

Conclusion

En croisant des approches quantitatives et qualitatives, notre étude met en lumière les perceptions positives des élèves de classe primaire à l'égard des jeux « *chEERS* » focalisés sur les CSE. Les résultats ont des implications pédagogiques importantes pour les pratiques

éducatives en Suisse dans les classes primaires. Un haut niveau d'acceptabilité peut soutenir davantage le processus d'apprentissage des compétences ciblées (Ninaus *et al.*, 2017). Alors que nos résultats suggèrent que les jeux « *chEERS* » s'avèrent des candidats prometteurs pour le soutien des CSE, il est indispensable que de futurs travaux soient menés pour évaluer leur efficacité en tant qu'intervention. Par le contenu et leur mécanique (l'ensemble de règles), ces jeux pourraient répondre à la nécessité de mettre à disposition des enseignants des outils pour développer les CSE des élèves. Les études futures doivent s'intéresser aux manières d'impliquer activement les enseignants et leur permettre d'endosser le rôle de porteurs principaux de ce type d'outil en classe.

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3.4 Study 4⁴

Youths' perspectives on school-based socio-emotional learning tools: board games, improvisational theater, and mindfulness: acceptability and feasibility

⁴ Zaharia, A., Mella, N., Rey, G., Piguët, C., Sander, D. & Samson, A. C. (2025). *Youths' perspectives on school-based socio-emotional learning tools: board games, improvisational theater, and mindfulness: acceptability and feasibility*. [Manuscript submitted for publication]

Abstract

Implementing school-based socio-emotional learning (SEL) methods for adolescents is challenging, and evidence regarding the acceptability and the feasibility remains limited. However, local public policies call for reinforcing the SEL in school, but without providing specific recommendations. Based on data from 365 adolescents collected in three secondary schools, we examined acceptability of three SEL methods – board games, improvisational theater (improv), and mindfulness – compared to a control condition. Additionally, trainers' and teachers' feedback was analyzed. Students' ratings indicated that board games and improv, which involve playful and social-oriented components, are perceived more enjoyable than mindfulness and control. Moreover, improv was rated more interesting than mindfulness and control, and more useful than mindfulness. No significant differences were found across the SEL methods in external trainers', nor teachers' evaluations. The article further discusses the facilitators and barriers found in the implementation of SEL methods in schools, based on the quantitative and the qualitative results. Finally, it outlines key considerations and future perspectives for the adaptation of SEL methods in order to better answer students' needs.

Keywords: acceptability, board games, improvisational theater, mindfulness, adolescence

Introduction

In recent decades, socio-emotional learning (SEL) methods have received increased attention from public policymakers across various countries and strengthened their presence in schools to support youth's development, well-being, and academic performance (Greenberg, 2023; van de Sande et al., 2019). SEL programs teach transversal competencies meant to trigger adaptive responses to environmental challenges, favoring resilience and healthy relationships (Durlak et al., 2011). Such skills are also applied beyond the classroom, positioning SEL as a key component in educational and mental health promotion strategies (Greenberg, 2023; Napolitano et al., 2021; Portela-Pino et al., 2021).

Overall, SEL programs addressed to children showed long-term and large-scale effects on both socio-emotional competencies and academic grades (Durlak et al., 2011; Greenberg, 2023; Zins & Elias, 2006). However, school-based SEL programs target less frequently adolescents compared to children, and their implementation is lower in Europe compared to North America (Greenberg, 2023; Lynn et al., 2024; Mertens et al., 2022; van de Sande et al., 2019; Yeager, 2017). In Switzerland, the context of this study, the public policies are now inspired by advances in learning and pedagogy, and affective and developmental psychology (Conférence intercantonale de l'instruction publique, n.d.; Dutrévis & Rastoldo, 2020; Gilbert Voide Crettenand, 2023; Schweizerische Konferenz der kantonalen Erziehungsdirektoren, n.d.). These policies emphasize the importance of socio-emotional skills (i.e., also known as transversal or psychosocial competencies) and encourage teachers to integrate these in both primary and secondary school curricula.

Adolescence is indeed a core developmental stage marked by significant changes in different interrelated areas (e.g., physical, neurobiological, cognitive, socio-emotional), profoundly shaping one's life experiences (McLaughlin et al., 2015; Scheu & Xu, 2014). The increased emotionality in adolescence may lead to frequent and intense emotions and emotion

regulation difficulties, which may raise the risk of psychopathologies, such as affective disorders (Guyer et al., 2016; McLaughlin et al., 2015; Young et al., 2019). However, these findings vary across cultures and individuals, lacking generalizability (Backes & Bonnie, 2019; Portela-Pino et al., 2021). The heightened neuroplasticity in adolescents supports their responses to socio-emotional stressors and also render them vulnerable to the environmental demands (Baker et al., 2025). Moreover, the first work-related experiences emerge at this age (Mertens et al., 2022). Adolescents also experience novel and more diverse social interactions, becoming more attuned to others' perspectives (Guyer et al., 2016; Mertens et al., 2022; Yeager, 2017). Therefore, the interest to develop programs supporting their socio-emotional skills through these transitions is even greater (Dutr vis & Rastoldo, 2020).

Implementing SEL programs in adolescents is challenging. Few programs were found efficient for adolescents, who often evaluate them less appealing than children do (Durlak et al., 2011; Yeager, 2017). Experts argue that a meticulous adjustment to their developmental stage is crucial to reduce adolescents' perceptions of stigma, condescension, or irrelevance in regard to the skills they train. In addition, adolescents may exhibit limited motivation to engage in these programs, particularly when they sense that their need for autonomy and preference to learn through personal experience and natural consequences are undermined. This challenge may be overcome by supporting independent choice and exploration (Yeager, 2017). Finally, data about acceptability or satisfaction, feasibility, or implementation quality is infrequently reported, but it could reveal in-field facilitators and barriers and help shape better approaches for implementing SEL programs in secondary schools (Greenberg, 2023; Mertens et al., 2022; van de Sande et al., 2019).

Various approaches and heterogeneous instructional methods are used in SEL programs for adolescents to reach their goals (Durlak et al., 2011; Jones et al., 2022). The common ones are didactic instructions (e.g., teachers' lectures or presentations), class

discussions, and worksheets (Jones et al., 2022). Some programs may include playful material and gamified tools (Brackett & Rivers, 2014; Durlak et al., 2011; Theurel & Gentaz, 2015), or mindfulness practices (Dunning et al., 2022; Montero-Marin et al., 2023). However, the student-centered methods (e.g., play, meditation) are rarely integrated (Jones et al., 2022).

Play is undoubtedly a valuable educational learning tool to consider in supporting socio-emotional skills and transmitting knowledge (Dell'Angela et al., 2020; Zaharia et al., 2022), as well as promoting mental health (Gray, 2011). Interestingly, decline in play over the past half century is thought to contribute to the rise of psychopathologies in youth (Gray, 2011). Although play is most often associated with childhood, adolescents can engage in and benefit from play too, despite the changes in their needs and development (Else, 2014; Johnston et al., 2023; Zaharia et al., 2022). Play is an immersive, positive emotion-driven, and intrinsic-motivated activity that could significantly contribute to their development (Else, 2014; Johnston et al., 2023; Milgrom, 2005; Zaharia et al., 2022). Although typically omitted in higher education, play-based activities can support adolescents' emotional development and academic engagement (Breen & Daigneault, 1998; Conklin, 2014, 2015; Fine, 2014; Gallo-Lopez & Schaefer, 2005; Kéravec, 2015; Michaud, 2014). The play opportunities may be shaped by the socio-economic background and reduced exposure to play could further hinder socio-emotional skills (Girio-Herrera et al., 2019). However, aside from the extensive research on video games, there is little research about the nature of play in adolescence (Johnston et al., 2023; Scheu & Xu, 2014).

Board games, a structured rule-based form of play (Nicolopoulou, 1993), can reflect real-life situations and, hence, be perfect candidates for promoting socio-emotional skills (Portela-Pino et al., 2021; Schrier, 2016; Zaharia et al., 2022). In adolescence, they can motivate learning, stimulate communication, relieve tensions, support social interactions and various skills, and generate positive emotions (e.g., relaxation, fun; Breen & Daigneault,

1998; Clary, 1991; Gutiérrez-Medina et al., 2024; Milgrom, 2005; Robinson et al., 2021). Serious board games (i.e., educational board games) showed benefits on a variety of health-related topics (e.g., tobacco, sexual health, nutrition), and on reducing problematic behavior (e.g., bullying) in adolescents (Gilliam et al., 2019; Nieh & Wu, 2018; van der Stege et al., 2010; Viggiano et al., 2015). This approach facilitates group discussions around sensitive topics using a positive and fun frame and provides opportunities to approach emotion-related topics that are less accessible when using traditional methods (e.g., therapy; Bruneau & Protivnak, 2012; van der Stege et al., 2010; Wiener, Battles, Mamalian, & Zadeh, 2011). Research on theory-driven board games to promote socio-emotional competencies in adolescents using high-quality methodology is scarce (Lennon & Coombs, 2007; Nakao, 2019; Vacca et al., 2014). Some studies suggested that board games were positively perceived and enjoyed by adolescents when used in classrooms (Bettini et al., 2019; Hanghøj & Karnøe, 2024; Nautiyal et al., 2024; Sousa et al., 2023). Studies showing positive responsiveness to such approaches used methods such as student interviews, questionnaires (self-reported Likert scales, open-ended questions), teacher's feedback, and external observations. However, implementation outcomes (e.g., acceptability, feasibility) are not consistently assessed, and more research is needed to substantiate the potential of board games as a promising SEL tool (Bayeck, 2020; Gutiérrez-Medina et al., 2024; Hromek & Roffey, 2009; Noda et al., 2019).

Another promising playful gateway of SEL for adolescents is improvisational theater (improv) (Lovett Barr, 2022). Improv stimulates one's playfulness and spontaneous creativity, by including role-playing, story-telling, and fun games or exercises that follow certain principles and rules (Blonde et al., 2021; West et al., 2017). Few studies used improv as the only tool in SEL programs. In France, improv is officially recognized as a learning tool (EDUscol, 2017). Qualitative studies point toward benefits, but adolescent samples are often small, and quantitative studies are limited (Blonde et al., 2021). However, the few available

studies that use various methodologies to assess implementation outcomes (e.g., focus groups, survey, and semi-structured interviews) show high acceptance, satisfaction, positive perception, and strong engagement towards theater-based programs in adolescents (Alfonso-Benlliure et al., 2021; Felsman et al., 2019; Hanrahan & Banerjee, 2017; Lovett Barr, 2022; Mendelowitz, 2023). Moreover, this approach is found more acceptable and memorable than conventional teaching methods, when approaching intimate topics (Taggart et al., 2016). In some studies, students reported improvements in self-efficacy and socio-emotional skills and they found improv useful, with the skills easily transferable beyond the classroom (Alfonso-Benlliure et al., 2021; Felsman et al., 2019; Lovett Barr, 2022; Mendelowitz, 2023). Youths with risk for psychosis that were enrolled in an improv program reported benefits in various areas, such as going beyond their comfort zones, socialization and communication, acting, mental flexibility, perspective-taking, and open-mindedness (Tang et al., 2020). They also perceived improv as helpful to reframe previous beliefs and reduce anxiety. Among challenges, youths reported fluctuations in engagement with improv and related homework, repetitiveness, and trainers' vocabulary. Their motivations for engaging in improv included social relationships, the opportunity to learn, curiosity about the activity, a safe space to share emotions, the acting coach, and the monetary incentive.

Mindfulness is another approach growing in popularity and used in SEL programs, given its promising effects on reducing stress, anxiety, and depression levels (Dunning et al., 2022). In terms of efficacy, findings in general adolescent population are mixed (see Piguet et al., 2025). Indeed, studies on mindfulness-based interventions in schools for adolescents reported mixed results, inviting experts to rethink the use of mindfulness as a public health prevention tool (Galla et al., 2024). Regarding mindfulness implementation outcomes, these are not always clearly defined, data is limited, and findings are mixed (e.g., Gutiérrez-Domingo et al., 2024). Approaches to measure implementation outcomes, notably

acceptability, differ across studies: focus groups, surveys (including open-ended questions), interviews, or external coding. Some of the mindfulness programs implemented in socially or medically disadvantaged adolescents were positively rated (e.g., helpful, enjoyable) (Basch et al., 2024; Clarke et al., 2022) and show high acceptance rates and satisfactory feasibility (Klimo et al., 2024). In younger samples (9-15 years old), some studies showed high acceptability and overall satisfaction in non-clinical samples (e.g., Krebs et al., 2022; Piguet et al., 2025), while in students with increased mental health challenges evidence indicated poor engagement and responsiveness (e.g., Montero-Marin et al., 2023).

