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STATEMENT OF INTEGRITY

I hereby declare having conducted this academic work with integrity. I confirm that I have not used plagiarism or any form of undue use of information or falsification of results along the process leading to its elaboration.

I further declare that I have fully acknowledged the Code of Ethical Conduct of the University of Minho.

University of Minho, 06/06/2022

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Intervenção baseada na narrativa no 1.º ciclo: Impacto na satisfação das necessidades psicológicas básicas e no envolvimento na sala de aula dos alunos

Resumo

A literatura tem reportado uma diminuição do envolvimento dos alunos ao longo da escolarização, enfatizando a sua importância para o desempenho académico imediato e subsequente, rendimento e conclusão escolar. De acordo com a Teoria da Autodeterminação, um ambiente de aprendizagem de apoio facilita a aprendizagem autorregulada dos estudantes devido à satisfação das suas necessidades psicológicas básicas, levando a um maior envolvimento. Deste modo, o presente estudo tem como objetivo avaliar o impacto de um programa de promoção de estratégias de autorregulação, implementado por professores, na satisfação das necessidades psicológicas básicas e no envolvimento em sala de aula dos alunos do 1.º ciclo. O programa utilizou a estória-ferramenta, *Sarilhos do Amarelo*, e incluiu 90 alunos do 4.º ano com idades compreendidas entre os oito e os 12 anos. O grupo de comparação incluiu 99 alunos do 4.º ano. O estudo seguiu um desenho quasi-experimental, com dados recolhidos antes e depois da intervenção. No final da intervenção, o grupo experimental reportou maior competência percebida e envolvimento na sala de aula do que o grupo de comparação. Espera-se que os resultados do presente estudo