Current study

Given the mixed findings about implementation (e.g., acceptability, feasibility) of SEL programs in adolescents and the struggles to identify well-tailored methods, the current study aims to shed light on how adolescents perceive SEL programs. The main goal is to compare students' perception of acceptability on three new SEL programs implemented in secondary school classrooms (i.e., board games, improv, and mindfulness), as well as to explore their adherence. In addition, feedback from external trainers and teachers is examined to complement the view on SEL programs at two other implementation levels (i.e., delivery and school staff). Trainers' reports provide insights into the feasibility of the programs. Finally, teachers' feedback on acceptability and feasibility help evaluate the relevance of a future follow-up. As efficacy measures are discussed elsewhere (Mella et al., 2026), the present study provides new perspectives on the success of implementation of school-based programs for adolescents and recommendations for future adaptations.

Method

Sample

Forty school classes from three secondary vocational schools in Geneva, Switzerland, agreed to participate. These schools are characterized by a predominantly culturally diverse

and allophone student population, mainly originating from under-resourced socio-economic backgrounds (Dutr vis & Rastoldo, 2020). All participants were informed about the study during a class presentation given by the researchers. Following a cluster quasi-randomization, the classrooms were assigned to one of the three experimental groups (i.e., board game-based, improv, and mindfulness), or to the active control group (digital literacy). The assignment of classes to groups also depended on the class teachers' approval. Out of the 471 students officially listed in school records, 365 students provided signed consent forms agreeing for their data to be used in research (78% of the initial list; k=38 school classes; see Figure 1). For students under 18 years old, parents also provided informed consent. A high heterogeneity of reasons for which the consent was not obtained from the remaining 23% of participants was observed: formal refusals, school dropouts or changes, regular absentees, prior participation in the pilot study, and missing parental consent due to parent's absence or challenging circumstances (e.g., language barriers). The study has been approved in Switzerland by both the Ethics Committee of the Faculty of Psychology and Educational Sciences of the University of Geneva ( PSE-2019-11-04.22), and the Service of Research in Education (Service de la Recherche en Education – SRED) of the State of Geneva. The new methods were approved by the school administration and implemented as part of the school curriculum. Participants for whom signed consent forms were not obtained were allowed to enroll in other activities or to participate in the sessions without data collection.

The four groups significantly differed in age ($F(3,356) = 14.80, p < .001, \eta^2 = .11$). Post-hoc Tukey tests revealed significant differences in age between the active control and the other three groups, as well as between improv and mindfulness groups (see Table 1). No significant difference in gender was found between groups ($\chi^2(3, 365) = 7.28; p > .05$; see Table 1). Regarding socio-economic information, professional status of participants' parents is described in Table 1. Due to implementation difficulties inherent to the classes, two of them

were administered non-standardized activities ($k = 2$; $N = 13$) and excluded from the students' adherence and feedback analyses. Due to absenteeism, 36 participants did not fill in the satisfaction questionnaire. Among them, 7 were absent along all the sessions. See Figure 1.

Figure 1

Flow of Participants through Study Phases

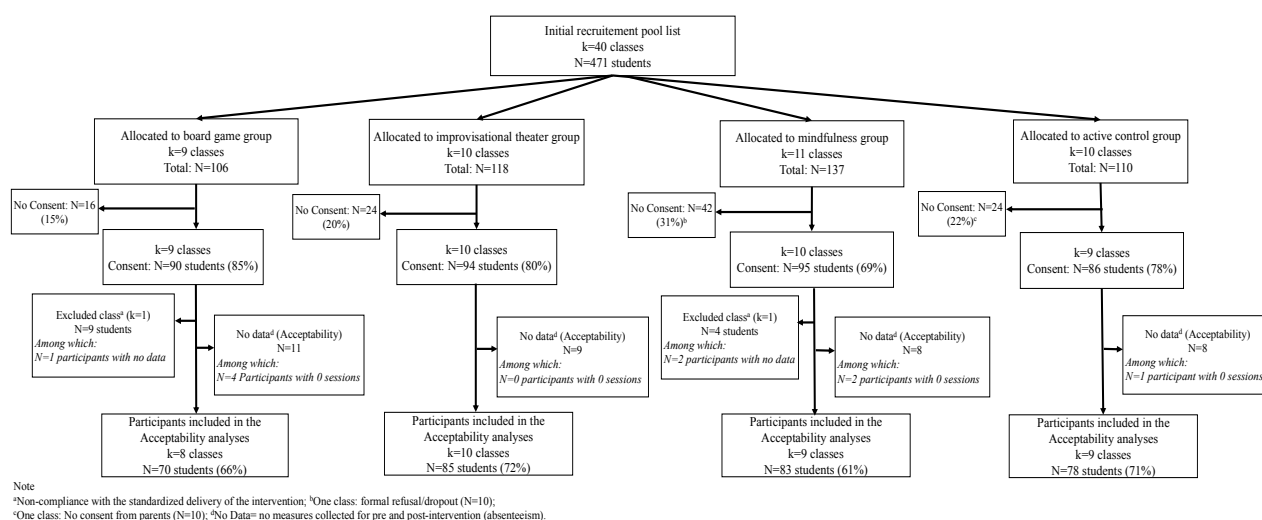


Table 1

Participants' Socio-Demographic Characteristics

	Board game (N=90)	Improv (N=94)	Mindfulness (N=95)	Control (N=86)
Age (years)				
Min.-Max.	15-25	15-23	15-17	15-26
Mean (SD)	16.76 (1.69)	16.96 (2.04)	16.06 (0.64)	17.96 (2.65)
Missing data (N)	0	0	9	0
Gender ratio (N)				
Female/Male	36/54	39/55	43/52	23/63
Parents' professional status - N(%)				
Managers/executive officers	4 (4%)	0 (0%)	2 (2%)	6 (7%)
Freelancers/self-employed	6 (7%)	5 (5%)	5 (5%)	3 (4%)
Middle-ranked employees/managers	16 (18%)	22 (23%)	16 (17%)	9 (10%)
Manual workers/laborers	32 (35%)	38 (41%)	42 (44%)	26 (30%)
Unclassified/Other	15 (17%)	21 (22%)	4 (4%)	33 (38%)
Missing data	17 (19%)	8 (9%)	26 (28%)	9 (11%)

Note. Total $N=365$. N =number of students, SD =standard deviation, Unclassified/Other=e.g., unemployment, stay-at-home parents, participants in youth centers.

Procedure

A pilot study preceded the main study and led to the refinement of the methods used and material. The main study started at the beginning of the academic year (September 2021), over a duration of 4 months (until December 2021). Additional measures (e.g., mask wearing, physical distancing) were taken to respect the sanitary rules during the Coronavirus Disease of 2019 (COVID-19) pandemic. A set of questionnaires and tasks (efficacy measures presented elsewhere, Mella et al., 2026) were administered at baseline, over two 90-minute sessions at two time points: one week before (Time 0) and one week after the SEL program (Time 1). At Time 1, a satisfaction questionnaire was administered to participants to assess programs acceptability. The questionnaires and tasks were administered on computers, in a classroom setting, using a secure on-line platform: Qualtrics (www.qualtrics.com). During testing session, researchers provided participants with their unique individual codes and assisted them throughout the process. All 9-session activities were administered by trainers external to schools at a frequency of one 90-minute session per week (corresponding to two school periods), starting one week after Time 0. After every session, trainers completed an online questionnaire on Qualtrics, to document the feasibility of the method delivery (quality of the implementation). After the study, class teachers were asked to fill in an anonymous survey about their perception of acceptability and feasibility of the implementation of such methods in classrooms.

Material/Measures

Adherence

First, the number of available signed consents was counted per group. Second, participants' attendance was calculated as the average number of sessions they attended.

Students' feedback

To evaluate the acceptability of the methods, a self-reported 9-item satisfaction questionnaire was administered to students one week after the end of the program (Time 1). Students rated their motivation to participate, enjoyment of the activity (i.e., how much they liked it), their engagement (i.e., perceived active participation), the program's perceived utility, their level of interest, and perceived difficulty on a continuous scale from 0 (not at all) to 100 (very much). They were also asked to assess the interactions with trainers, classmates, and classroom teachers (0 = very unpleasant; 100 = very pleasant). Finally, students answered two open-ended questions: the first one referred to what they like about the method (i.e., "like": What did you like about the intervention?) and the second one to what they dislike about it (i.e., "dislike": What did you dislike about the intervention?). Students' verbatim answers (i.e., free text comments) were coded by two raters and categorized based on the emergent main themes. Each answer was assigned to a single category. The overall interrater percent agreement (the number of agreements divided by the total number of coded answers – $N_{\text{total}} = 316$) was 83% for Question 1, and 85% for Question 2. The overall interrater reliability of Cohen's Kappa was .81 for Question 1 and .82 for Question 2, interpreted as a near perfect agreement. Given the high interrater agreement, conflicts were solved through discussion between the two raters. Then, final percentages for each response category were calculated based on the total number of answers within each group. Non-codable answers were removed from the calculation and illustration.

External trainers' feedback

To assess feasibility of the SEL methods in the school setting, a questionnaire measuring the quality of implementation was administered to the trainers delivering the experimental school programs (board games, improvisational theater, and mindfulness). The questionnaire was filled in at the end of each session (i.e., at nine timepoints). It included two

main questions: the first one assessed the objective achievement (i.e., Did you manage to achieve the planned objective during the session?) and the second one the difficulties encountered during the session (i.e., Did you encounter difficulties that interfered with the session flow?). Trainers were asked to choose one of the following answers: “Yes”, “A little”, “No”. Finally, the trainers who reported difficulties were asked to select the type of difficulty they have encountered by answering a multiple-choice question. Multiple answers were allowed. The occurrence for each type of difficulty was counted, as well as the percentage out on the total count.

The board game trainers were also asked to report the group dynamics and the occurrence of cheating behavior during play. For the group dynamics, game masters answered one question after each play session (i.e., How do you estimate the quality group dynamic during the game play?) on a Likert scale from 1=not good at all at all to 5=very good. An average across the trainers per each session and class was calculated.

Teachers’ feedback. Additionally, to evaluate acceptability and feasibility aspects, as well as the relevance of a future follow-up study wave with an improved program, class teachers were sent an on-line anonymous survey, post-study. Teachers answered 11 items, using a continuous scale from 0 (disagreement) to 100 (agreement). Hence, they provided feedback about the enjoyment, utility, appropriateness, whether they found the activities stimulating, and evaluated the pleasantness of the contact with trainers and students during sessions. Next, three questions referred to the class climate: teachers evaluated whether the methods had a positive influence on the relationship between students, between teacher and students, and on the students’ attention/engagement in classroom. They were also asked whether they wish to continue using the the SEL tools in class, as well as for themselves. Finally, they were asked whether they recommend the program to other colleagues. Teachers could fill in the survey for each participating class. As some classes had co-teachers, some teachers may have

completed the survey for the same class. Teachers who did not participate in the activities filled only the questions about class climate.

SEL programs

Board games

The board game-based intervention was delivered by research team members, with psychology background. They were trained in board game mastery by A.Z, a certified generalist in serious games, who underwent a board game master training. Although they were encouraged to join the sessions, classroom teachers' participation was inconsistent. In 4 out of 9 classes, teachers participated to the entire program.

Structure. Each 90-minute session started with a 10-minute administrative part to verify the attendance list. Then, each session continued with an approximatively 20-minute briefing which defined the concepts used in board games (e.g., emotion, emotion regulation, recognition, emotion regulation strategies), using a presentation with slides. The concepts were illustrated using daily life scenarios, videos and images, short visualization, and/or question and answer exercises. Students were encouraged to participate, provide examples, share ideas, and ask questions. Next, they were assigned to one of the 2 or 3 groups of players. The following 60 minutes continued with a play demonstration provided by the game master and then students were invited to play the board games themselves. Debriefing was conducted during the play and at the beginning of the next session. For the detailed session content, including the board game variations, see Figure S1, Supplementary Material.

Board Games Description. The board games are part of the kit entitled chEERS Games, invented by three of the authors, Zaharia, Sander, and Samson (2021).

The first game, the Theater of Emotions, engages players in emotion expression and recognition. Two card decks are provided: one for each valence (pleasant and unpleasant), each with three difficulty levels. Three emotion cards are drawn from each deck, presented on

the board and assigned a number from 1 to 6. During their turn, the player, “the actor”, is required to roll the 6-sided dice and convey the emotion indicated by the dice while verbalizing a sentence randomly chosen from a provided deck. The other players, the “spectators”, endeavor to guess the expressed emotion. The actor wins as many points as the number of spectators who have guessed correctly the emotion the actor was supposed to express. The spectators win 1 point each when they guess the actor’s emotion. The goal of the game is to accumulate points by advancing their tokens along the two tracks on the board: one designated for when the “actor” role (emotion expression) and the other for the “spectator” role (emotion recognition).

The second game, the Kitchen of Emotions, encompasses three versions. In the first version, players engage in emotion differentiation. Six, nine or twelve (depending on participants’ experience level) daily life situations chosen randomly from a provided deck were presented on the board. During their turn, the player, “the chef”, is required to roll the corresponding dice (6-, 9-, or 12-sided) and invite others to guess the situation indicated by their dice. The “chef” player may give only one clue, which is an emotion chosen from a non-exhaustive list. The second version provides knowledge about emotion regulation strategies. The “chef” must provide two clues: the emotion generated by the situation (as above) and an emotion regulation strategy chosen from two of the four available lists. The third version taps into emotion comprehension. Six, nine or twelve emotions are randomly chosen from the deck and placed on the board. After the dice roll, “the chef” invites others to guess the emotion indicated by their dice by giving as clue their own “recipe”. The “recipe” is a real or imagined situation that could generate the emotion indicated by the dice. For all the three versions, the other players, the “gourmets”, must guess the situation or the emotion based on the clues given by the “chef”. The chef wins as many points as the number of gourmets who make a correct guess. The gourmets win 1 point for each correct guess. As previously, the

goal is to accumulate points by advancing their tokens along the two tracks: one designated for when the players play the “chef” and the other one for when they play the “gourmet”.

Improvisational theater

The sessions were delivered by certified instructors of a local improv club. Each session followed a specific theme and trained various competencies, such as: cooperation, self-confidence, decision-making, imagination, openness to others’ ideas. The detailed program is presented elsewhere (Mella et al., 2026).

Mindfulness

The mindfulness-based program is an adaptation of the Mindfulteen program for adolescents (Piguet et al., 2022). Therefore, the mindfulness exercises were adapted for adolescents in terms of duration (e.g., meditation practice between 2-10 minutes). The activities were delivered by three certified instructors. The main program themes were attention, acceptance, awareness of bodily sensations, emotions and thoughts, breathing, non-judgement, stress and relaxation, kindness and gratitude, and trust. The detailed description is presented elsewhere (Mella et al., 2026).

Active Control Group: Digital Literacy for Job Applications

The active control group underwent a program focused on digital literacy meant to teach participants computer and job search related skills, such as: use of Microsoft Word to edit a Curriculum Vitae and motivation letter, and Microsoft Powerpoint for future job applications and presentations, data protection knowledge, use of common types of files and extensions (e.g., Portable Document Format), use of web and on-line libraries for document research, use of e-mail, electronic agendas, and Google tools for education and collaboration (GSuite, Classroom). The activity was organized by schools and provided by external trainers.

Data analysis

Due to significant age differences between groups, age was included as a covariate when examining students' feedback. ANOVAs investigated whether there are group differences in students' answers and attendance. When F-tests reached significance, Tukey post-hoc tests were run. Chi-squared tests were run to analyze group differences in adherence rates (i.e., consents), as well as in trainers' responses (i.e., objective achievement, encountered difficulties). For additional analyses, due to small and unequal group sizes, differences in teachers' feedback were tested using Kruskal-Wallis H non-parametric tests. The statistical tests were run in the IBM SPSS Statistics software, version 29.0.2.0. The figures were created in R-Studio version 3.6., using "mice" (van Buuren & Groothuis-Oudshoorn, 2011) and "corrplot" packages (Wei & Simko, 2021).

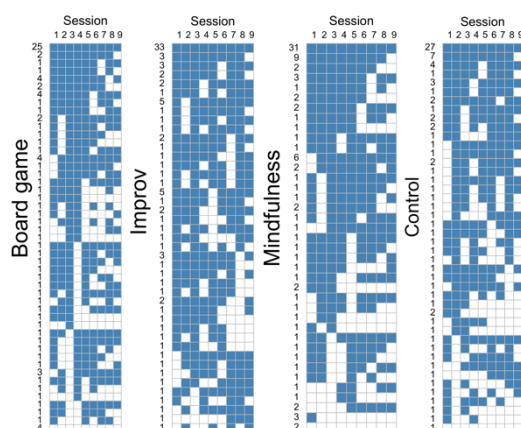
Results

Adherence

First, a chi-squared test of independence revealed that there is a significant association between group and the consent rates ($\chi^2(4,471) = 8.9, p = .031$). A significant follow-up chi-squared tests suggest that there are more signed consents collected in the board game group than mindfulness group ($\chi^2(2,243) = 7.97, p < .05$). Second, there is no significant difference in the attendance average according to the groups ($F(3,348) = 2.27, p > .05, \eta^2 = .02$). However, when age is introduced as a covariate the result reaches significance: $F(3,339) = 2.90, p = .035, \eta^2 = .03$). Post-hoc t-test indicate that attendance average in improv is higher than both board game and control groups ($p < .05$). On average, students participated to 7 out of 9 sessions (for a detailed description see Table S1, Supplementary Material). Participants' attendance over time, across sessions and groups is presented in Figure 2. Due to technical issues, in the mindfulness group, the data regarding the presence over sessions for one participant and in session 9 for 14 participants (one class) is missing.

Figure 2

Participants' Attendance Across Sessions and Groups



Note. Each row aggregates participants with the same attendance pattern. Numbers on the left of each row represent the number of students with the same attendance pattern across time.

Blue cells represent presence during the session. White cells represent absenteeism.

Students' feedback

Satisfaction questionnaire

Regarding the satisfaction questionnaire assessing the acceptability, separate univariate ANOVAs were run for each item. See Table 2. No significant difference is found in the self-reported scores according to the group on motivation scores. Significant differences according to the group are found in the other eight self-reported scores. The F-test remains significant when age is introduced as a covariate for the following items: enjoyment ($p < .001$), utility ($p = .006$), interest ($p = .007$), contact with trainers ($p = .010$), with classmates ($p = .035$), and with class teachers ($p = .005$). For self-reported participation and difficulty scores, the F-test reaches only a marginal significance after introducing age as a covariate ($p = .05$ and $p = .056$, respectively).

Tukey post-hoc tests were run for follow-up analyses on each significant F-test. First, improv is rated more likable than control activities ($p = .008$) and mindfulness ($p = .005$).

Students in board game group rate the activity more likable than those in control ($p = .039$) and those in mindfulness group ($p = .027$). Another post-hoc test shows that improv was perceived more useful than mindfulness ($p < .001$). On the self-reported participation scores, the post-hoc test reveals that scores are significantly higher in the improv than mindfulness group ($p = .015$). Next, the follow-up tests reveal that participants in the improv group find the sessions more interesting than both participants from control and mindfulness groups ($p = .037$ and $p = .043$, respectively). A post-hoc test shows that improv is perceived more difficult than mindfulness ($p = .022$). Moreover, contact with trainers is rated as more pleasant in the board game group compared to control group ($p = .003$). Participants in the improv group report a more pleasant contact with classmates compared to participants in the mindfulness group ($p = .024$). Finally, contact with class teachers in the board game group is rated more positively compared to the control group ($p = .019$). For more information, see Table 2.

Table 2

Mean and Standard Deviation Across Groups for Each of the Satisfaction Questionnaire Items

	Board game	Improv	Mindfulness	Control	<i>F</i> -test (3,316)	<i>p</i> - value	η^2
<i>N</i>	70	85	83	78			
Motivation	49.19 (34.60)	49.72 (33.21)	42.94 (31.05)	47.56 (33.91)	.71	ns	.00 7
Enjoyment	68.93 (29.40)	70.76 (26.67)	55.87 (27.26)	56.27 (31.51)	6.21	<.001	.06
Utility	57.94 (27.24)	67.76 (25.81)	49.81 (27.20)	57.87 (32.40)	5.70	<.001	.05
Self-reported participation	73.73 (28.11)	76.28 (24.36)	63.28 (29.17)	69.10 (30.46)	3.41	.018	.03
Interest	67.10 (28.32)	69.60 (27.73)	57.93 (25.91)	57.53 (32.39)	3.81	.011	.04
Difficulty	30.54 (29.97)	32.84 (29.63)	20.25 (25.21)	26.29 (28.23)	3.15	.025	.03

Contact with facilitators	79.83 (26.21)	74.26 (23.62)	75.19 (24.95)	65.05 (27.57)	4.42	.005	.04
Contact with classmates	74.30 (29.16)	79.06 (22.08)	67.66 (26.36)	70.35 (26.29)	3.05	.029	.03
Contact with class teachers	77.93 (28.89)	72.26 (27.57)	68.19 (32.32)	63.55 (30.53)	3.11	.027	.03

Note. ns=not significant.

Open-ended questions

Percentages of the categories resulted from the verbatim analysis are presented in Figure 3. “No answer” category also encompasses responses such as: “not sure” and “I do not know”. In each group, 2 to 3 answers were identified as non-codable (not valid). Percentages of answers distributed in each group across categories, questions, and groups are illustrated in Figure 3.

When asked what they like, around 90% of students in each group specify a reason. In the board game group, 15% of students like everything about the method and other 37% like the method features (e.g., the board games, play, and game mechanics - guess emotions or emotional situations). Around 12% report they like learning new skills (e.g., learning about one own’s and other’s emotions). Other 12% of answers fall under the category of enjoyment, related to the fun atmosphere and the positive emotional experience (e.g., laughing, amusement). In the improv group, 30% of students like everything and 20% appreciate the method features (e.g., collaborative and solo theater-related exercises, creativity/imagination, active movement, loud expression). Other 16% appreciate socializing with their classmates. Learning about their limits/comfort zone and self-expression are categorized under “learning new skills”. In the mindfulness group, 15% of students like everything and 30% like features such as: relaxation, sleeping, respiration, image use, calming and physical exercises, and complimenting others. 14% like learning skills related to emotion and stress management. In mindfulness, 7% appreciated the physical gamified material used in the sessions. In the active

control group, 14% of students like everything and 39% like newly learnt skills related to job search and computer use. Other 12% like the contact with trainers.

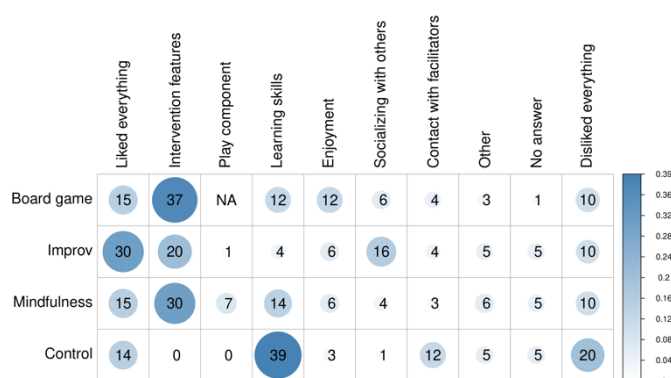
When asked what they dislike, 10% of students and less in each group reported they have disliked everything. The category “Liked everything” includes answers such as: “nothing (to dislike)” or “I liked everything”. When mentioning sources of dissatisfaction, expressing in front of others is the category in which most of the responses of the board game and improv groups fall (16% and 20%, respectively). In the mindfulness group, 19% are unsatisfied by the perceived lengthiness of meditation exercises, the silent moments, the respiration and the attention-related exercises. Other 18% do not know what to answer, nor point towards a specific reason. In the active control group, 23% of responses mention boredom as an unpleasant aspect.

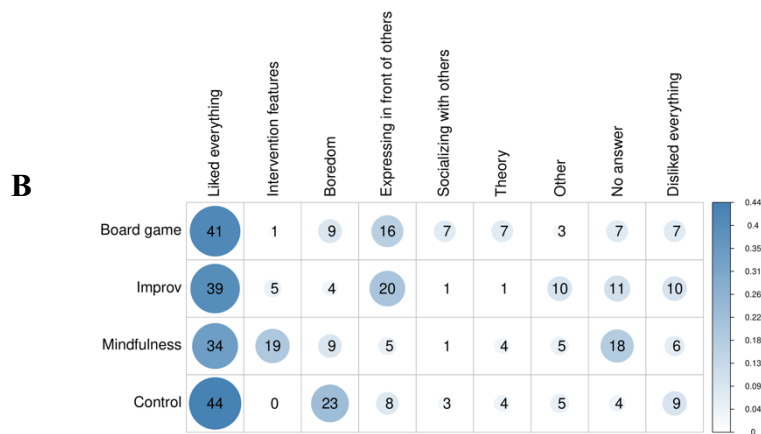
Responses categorized as “Other”, are noteworthy. A few students appreciate the novelty brought by board games and improv and the active participation requirement. A few others are not satisfied with the early-morning scheduling, high exercise difficulty, and contact with trainers and class teachers.

Figure 3

Percentage of Answers in Each Group Distributed Across Categories

A





Note. A=What did you like?; B=What did you not like?. NA=not applicable.

External trainers' feedback

Quality of implementation. There are no significant differences between groups across the distribution of trainers' answers (objectives achievement: $\chi^2(4, 254) = 4.66; p > .05$; encountered difficulties: $\chi^2(4, 251) = 8.58; p > .05$). For more details, see Table S2, Supplementary Material.

Board game group dynamics

The group dynamics overall mean during the standardized board game sessions across 8 classes is estimated at 4.28 ($SD = .08$). In each class, the mean group dynamic over the 9 sessions is estimated above the average. The game masters have reported cheating in 47% of the total board game sessions for which feedback was collected, across all classes.

Teachers' feedback

There is a considerable imbalance in the number of responses across groups which limits the interpretation of results. Kruskal-Wallis H tests show no significant differences between groups across items beside the one evaluating how stimulating the activities were ($H(3)=8.44, p = .038$). Post-hoc pairwise comparisons reveal that the control activity ($M = 52.75, SD = 15.39$) is perceived less stimulating than improv ($M = 91.00, SD = 8.77, p = .018$), as well as than board game activity ($M = 73.33, SD = 36.87, p = .010$). Overall, active

participation of teachers during the activities along with students is rather high (76%). Most teachers (64%) recommend the activities to their colleagues. Less than half teachers (42%) manifest interest in receiving training in mindfulness and improv exercises. For more information, see Table S3, Supplementary Material.

Discussion

Our main objective was to investigate the acceptability and feasibility on three different SEL methods (i.e., board games, improv, and mindfulness) that were delivered to adolescents in secondary schools by external trainers. The focus was particularly on adolescents' perceived acceptability, as well as their adherence, including attendance rates. Additionally, feedback from trainers and teachers was corroborated to gain a more comprehensive perspective on the implementation of these programs. To our knowledge, this is the first comparative study of implementation outcomes (here referred to as adherence, acceptability, and feasibility) of SEL programs using various approaches with adolescents in schools. The current study brings a multi-informant view on the SEL program implementation, bringing together self-reports collected from different sources: students, trainers, and teachers, which is a rare but useful practice. This study provides valuable information contributing hence to the ongoing discussion on SEL program use for adolescents and future design considerations.

First, when controlling for age, groups differ in attendance: students in improv show a higher attendance than those in board game and control groups. However, this estimation is subject to biases. On one hand, adherence may be underestimated given that the sessions were part of the school schedule and that students without a signed consent for data use were allowed to participate to the sessions. On the contrary, when a SEL method is integrated in the curriculum, it is mandatory and, then, attendance may be overestimated.

Second, board game and improv sessions are significantly more enjoyed than mindfulness and control ones, underscoring their relevance as vectors for education and training in secondary schools. Board games and improv contrast with didactic approaches because they are more oriented on students' social play, active engagement, and self-expression. Our results show that these features appeal to adolescents. This is in line with previous work indicating that the use of interpersonal contexts and play in such activities support adolescents' engagement and satisfaction (Johnston et al., 2023; Meredith & Silvers, 2024). From a developmental perspective, adolescents' natural interest stands in increased socializing. Engaging adolescents in healthy forms of play with others may be important to reduce the tendency to dangerous forms of play (Else, 2014).

In the board game group, contact with other adults (i.e., trainers, teachers) is perceived more pleasant than in the control group. This could be related to the close interaction in small groups in the board game sessions. Trainers are trained board game masters, stimulating the immersion and flow, and offering constant debriefing during play. Cheating or other difficulties were addressed with supportiveness, curiosity, and call to share. Moreover, in most of the sessions, teachers played too. This result may support the view on board games as an intergenerational bridge promoting social connection across generations (Zaharia et al., 2022).

Improv is rated more interesting than both mindfulness and control sessions. Moreover, improv is perceived more useful, the contact with classmates more pleasant, and the perception of self-participation higher than mindfulness. This may be due to certain components such as active engagement and cooperation which strengthen the sense of community and relationships (Lovett Barr, 2022). Improv is also perceived more difficult than mindfulness. Perceived difficulty did not interfere with positive ratings in enjoyment and utility. This may indicate that play in improv challenges relevant processes in the zone of proximal development (i.e., zone slightly beyond one's current development of learning

processes which stimulates new acquisitions) (ZPD; see Zaharia et al., 2022). Although perceived as easier, mindfulness is rated lower on interest and utility, possibly reflecting reduced challenge level and goal relevance. Task comprehension and the developmental readiness of adolescents for mindfulness is then questionable, as recently suggested (Galla et al., 2024; Johnson et al., 2024).

Overall, the qualitative data suggests a high acceptability of all three SEL programs. Some categories emerging from students' responses are worthy to note. The board games are appreciated for their inherent play component (which includes play with others, self-expression, active participation), as well as for the positive emotional experience (i.e., enjoyment) and learning of new socio-emotional skills. In the board game group, a few students dislike the contact with classmates during play. This can be attributed to the competitiveness and to the fact that play groups were assigned by trainers. Some students were paired with peers they had less affinity for. The simulation of real-life situations in board games may trigger discomfort, unpleasant emotions, and tensions, and alter the intrinsic motivation and enjoyment (Eriksson et al., 2021; Panksepp, 2007). Indeed, the influence of peers is a developmental need that may impact adolescents' play behavior (Meredith & Silvers, 2024). However, these challenges nurture the emotional and behavioral repertoire and prepare adolescents for various social situations. Future adaptations may alternate group-choice formats and incorporate debriefing after these different experiences, supporting in this way youths' emotional awareness and understanding.

Improv is appreciated for its playful, self-expression, and social-oriented components. The results may suggest that socialization during learning activities holds an important role. Indeed, one previous study showed that one third of participants consider that social play supports learning (Turkay & Adinolf, 2012). Performing in front of others is disliked by up to one fifth of students in each of the board game and improv groups. As peers' perception is

crucial at this age, social exposure may create discomfort, but it seems, nonetheless, stimulating.

Mindfulness is appreciated for the relaxation techniques and learning of emotion and stress management skills. A few students appreciate the play components. To increase students' acceptability and engagement with mindfulness, recent studies recommend, indeed, to strengthen the social and the interactive components, such as through fun games (Pike et al., 2024; Shinde et al., 2022). However, the playful component may need more enhancement in the current program. Furthermore, almost one fifth of students show uncertainty regarding the dissatisfaction reasons, suggesting, probably, a limited understanding of mindfulness practice. Exercises demanding attention and inhibition skills are perceived as unsatisfying, indicating that these components may not be developmentally appropriate for some students (Johnson et al., 2024).

In the control group, a high percentage of students enjoyed learning job- and computer-related skills. They probably perceived the activity more relevant for their current professional objectives. Interestingly, this group also reports a high occurrence of boredom, which may suggest that the sessions were understimulating. However, it appears that learning can still occur in sessions perceived as boring. Furthermore, the learning process is usually associated with didactic instructional methods similar with the ones employed in control sessions. Hence, during the experimental programs, learning is less explicit, rendering students less aware of the learning value of the socio-emotional training. Nevertheless, integration of edutainment (i.e., material intended to be both educational and enjoyable) in teacher practice is a complex task given the unclear frontiers between fun and learning (Robinson et al., 2021). In experimental groups, the appreciation seems to lay in the nature of the activity rather than the perceived learning outcomes. Although the play enjoyment may not automatically predict successful learning, engagement with content is essential to it

(Bayeck, 2020; Hromek & Roffey, 2009; Iten & Petko, 2016). However, due to the unpredictable nature of play, learning may happen beyond knowledge transfer and behavior change and tap into areas that were not initially targeted (Bayeck, 2020).

Regarding trainers' feedback, there are no significant differences between the three programs in terms of the quality of implementation. The feasibility of such methods seems successful: most answers describe complete goal achievement and almost no difficulties during the sessions. Trainers report students' lack of motivation and discipline as common difficulties during sessions (Table S2, supplementary material), important to consider in interpreting efficacy (Mella et al., 2026). Interestingly, cheating in play was a common behavior, occurring in almost half of the play sessions. Cheating may indicate the presence of different profile types of players, potentially motivated by competitiveness and/or social bonding and quest for fun (Bartle, 1996). These interindividual differences occurring during play may considerably influence program acceptability among students. Cheating may be a sign of boredom and a strategy to increase challenge. However, this estimation remains inaccurate because of its non-uniformity, the difficulty to track individual cheating and repetitiveness, and the potential omissions in board game masters' reports due to successful cheaters.

Additional investigation on teachers' feedback shows, in general, no major differences between conditions. However, improv and board games are evaluated as more stimulating than the active control group. Descriptively, teachers rate all three experimental SEL methods above average on most items, indicating overall positive feedback. Most teachers engage in the activities and recommend them to their colleagues.

Limitations

First, several in-field barriers are important to consider during the delivery of the SEL tools in schools. Despite the consequent loss of participants compared to the initial

recruitment pool (see Figure 1), groups remain well balanced. Some parents did not provide consent due to unavailability as well as, potentially, to language barrier or unfamiliarity research studies. Discrepancies between the anticipated and the actual number of participants seem common in school research (Montero-Marin et al., 2021).

Second, research on SEL in adolescence rarely addressed the socioeconomic status of the school area or students. This holds an important role in the successful implementation and results generalization (Dunning et al., 2022; Durlak et al., 2022). Although most students completed our programs (see Table S1, supplementary material), the instability in school enrollment, absenteeism rates, and socio-demographics characteristics observed in our sample may indicate a population with under-resourced and/or disadvantaged background. It is advised to carefully consider students' diversity, socioeconomic background, and language barriers, as well as the school climate, and adapt the methods accordingly (Dunning et al., 2022; Mertens et al., 2022; Schachner et al., 2024). For instance, cultural differences exist in perception of adaptative emotional skills (Ford & Mauss, 2015), as well as in board game use and preferences (Bar & Otterbring, 2021). In multicultural settings, some authors recommend the use of theater-based approaches (Dimitropoulou & Leontopoulou, 2017).

Moreover, not only did the COVID-19 impact attendance rates (e.g., sickness, quarantine), but it also created suboptimal conditions for SEL program delivery due to sanitary measures. Nevertheless, the implementation outcomes and the sample size are satisfactory. To note, reaching the final amount of usable data required significant efforts put into staff resources, time investment, and sound planning, which should not be overlooked (Girio-Herrera et al., 2019).

Another limitation is the absence of implementation fidelity measures. Two classes underwent non-standardized customized protocols due to the specific characteristics of class

climate. Trainers' characteristics (e.g., enthusiasm) may also influence our findings (Mertens et al., 2022).

Future perspectives

Several questions remain open for future research. New SEL research may help expand these results and the subsequent conclusions.

First, as seen in our study, collaborations among multiple specialists (e.g., psychologists, game designers, actors), guarantee adolescents' high satisfaction with programs. These key synergies help establish optimal levels of stimulation, competitiveness, and fun necessary for acceptability and learning objectives (Gkintoni et al., 2024). Additionally, raising awareness in educational settings about research projects is crucial to strengthen the link between theory and practice (Gkintoni et al., 2024).

Second, given the differences in the acceptability of the SEL programs, future studies should run preliminary surveys to identify students, teachers, and/or schools' needs and the competencies to improve (Durlak et al., 2022). As shown by the range of students' answers, such methods may have a non-uniform impact due to the high heterogeneity in adolescent development (Mertens et al., 2022). Ideally, researchers should gather information on students' familiarity with the new unconventional approaches. Also, practicality and demand constructs could provide more information about the relevance of such programs for this age (Klimo et al., 2024). Moreover, participatory designs in which students contribute to the design of educational programs are considered beneficial for better targeting their needs (de Leeuw et al., 2020).

Next, given the acceptance rates and the program novelty, adaptations and replications should be considered (Axford et al., 2022). For instance, focus groups would be a valuable method to gain deeper insight of students' perceptions and support their engagement with content and learning (see Introduction). Given the school socio-economic heterogeneity, the

programs should undergo culturally sensitive adaptations to include materials and content to better address diversity and serve communities marked by structural inequity (Jones et al., 2022).

Furthermore, the teachers' role should be further explored. It would be important to assess the success of implementation of the present programs when teachers actively participate and/or are trained to deliver them themselves (Johnston et al., 2023). In our study, while encouraged, teachers' participation remained voluntary. Most were present during the sessions but had limited availability due to schoolwork duties. Although a majority of SEL programs are delivered by teachers (van de Sande et al., 2019), the devoted time and resources may be perceived as a burden (Greenberg, 2023). In schools with high absenteeism, teachers deal with delays in knowledge transfer and, hence, are less available to invest time in SEL. This aspect has important implications for school policies and use of SEL programs. Some authors invite to rethink teachers' training to help consolidate students' engagement (Montero-Marin et al., 2023). While students may show a preference for play-based approaches, their implementation success can be limited by teacher workload but also by the appropriate alignment of game design with educational goals (Greenhalgh et al., 2019; Hassinger-das et al., 2017; Nautiyal et al., 2024). Indeed, recent guidelines suggest a careful consideration of the links between game mechanics, players' emotions and interindividual differences, and implementation context (Epstein et al., 2021).

Finally, the current design with three experimental SEL methods versus active control group is a rare practice, but useful to observe differential outcomes. Adding a non-active control group (i.e., standard curriculum) is costly but could explain the influence of the program novelty or interaction with trainers on the results. Some authors suggest multi-component programs in which both teachers (Veiga Simao et al., 2021) and parents participate

(Durlak et al., 2022). However, in our sample, one third of parents are unemployed and/or participants leave in youth centers, making this goal hard to achieve.

Conclusion

In the context of a lack of studies that rigorously assess youth's perspectives on SEL programs, our study offers new evidence on their satisfaction with school-based methods and insights on what features appeal to them. Examining adherence, acceptability, and feasibility measures as implementation outcomes, three SEL approaches are compared. The present work explores three-dimensional feedback on new SEL programs proposed as alternatives to the traditional school methods. Overall, the results indicate a high satisfaction among adolescents towards all three programs and no significant differences in implementation quality. However, students tend to show greater enjoyment with improv and board games, which are characterized by high levels of playfulness and socialization. The difficulties they report having encountered during play with others, such as uncomfortable social interactions and exposure, may be a sign of underlying subsequent emotional and behavioral challenges (Mol Lous, 2014), but also inform on which opportunities may serve the ZPD-related learning processes and which skills they are likely to enhance (Zaharia et al., 2022). To better shape the learning opportunities and help individuals extend their repertoire of responses to environment, discussion groups for debriefing and stimulating reflexivity should be better accommodated (e.g., focus groups). Barriers reported by trainers, such as motivation or discipline, provide information on the school environment and should be anticipated and addressed with adaptability and flexibility. To carefully plan the implementation in schools, worksheets for SEL program selection can help choose and match the instructional methods and targeted skills with students and teachers' needs and goals, as well as with school culture and climate, while considering the benefits and the drawbacks (Jones et al., 2022; Poddar & Brush, 2022). By systematically integrating recommended guidelines (Durlak et al., 2022;

Jones et al., 2022), SEL programs may reach better successful rates, achieve implementation quality, and be perceived by adolescents more relevant for learning. Ultimately, this new evidence opens new avenues in the field of SEL for future research and educational policymakers.

Supplementary Information is available at:

<https://www2.cloud.editorialmanager.com/ijedro/download.aspx?id=111481&guid=7232f355-e065-4b04-aadc-3e1701e00711&scheme=1>

Data is available in a public, open access repository:

https://osf.io/xnvqc/?view_only=c6de180270c54f17a3f73fcee676d51e

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4 Discussion

The aim of this doctoral thesis was to contribute with new insights into emotional development and bring new perspectives in the field of education and psychology, notably on emotional competencies (EC) and positive emotions (PE). This work focuses mainly on youth, a developmental sensitive period, including youth with neurodivergent conditions, notably autism, as well as youth across different age groups (primary and secondary school levels). This thesis is built on findings from the four studies conducted across different research settings (i.e., individual/laboratory and group/real-world) and employing multiple methodologies. These included subjective (e.g., questionnaires) or objective measures (e.g., eye-tracking), quantitative and qualitative approaches in data collection and analyses, as well as both control-group and cross-sectional or longitudinal research designs. The thesis finally sought to provide practical directions for interventions in the field of education.

The introduction provided the foundation for outlining the main concepts, theoretical frameworks, and the rationale guiding the conception of the four studies presented in this thesis. It hence presented key concepts related to EC, including emotion regulation (ER), PE, and socio-emotional learning (SEL), by highlighting their relevance to emotional development and positive mental health outcomes in youth. The introduction elaborated on these concepts within a theoretical framework derived from affective sciences (Gross, 1998; Mikolajczak et al., 2009; Sander, 2025b; Scherer, 2007), as well as from positive psychology, with a focus on the broaden-and-build framework (Fredrickson, 2004), including its extension to the sense of belonging (Seehagen et al., 2025), as a crucial foundation for experiencing PE (Garland et al., 2010; Quoidbach et al., 2010). See Figure 1.

Overall, the results provided new insights into the study of EC and PE in youth concerned by autism, as well as in youth in school settings. They first addressed mechanisms in visual attention to stimuli eliciting PE in early development, as well as the efficacy (*Study*

2) and/or the acceptability (*Study 2, 3 and 4*) of psychoeducational tools designed to promote EC and PE for different young populations and settings.

For the first research axis focused on autism, two parallel studies examined PE and EC in autism from different angles. First, *Study 1* showed the extent to which visual attention in the early stages of life is associated with symptom severity, particularly in the social affect domain, and discusses how this may shape the experience of PE in autistic children. PE is an important domain of study in affective sciences, given its role in ER, both as a target and a mechanism, as previously explained in the introduction (Quoidbach et al., 2010, 2015). Both PE experience and ER processes may be different in autistic individuals when compared to their neurotypical peers and may be associated with certain challenges when viewed through a normative lens within society (Cai et al., 2018; Cai & Samson, 2025; Moreno, Manfredi, et al., 2026). Although research on autism has predominantly focused on negative emotions (Dykshoorn & Cormier, 2019), *Study 2* built on growing knowledge of the link between PE and ER (Quoidbach et al., 2015; Weytens, 2014). It therefore evaluated a brief training program targeting positive emotion regulation (PER), which demonstrated that it could help autistic youth to increase the use of adaptive ER strategies, with effects maintained up to 7 weeks.

The second research axis (*Studies 3 and 4*) adopted a field-based approach by introducing an ambitious and creative psychoeducational tool in the form of a board game kit, the *chEERS Games* (Zaharia, Sander, et al., 2021). The *chEERS Games* were implemented at different stages of the design process across two parallel studies, involving distinct age groups. Enablers and obstacles in their implementation in classrooms of different schools were explored. The results indicated high levels of acceptability among both primary and secondary school students, suggesting that play was perceived as an enjoyable activity and that emerging positive emotional experiences acted as a motivational factor. Some

participants also demonstrated emerging awareness of EC. In addition, several barriers were identified in students' responses and are addressed in the following sections.

The body of findings from this thesis are examined below in more detail in relation to the current knowledge, the theoretical contributions and the practical implications.

Limitations and future perspectives are further outlined.

4.1 Theoretical Contributions

All four studies provide valuable insights and stimulate further theoretical reflection on the conceptual framework presented in the introduction, with each study contributing to different aspects of the proposed framework and offering complementary perspectives (See Figure 1).

4.1.1 Emotions in Autism Through the Positive Psychology Lens

The first two studies explored, for the first time to our knowledge, different facets of PE in autism, including early mechanisms of visual attention and the efficacy of an intervention targeting PER. Both PE and ER may be expressed and experienced differently in autism than neurotypical individuals (Moreno, Manfredi et al., 2026; Cai & Samson, 2025). Given the particularities of PE and ER in autism and the limited evidence currently available on PER, this line of inquiry appears relevant and is a promising starting point for further exploration. The studies contribute to the emerging field and application of positive psychology in autism as well as the neurodiversity approach, shifting the perspective from deficits to positive experiences (Dykshoorn & Cormier, 2019).

Study 1 is the first attempt to investigate visual attention toward social stimuli meant to trigger PE, particularly a cuteness response, in autism. To date, research on this topic has been limited to studies involving small sample autistic adults and neurotypical populations (e.g., Borgi et al., 2014; Sasson et al., 2012). Our results indicated that the participants with

higher levels of social skills showed increased attraction towards cute-featured stimuli, which is in line with the results of Kumazaki and colleagues (2017) who showed that autistic youths with less severe symptoms prefer “cute” (i.e., mascot-like) over humanoid robots. Children with more severe symptoms in the social domain seem to direct their attention more towards non-cute stimuli. Reduced attention to emotionally salient social cues may reflect a lower appraised relevance and emotional engagement with these specific stimuli (Borgi et al., 2014; Pool et al., 2016); this could also indicate an atypical social reward processing in autistic children with more severe symptoms, relative to neurotypical peers and autistic children with lower symptom severity (Bottini, 2018). *Study 1* provides new perspectives on the underlying mechanisms of emotionally and socially salient cues (Borgi et al., 2014), while supporting findings indicating that visual patterns may be impacted by the heterogeneity in autism (e.g., Franchini et al., 2017). However, the results in the literature regarding the visual attention towards positive social stimuli in autism are mixed (e.g., Grandgeorge et al., 2016), which may be due to interindividual differences within the same neurodiverse group. Variations in symptom severity, particularly in the social affect domain, are rarely measured although they may be associated with specific behavioral outcomes.

These findings may also have implications for understanding early developmental mechanisms of attention and sensitivity to positive social stimuli, as well as their role in the initiation of social relationships. Alterations in the visual attention patterns found in autistic children with a higher symptom severity may potentially affect empathy, bonding with caregivers, prosocial behavior, engagement in play with others, and responsiveness to certain therapeutic approaches (e.g., animal-assisted or robot-mediated interventions) (Borgi et al., 2014; Kumazaki et al., 2017). Moreover, our findings indicated alterations in the early developmental foundations of PE experiences in some of the autistic children, which are typically meant to facilitate the broadening of experiences and the building of social and

emotional resources (Seehagen et al., 2019). Moreover, visual attraction to positive social cues may have important implications in approaching and engaging in play. Indeed, social play is thought to be affected in autism in early childhood (APA, 2022; Ray-Kaesler et al., 2017). An altered sensitivity to socially salient cues triggering PE may affect the emergence of play and reduce one's engagement, thereby limiting learning opportunities and positive emotional experiences.

The intervention study (Study 2; Zaharia, Noir-Kahlo, et al., 2021) provides new findings in the field of PER, for which empirical evidence in autism remains limited (Cai & Samson, 2025; Nuske et al., 2024). To our knowledge, this is the first study assessing the efficacy of an intervention focused on using adaptive strategies to upregulate PE in autism. The acceptability rate was highly satisfying, which is essential for participants' adherence and engagement with content. Moreover, our study showed that PER has potential to be trained in autistic youth and even after a brief program the effects may last on long-term.

However, it is worthy of note that autistic individuals may differ from their neurotypical peers and may encounter certain difficulties during the different stages related to the ER process: identification of emotions to regulate, ER goal setting, selection, implementation, and monitoring of the ER strategies, as well as in the use of ER strategies (Cai & Samson, 2025). Indeed, while acknowledging the high variability within this neurodiverse population, autistic individuals may tend to down-regulate PE, possibly due to difficulties in understanding them and perceiving them as overwhelming (Cai et al., 2020; Cai & Samson, 2025). Therefore, social cues that typically elicit PE are processed differently or hold reduced reward value (see *Study 1*). Regulating PE may become challenging, as the stimuli generating them may be less salient and more prone to a less favorable interpretation. In addition, autistic individuals may rely on ER strategies that are not typically classified as adaptive in neurotypical populations (Ahmad et al., 2026), indicating that their repertoire of

EC, including the regulation of PE, may present distinct characteristics (Cai & Samson, 2025). A training program targeting PE, such as the one proposed in *Study 2*, may prove valuable by fostering a more nuanced and constructive understanding of PE, improving their understanding about their use and mechanisms, and promoting awareness of their adaptive role in supporting EC, such as regulation.

4.1.2 Board Games and “*Iuventus Ludens*”: Enablers and Barriers

“Whether they [board games] are games of chance or skill they all contain an element of seriousness.” (Huizinga, 1964, pp. 198).

The second research axis provides insights into the use of board games in school settings and offers a better understanding of youth’ perspectives on the play with a newly designed SEL tool, the *chEERS Games* (Zaharia, Sander et al., 2021). The intersection of play, board games, and education has increasingly been explored in the past decades as a means of fostering engagement and supporting learning processes (Bucher & Gay, 2018; Hromek & Roffey, 2009) . However, the use of play and/or games within SEL programs remains limited, although the value of EC and PE is highly recognized (Jones et al., 2021, 2022). These last two studies also sought to provide specific tools to implement within Swiss educational policies that encourage teachers to support transversal competencies in schools.

Overall, as expected and in line with the literature (Bettini et al., 2019; Hanghøj & Karnøe, 2024; Nautiyal et al., 2024; Sousa et al., 2023), our qualitative results indicated a very high level of acceptability in the use of board games in the classroom among both primary and secondary school students. Similar to our results, a recent study in adolescents residing in care homes showed that playing with commercial board games can create positive emotional experiences, promote ER, and facilitate positive social interactions (Gallardo-Masa et al., 2024). Hence, the appreciation of play with games designed around an emotion-related content extends beyond childhood.

The analyses of students' verbatim showed that enablers and barriers may differ depending on the age of the students participating in the study. Although *Study 4* did not provide a comparative view of the three *chEERS* board games, such as in *Study 3*, enablers and barriers mentioned by the older students still hold valuable information about user experience and their implementation as a psychoeducational tool in classrooms. Among the enablers of board game implementation in classrooms, students mentioned the inherent characteristics of board games, including features related to both content and play mechanics. Another supporting factor appeared to be the positive emotional experiences elicited during play (e.g., mentions of amusement, fun, laughter). In both studies, some participants mentioned they liked learning about EC (referred to as socio-emotional skills category in the manuscripts). In both samples, we found students appreciating the socialization during game play. However, socialization was also mentioned by the older students (*Study 4*) as an obstacle when difficult group dynamics were encountered. Although younger students perceived 'expressing in front of others' as an enabler (*Study 3*), older students mentioned this particular game mechanic as rather unpleasant (*Study 4*). With the developmental changes, adolescents are known to be more concerned about others' perspectives as social interactions with peers gain more of their attention, whereas in children, this is a facilitating factor and an appealing feature (Guyer et al., 2016; Mertens et al., 2022; Yeager, 2017). Mentions of boredom and global dissatisfaction seem to be highlighted more by the older students, rather than by children. However, social-related barriers may also function as constructive challenges. Although they may elicit discomfort, they can promote learning by enabling individuals to test their abilities and experience overcoming difficulties within the safe environment of play.

These various views collected through the last two studies seem also to depend on players' age. It is therefore important to consider the developmental stage when implementing board games in schools and to consider appropriate adaptations when required. This aligns

with previous research on SEL, emphasizing the need to carefully tailor the tools to specific student groups rather than using them indiscriminately, as youths may perceive play as condescending, as it is often associated with childhood (Durlak et al., 2011; Yeager, 2017).

Moreover, these satisfaction categories that emerged from students' answers may also reflect the player profile (e.g., explorer, achiever, socializers, or competitor) (Bartle, 1996), for whom motivations to engage in such activity could be different. For instance, when engaging in board game playing, players can be driven by conflictual elements in the game (e.g., competition, confrontation), immersion in an alternate world, social fun (e.g., playing together, being on a team), or use of strategies (e.g., thinking, planning, testing skills, focusing on winning) (Yee & Ducheneaut, 2017). This aspect may be worthy of note when conceptualizing play as a thought-action tendency within the broaden-and-built theory (Fredrickson, 2000, 2004). The broadening of the action, thoughts, behavior repertoire, as well as the building of resources through play may differ depending on players' profile and motivations.

Furthermore, the high satisfaction rates can be also explained by rather pleasant dynamics between the players, which is a crucial factor to consider in board games (Epstein et al., 2021). Board games provide a micro-representation of social relationships and behavior appropriateness, which can change depending on the group dynamic (Epstein et al., 2021). This is not surprising given the importance of the class climate, this type of research seems very dependent on this class climate aspect (Singla et al., 2021). Although less controllable, testing board games in school settings is essential to capture spontaneous, real-life social interactions and emotional communication, providing ecologically valid insights that can nurture and enrich the theoretical framework of PE and EC (Begeer et al., 2008).

Finally, consistent with findings from a recent review (Cès et al., 2024), our results suggested that *chEERS games* have potential for being used for EC and stimulate emotion-

related discussion in school students, across different age ranges. The *chEERS Games* seem to operate at two different yet complementary levels: game *mechanics* that promote PE and trigger EC use, and *content* that raises awareness and provides knowledge about EC. For a game to be successful in terms of learning, it is essential that players engage with content; however, intense PE experienced and expressed during play may be detrimental to learning (Iten & Petko, 2016; Zaharia et al., 2022). The present research reinforces the value of board games as educational tool, particularly those incorporating emotion-related content, and contributes to a body of research that has predominantly focused on digital games in educational contexts (Ninaus et al., 2017). Overall, *chEERS Games* appear to be promising and well-suited candidates for supporting transversal skills in school settings and for being implemented within teachers' practices.

4.2 Practical implications

Overall, our findings and the tools used in the methodology may have a direct impact and implications in educational and therapeutic settings. Take together, the four studies support the theoretical framework emerging from positive psychology and affective sciences applied to the domains of autism and education. Moreover, their results offer new perspectives on practical tools for individual, as well as for collective settings.

4.2.1 Translating Research on Positive Emotions in Autism into Practice

Study 1 goes beyond visual attention to cute stimuli, highlighting the relevance of social stimuli designed to elicit PE in bonding and social relationships. These findings suggest that sensitivity to cuteness may inform interventions targeting emotional development, such as occupational therapy, play-based (social play, play with toys), or agent-assisted approaches (e.g., animals, robots) (Borgi et al., 2014; Kringelbach et al., 2016). Contrary to our findings, autistic children have been shown to display fewer negative behaviors when interacting with

younger than with older peers, but, as authors suggested, the absence of symptom severity measures in this study limits the interpretation (O'Brien et al., 2020). Considering the heterogeneity in autism, the response to such stimuli may depend on variations in one's socio-emotional skill levels.

As for the *Study 2*, informal input from the external collaborators who worked on the project and administered the training who hold expertise in child and adolescent psychology and, teacher training and inclusive classroom practices (i.e., co-authors: K.N.-K. and N.B.), further supports the potential value of the brief PER training program in both therapeutic and educational contexts. The development of a manual for the proposed training program is currently underway, in collaboration with one of the co-authors of the article who is also a child and adolescent psychotherapist (Noir-Kahlo et al., unpublished work). Ideally, this work should be supported by the creation of an online platform to facilitate access to resources. These synergies are crucial to promote the adoption of these tools by practitioners and to ensure their usability for the target population within psychotherapy and educational contexts.

To note, corroborating the results from the first two studies, it is recommended that interventions should be tailored to individual profiles, taking into account variations in sensitivity to social cues and PE experience. For individuals presenting less severe symptoms or similar patterns with neurotypical peers, interventions involving socially, and emotionally salient agents may be particularly promising, as these individuals may show greater responsiveness to such approaches.

4.2.2 Board Games: It Takes a Village...

The work on board games does not conclude here but instead constitutes an ongoing process requiring the collaboration of a large community and multiple stakeholders to ensure the accessibility of these tools for practitioners. The first ideas and efforts emerged in our lab nearly a decade ago and led to an initial publication I have co-authored, in which three semi-

cooperative board games were tested and compared to off-the-shelf board games (Dell'Angela et al., 2020). New insights have emerged, and the work on play has progressed toward the development of a functional and implementable competitive board game, *the chEERS Games* (Zaharia, Sander et al., 2021). Through close collaboration with a local cooperative specialized in board game counselling, edition, and design (*Entrée de Jeux*), approximately 100 copies were produced. Some were distributed to collaborators, while others continue to be used in laboratory research. Currently, a follow-up project examines the feasibility, accessibility, and adaptability of the *chEERS Games* in inclusive classroom settings, with local teachers directly involved in a participatory approach (Moreno, Zaharia, et al., 2026). This highlights the importance of involving teachers as a natural vector for implementing board games promoting EC and PE, so they can further support the development of transversal skills in the classroom.

The favorable responsiveness observed among school students served as a motivating factor to ensure the sustainability of this line of research and to further bridge the gap between research and practice, by concretely responding to the growing demand from practitioners to use the *chEERS Games*. Currently, in collaboration with HelvetiQ, a new board game with similar emotion-related content and game mechanics will be available on the market in the following months and ready for use by professionals across various fields, including education and psychology (Zaharia et al., 2026). With the support of new available funding and resources, the new board game is designed as cooperative to better support PE in players regardless of achievement (Eriksson et al., 2021). This approach appears particularly relevant given some of the board game masters' observations indicating that competitiveness and related behavior (e.g., cheating) may overshadow the primary educational aim of the games.

These types of research projects require substantial time not only for the conceptual development of tools to be tested, but also for implementation and further dissemination;

significant efforts are devoted to translating such ideas into practice (English et al., 2026). These stages in research are often overlooked and undervalued; however, it is both important and ethically necessary to move beyond implementation toward accessibility and to ensure that research outcomes are made available to the public. In research, the “know-do gap” (i.e., the time between knowledge generation and its implementation in practice) can be substantial, sometimes reaching up to 17 years in clinical contexts (de Waard et al., 2025; English et al., 2026; Kantorski et al., 2025; Rubin, 2023). As illustrated by research on educational board game development, multiple stages are involved, from design and iterative refinement to production and accessibility, often occurring alongside the writing and publication of related research (Kantorski et al., 2025). Without doubt, efficacy is crucial for evaluating the impact of interventions and is of primary interest to stakeholders. However, implementation processes and user experience are equally essential for fostering participants’ engagement and motivation, and ensuring that tools align with users’ needs and interests (Hassani & Schwab, 2021).

Implementing board games in the classroom supports a systemic approach that holds significant value for inclusive learning environments and fosters the development of EC at a collective level. Such an approach may also address important ethical considerations related to neurodiversity by reducing the risk of stigmatization and avoiding interventions that single out individuals. In this sense, collective interventions may represent a more inclusive, ecologically valid, and real-world setting to supporting diverse learners. The *chEERS Games* provide a concrete, ready-to-use tool that responds to local public policy requirements aligned with international SEL standards (Conférence intercantonale de l’instruction publique de la suisse romande et du Tessin, 2010; Žic Ralić et al., 2025). As such, they have the potential to be integrated into educational curricula.

Finally, the value of *chEERS Games* was speculated not only by teachers/educators, but also in clinical practice, although it lacks empirical testing. For instance, when used in my practice as a psychologist in parent-child interactions in counselling but also clinical group activities, these board games can be used as icebreakers and support emotion understanding in youth, for instance, in migratory settings, bringing together interindividual and cultural differences. Recent studies support the use of tabletop games such as *Dungeons & Dragons* to foster emotional competencies in therapy (Rosenblad et al., 2025), as well as *Dixit* in both clinical settings (Ikiz & Béziat, 2020; Mousnier et al., 2016) and with autistic individuals (Atherton et al., 2025). While play therapy have indeed demonstrated effectiveness in supporting youth development (Breen & Daigneault, 1998), it remains important to evaluate whether *chEERS Games* can be suitable and efficient in new settings, such as therapeutic contexts, including with autistic individuals.

4.3 Strengths and Limitations

First, caution is warranted when generalizing the entirety of these findings, regarding both behavioral patterns and psychoeducational tools. There is no “one-size-fits-all” approach, as youths differ widely in their developmental trajectories, and individuals within the same neurodiverse group display considerable heterogeneity. Although the present results are based on group-level analyses, it remains essential not to overlook inter-individual differences when interpreting findings and designing and implementing interventions. Variations in symptom severity and individual traits may also affect play behavior, interpretation of environmental stimuli, and further the learning outcomes and resource building. While *Study 1* benefited from a rigorous diagnostic assessment, *Study 2* lacked confirmation using gold-standard diagnostic procedures. As a result, the characterization of autistic participants was limited, potentially obscuring variability in responses to the intervention. Importantly, the attempt to apply theoretical frameworks developed for

neurotypical populations, such as the belong, broaden and build theories (Fredrickson, 2004; Seehagen et al., 2025), to neurodiverse groups and/or to highly heterogeneous populations such as student classrooms is ambitious. Future theoretical refinement of these theoretical frameworks used in the present thesis may be required to better account for neurodiversity.

Second, the conceptualization of PE is often insufficiently specified in the theoretical frameworks (Fredrickson, 2000; Garland et al., 2010). It is sometimes unclear which aspects of PE are sought to be cultivated or addressed by these theories (e.g., expression, experience, recognition, regulation), how they relate to specific resources, and whether different PE exert distinct effects on the outcomes. In regard to autism, Dykshoorn and Cormier (2019) suggest that the study of PE warrants further attention and call for greater examination of the experience, promotion, and the utility of PE in individuals concerned by this neurodivergent condition, but also in their broader social environment, including caregivers.

Further, the research presented in this thesis does not address the EC from a developmental perspective. Longitudinal studies studying developmental trajectories have been used in eye-tracking literature (see W. Jones & Klin, 2013; Sifre et al., 2018) and may help understand whether the group differences in the visual patterns during the exploration of cute-featured stimuli are stable over time, or whether they reflect delayed development instead of an atypical processing. In addition, the second research axis also lacks a developmental perspective. More specifically, the EC presented in the board games are the same in *Study 3* and *4*. As levels of emotional understanding and awareness vary across age, EC in these different settings should be nuanced accordingly (Colle & Del Giudice, 2011). A longitudinal approach in studying EC and PE may help clarify whether inter-individual difference that may emerge are due to atypical processing or to developmental delays, as suggested for ER in autistic children (Nuske et al., 2017). The absence of direct comparisons between primary and secondary school students limits the understanding on how user

experience varies across age groups. However, obtaining a comparative view is compromised, as the board games were evaluated at different stages of their design and for distinct purposes. Additionally, qualitative data is not directly comparable, as a bottom-up approach was used in each study, leading to the emergence of different themes and categories in the two samples.

Importantly, although the board games showed high acceptability, their *efficacy* was not yet proven. This question was examined in a complementary study within the IMAGINE Project (Mella et al., 2026), which showed a trend toward improved accuracy in emotion recognition following board game implementation in classrooms, but which did not reach significance. Although no other significant changes were observed before and after the SEL interventions, the findings suggested a potential protective effect of SEL interventions in secondary school students. As a continuation of Study 3, an ongoing study (Savary et al., 2026) seeks to examine the associations between individual game performance and the specific EC the board games address, as measured using classic questionnaires and tasks. The limited evidence supporting the efficacy of SEL methods in promoting EC in IMAGINE project aligns with previous critiques regarding the insufficient empirical support for the link between SEL interventions and EC development (Maxwell & Peplak, 2022).

Moreover, the use of objective measurement tools such as the eye-tracking may be a methodological strength. It is though necessary to clarify the type of processing involved during the visual exploration of cute-featured stimuli to rule out alternative explanations. For example, it could be insightful to examine how featural and configural processing may influence the visual exploration of cute-featured stimuli as differences may exist across neurodiverse conditions (e.g., Zaharia et al., 2018). However, eye-tracking can also constitute a limitation regarding understanding behavior in daily life. Exploring interactions with real-life cute stimuli (e.g., approach behavior), as well as the emergence of play in natural conditions may be of interest (Celani, 2002; Prothmann et al., 2009). For this reason, methods

using ecological momentary assessments (e.g., Garland et al., 2015) or augmented reality (AR) may offer a more fine-grained comprehension of these mechanisms and behaviors. For example, AR may allow the observation of visual attention within dynamic, naturalistic environments, where multiple stimuli compete for selection (e.g., Ruffieux et al., 2017; Thoo et al., 2025).

In addition, the multi-informant assessments and the mixed methods combining qualitative and quantitative data in board game research, certainly constitute a methodological advantage. However, they are costly and require substantial time and resources during data collection and analysis (Hassani & Schwab, 2021; Mori et al., 2025). Indeed, integrative approaches combining these methods would be ideal, but their use was inconsistently implemented across the four studies and remains limited in the literature (Mori et al., 2025). For instance, crossing participants' perspectives with those of their caregivers would have been beneficial. However, depending on participants' age, socio-demographic characteristics, and/or level of autonomy, caregivers may not always be available (e.g., *Study 4*).

Finally, while the controlled *environments* of the first two studies may represent a strength, the translation of the results to real-world behavior may not be generalizable. By contrast, the second research axis is conducted in a real-world setting, offering valuable and ecologically valid insights into the complexities and challenges of play research. Yet, it is evident that uncontrolled factors may complicate data interpretation. For instance, acceptability can be influenced by factors inherent to players' characteristics (e.g., motivations)(Yee & Ducheneaut, 2017), as well as to play, such as group dynamics or cheating behaviors (e.g., *Study 4*). The settings and samples in the board game studies are representative of in-field conditions, as teachers typically work with classrooms comprising students of diverse ages. Playing board games in a laboratory setting may limit the ecological validity of the findings. Hence, investigating board games in naturalistic contexts provides a

more accurate representation of players' behaviors and perceived experiences. Nonetheless, intrinsic motivation, a core characteristic in the definition of play, may be compromised when play is imposed to a group by external agents as in *Studies 3 and 4* (Barnett, 1976; Csikszentmihalyi & Bennett, 1971). This raises concerns about the extent to which such studies can simultaneously preserve the nature of play and adequately capture it in its authentic form, and contribute to the initial theoretical frameworks (*National Institute for Play*, n.d.; Zaharia et al., 2022).

4.4 Future Perspectives

4.4.1 Neurodiversity and Research: For Whose Benefit?

The design of new materials and intervention programs is often justified in terms of improving well-being, competencies, and quality of life, but these constructs are themselves frequently defined according to normative standards. In autism, the use of interventions to enhance EC raises important ethical and conceptual questions regarding their goals and underlying assumptions about who is benefiting from these interventions and whether they respect neurodiversity or whether they answer to a “normalization” agenda trying to modify traits in autistic individuals to come closer to normative standards (Manzini et al., 2021; Ne’eman A, 2021; The Autistic Self-Advocacy Network, 2022)

It is then important that researchers create interventions that promote wellbeing aspects as defined by neurodiverse individuals, target rather harmful behaviors relevant to them (e.g., self-injury), and respect their identity, uniqueness, and sense of self (Carlson, 2013; Manzini et al., 2021; Vermeulen, 2014). Behaviors often labeled as “challenging” invite further scrutiny: challenging for whom, and according to which norms? Such questions highlight the risk that interventions may implicitly prioritize societal expectations over the needs and priorities in neurodiverse populations (Gowen et al., 2019; The Autistic Self-

Advocacy Network, 2022). Additional concerns refer to the balance between the time spent on structured intervention and therapy delivered in professional settings versus the free time for leisure, play, and personal interests (Carlson, 2013; The Autistic Self-Advocacy Network, 2022). Incorporating accounts from autistic adults who have been previously enrolled in research programs may indicate whether the interventions align also with neurodiversity perspectives, not only with those of professionals, researchers and parents (Manzini et al., 2021). Ideally, research should adopt more participatory design approaches involving autistic adults from advocacy groups and refer to guidelines specifically formulated to prioritize outcomes relevant for neurodiverse groups rather than only producing knowledge for “research’s sake” (Gowen et al., 2019). Finally, the double empathy problem theory emphasizes the reciprocal nature of misunderstandings between autistic and non-autistic individuals (Gernsbacher & Yergeau, 2019; Milton, 2012). This would support the view that non-autistic individuals should also benefit from trainings to better understand EC and the experience of PE in neurodiverse populations. In this regard, play-based settings (e.g., board games; role-play) may be valuable contexts to promote an inclusive environment, safe to share different perspectives and facilitate mutual learning (Atherton et al., 2025; Cross et al., 2025).

4.4.2 Towards a Participatory Design in Education Research

Future research should place greater emphasis on teacher participation in study design and on teacher training. For instance, when building new SEL tools, teachers’ expertise is very valuable. In this regard, a recent study (Barras et al., 2025) used the Delphi method to collect experts’ feedback and subsequently assess the *content validity* of a newly developed SEL curricula for special education. Moreover, teacher training is critical for the successful implementation and sustainability of SEL tools (Hassani & Schwab, 2021)(see *Study 4*). It has been recently suggested that teachers’ own emotions should also be considered during their

training as well as during the delivery of interventions focused on EC in classrooms (Gay et al., 2026). Training students through teacher-mediated approaches (e.g., project INSPIRE)(Ambresin et al., 2025) and supporting teachers through thorough coaching (McCormick et al., 2019) appear particularly promising. This view is shared by our follow-up project, currently underway, involving the collaboration with teachers from Haute Ecole Pédagogique du Valais (HEP-VS): briefing them on EC and PE, and training them for the use of *chEERS Games* with students (Moreno, Zaharia et al., 2026). Importantly, while SEL programs can be resource-intensive, board games in general may offer a more cost-effective and adaptable alternative, as their mechanics can be easily adjusted by teachers to suit diverse populations (Hassani & Schwab, 2021). Teachers can be trained to gain from the flexibility of games promoting transversal skills, which may help them accelerate the transition from SEL tools design to practical application. They can also include procedures to teach board games skills and improve the play skills repertoire of students with SEN and/or in inclusive classrooms, as inspired by research in occupational therapy (Davis-Temple et al., 2014). Future research should also ensure that implementation *fidelity* is measured, as it remains a key challenge in in both collective and one-to-one research settings (Durlak & DuPre, 2008; Mori et al., 2025).

Directly involving both neurotypical and neurodivergent students in tool development and implementation decisions may enhance the adherence, acceptability, and feasibility of interventions (Hassani & Schwab, 2021). Co-design practices can ensure that tools better reflect users' needs and experiences. In this context, focus groups with both students and teachers may provide valuable insights into the acceptability, responsiveness, and usability of new interventions, thereby supporting more inclusive and effective program development (Norris et al., 2012).

4.4.3 Cultural Considerations: Beyond WEIRD

All the four studies presented in this thesis are conducted in a singular Western European country, Switzerland, although it is suggested that participants have mixed cultural origins (e.g., *Study 1*, *Study 3*). Most of the studies in the field of autism or SEL are based on results coming from western, educated, industrialized, rich, and democratic (WEIRD) countries (Bailey et al., 2021). For instance, it is argued that SEL tools are usually developed and implemented in WEIRD countries, with most of the evidence coming from the United States, from where the SEL concept originates (Bailey et al., 2021; Hassani & Schwab, 2021; van de Sande et al., 2019). Researchers argue that there is an urgent need to foster these programs in Europe and non-English speaking countries (Hassani & Schwab, 2021; van de Sande et al., 2019). Yet, cross-cultural studies are needed to assess the generalizability of these findings (Henrich et al., 2010). It is then important to provide tools that can be adapted to different settings, as findings from WEIRD populations may limit generalization, highlighting the importance of cultural relevance and appropriateness in intervention programs or SEL tool development. This issue is particularly salient in Switzerland, as it is a country with different cultural regions, four official languages, and where over 40% of residents have a migratory background at the national level, rising to more than 60% in certain cantons (e.g., Geneva)(Federal Statistical Office, n.d.).

Furthermore, culture shapes how individuals relate to EC and the value attributed to the expression and regulation of PE (Ford & Mauss, 2015). Based on this observation, culture defines what is considered adaptive or maladaptive, influencing which emotions are prioritized for regulation. For example, ER strategies such as suppression, viewed as maladaptive in Western contexts, was shown to be more frequently used and considered adaptive in certain Asian cultures (Ford & Mauss, 2015).

Finally, cultural spaces in which the individual develops will also influence play behavior, beliefs about play, parent-child play, and even board game preferences (Bar & Otterbring, 2021). In conclusion, adopting a cross-cultural perspective is essential when studying such theories and behaviors, and requires researchers to approach them from a reflexive and humble stance.

4.4.4 Born to Be Playful

Regarding the second research axis, playfulness may represent a relevant avenue for future research to better understand findings from research on board games focused on EC and PE, as it remained unexamined in *Studies 3* and *4*. Playfulness is a concept studied in different fields, including affective neuroscience, and has been also conceptualized as an innate personality trait reflecting the tendency to frame and reframe situations in ways that elicit amusement, humor, and enjoyment (Barrett et al., 2013; Davis & Montag, 2019; Proyer, 2012). Studies associated it with characteristics such as spontaneity, sociability, humor, positive affect (e.g., amusement), and a propensity for playful behaviors (e.g., joking, teasing, or acting “silly”). Beyond these behavioral expressions, playfulness appears to have a complex role in psychopathology holding a dual role both as a predictor and an outcome of certain psychopathologies (P. Berger et al., 2018). In adults, playfulness has been theoretically linked to ER mechanisms, in particular to cognitive reappraisal, as it can help interpreting stressful situations in a playful manner (P. Berger et al., 2018). Indeed, empirical evidence showed that playfulness is positively associated with PE and the use of cognitive reappraisal, and negatively with the use of suppression and negative affect (Barrett et al., 2013). However, an optimal level of playfulness may be necessary, as excessive playfulness could hinder self-regulation. Importantly, the construct of playfulness varies across cultures, with different measurement tools reflecting distinct conceptualizations based on the study country origin

and participants' age (Proyer, 2012; Shen et al., 2025), highlighting the need for culturally and developmentally sensitive approaches in its study.

4.4.5 When Socio-Emotional Learning Meets Special Education

From an inclusive perspective, it is essential that SEL tools are designed and adapted to benefit students with special educational needs (SEN) (Cipriano & McCarthy, 2023; Stark et al., 2024). Through SEL, classmates with and without SEN can be supported in understanding one another and in fostering inclusive and accepting classroom environments (see Hassani & Schwab, 2021). Research on SEL in students enrolled in special education remains limited, with most studies conducted in the United States and fewer than 10% specifically addressing students with SEN (Cipriano & McCarthy, 2023; Stark et al., 2024). In Switzerland, Barras and colleagues (2024) found that special education teachers of students with visual impairments consider that training themselves in EC is essential and that EC should be specifically addressed in schools. The efforts of this research group have led to a SEL curriculum designed for children with visual impairments, which was evaluated for content validity and is now available for use (Barras et al., 2025). The assumption of SEL universality remains contested and particularly challenged when SEL meets neurodiversity.

This new suggested direction of future implementation also raises the question of who is best positioned to deliver SEL interventions in schools, in particular when students with SEN are concerned. External staff may be less familiar with students' specific needs, highlighting the importance of involving special education teachers (Stark et al., 2024). For instance, previous studies on SEL in classrooms with autistic students emphasized the value of teachers' perspectives in developing appropriate and effective approaches (Gardner et al., 2021). Indeed, teachers occupy a unique position in understanding and responding to each of their students' needs. In line with this, our follow-up research addressing teachers' views in the implementation of the *chEERS Games* in inclusive classrooms may generate further

insights (Moreno, Zaharia, et al., 2026). Nonetheless, this underscores the importance of close collaboration between teachers and researchers as an ideal approach for such studies.

4.5 Conclusion

This thesis embarked on a challenging journey involving mixed methodologies and diverse populations in terms of age, socio-demographic background, and neurodiversity, requiring substantial resources (time and human effort) for recruitment, trainer training, development of new tools promoting EC, and their implementation across various settings (PER training program; *chEERS Games*). This research field was proven to be particularly challenging, both due to the nature of the methods employed (e.g., play and board games) and to practical constraints such as the recruitment process and external obstacles (e.g., the compliance to the sanitary measures and the delays due to COVID-19 pandemic; see *Introduction*), which required us to remain flexible and responsive to changing conditions.

The evidence presented in this thesis sheds light on the applications of theoretical frameworks from positive psychology, affective sciences, and education to youth populations with or without autism. In addition, the findings challenge existing conceptualizations of play, EC, and PE, while offering new perspectives and innovative approaches for training or promoting them in youth.

The first axis, focus on autism, highlights how differences within the same neurodivergent condition may shape early behavior in processing PE through the lens of the extended model of broaden and build theory (Seehagen et al., 2025). In parallel, it proposes a concrete program focused on PE to support ER, an EC recognized as a transdiagnostic factor across different conditions (E. Sloan et al., 2017).

Adopting an ambitious perspective, the second axis undertook a highly challenging, but creative task in play research by addressing a complex and intimate *content*, emotions, via *means* that are inherently spontaneous and sometimes chaotic by nature, namely play and

board games, within socially exposed, group-dynamic-driven *settings* such as school classrooms. The subsequent research gave voice to students by exploring their user experiences and their spontaneous thoughts and feelings about board games, as well as other SEL methods (improv, mindful). Hence, enablers and barriers in the implementation of *chEERS Games* were identified. Overall, the board games appeared to be appreciated and engaging for students, likely due to their social and playful nature.

Several strengths and limitations are acknowledged, and new research avenues informed by our findings are suggested. In particular, we draw attention to the limited generalizability of these findings, which may remain inconclusive given the specific characteristics of our study samples and the fact that board game studies did not directly assess efficacy. These limitations also reflect the fact that such research projects represent a long-term investment requiring continuous evaluation and critical reflection. Nevertheless, this line of work is promising, and we anticipate that the follow-up projects will continue to nurture the ideas advanced in this thesis.

This work sought to embrace the diversity in EC and PE as a resource to expand research perspectives and generate more meaningful and impactful approaches that better address heterogeneity among youth and support environments attuned to their needs and interests (e.g., Stark et al., 2024). Beyond the potential efficacy at an individual level that remains yet to be proven, the use of the tools we have developed may promote understanding of individual differences. There is no perfect player, no perfect game, and likewise no perfect participant or research design or setting: this remains an elusive research ideal with limited alignment to real-world contexts. Nevertheless, the imperfect evidence presented here is substantial, challenges existing theoretical frameworks, and provides precious practical implications.

5 References

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8 Appendix

8.1 The Positive Emotion Regulation Training Program

Figure A1

Selected Still Frames from a Video Presented During Training Sessions (Study 1)



Note. The videos illustrating examples of emotion regulation strategies were created using GoAnimate for Schools. The first sequence depicts a student who unintentionally spills water on his school project, while the second shows how he uses humor to regulate with the negative emotion before presenting the project to the class (Zaharia, Noir-Kahlo et al, 2021).

Figure A2

Examples of Exercises Presented During Training Sessions

Qu'est-ce que « penser différemment »?

Pour sortir d'une boucle de pensées négatives et changer les émotions désagréables que nous ressentons et qui ne nous aident pas, **nous pouvons changer la façon dont nous pensons à la situation.**

- Nous pouvons penser à la situation plus positivement
Par exemple, Pierre pourrait penser: « Maintenant, je sais sur quoi je dois travailler pour la prochaine épreuve de maths. »
- Nous pouvons minimiser les aspects négatifs
Par exemple, Pierre pourrait penser: « Tout le monde fait des erreurs et avoir une mauvaise note ne veut pas dire que je suis bête. »



Se focaliser sur le positif – Exercice

Maintenant, essayons un exercice!



Tu vas écouter des sons de chants d'oiseaux.

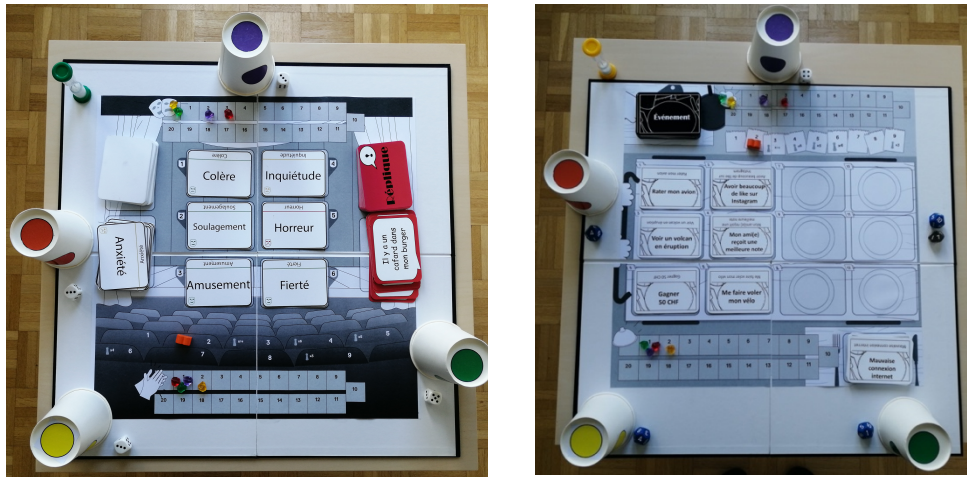
- Ferme les yeux et essaye de te concentrer sur ce que tu ressens pendant que tu écoutes ces sons. Essaye de visualiser les sensations que tu éprouves pendant cet exercice.
- Clique sur le haut parleur que tu vois à côté de l'oiseau.
- Maintenant, pourrais-tu nous parler de ces sensations ? Ecris ce que tu as ressenti (en quelques mots).

Note. The exercise on the left refers to the use of cognitive reappraisal. The exercise on the right refers to the use of attentional deployment and savoring (Zaharia, Noir-Kahlo et al, 2021).

8.2 The *chEERS Games*

Figure A3

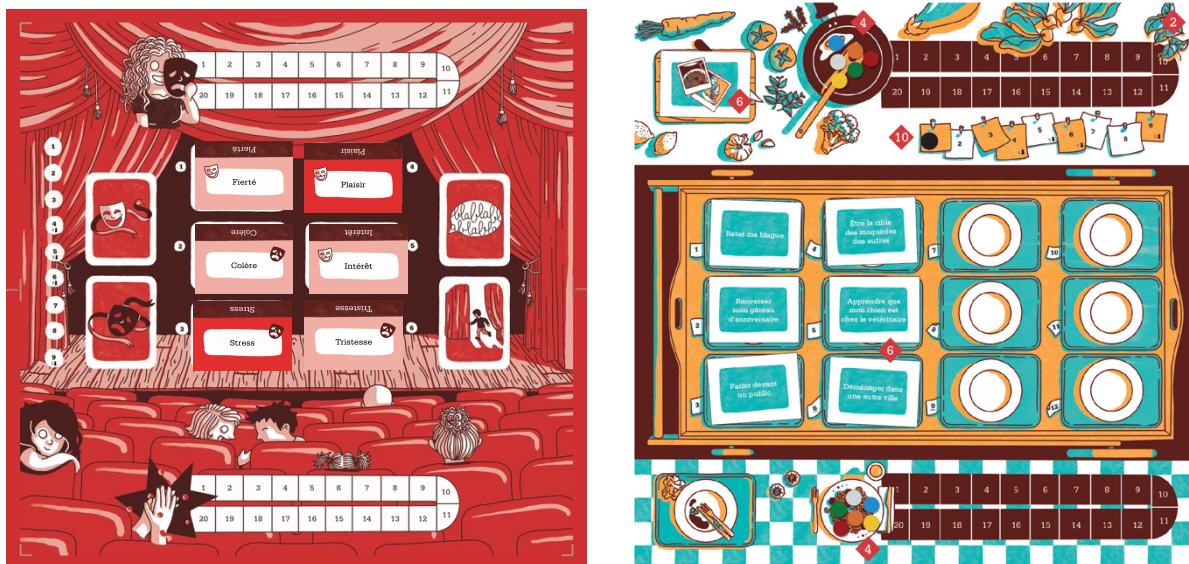
Material of the Functional Prototypes of the “chEERS Games” (Study 3)



Note. The photo illustrates the setup of the material of the *Theater of Emotions* (left) and *Kitchen of Emotions* (right), in Study 3 (Zaharia, Savary, et al., 2025).

Figure A4

Material of the Finalized Version of the “chEERS Games”



Note. Board games used in Study 4 (Zaharia, Mella, et al., 2025). Left: setup of the material of the *Theater of Emotions*. Right: *Kitchen of Emotions – version 1* (Zaharia, Sander et al., 2021).

8.3 Public Reception of the Board Games

Figure A5

chEERS Games Presented at Public Events



Note. Left: KidsUni organized by UniDistance Suisse, Brig, 2025. Right: Ludesco board game festival, La Chaux-de-Fonds, 2021.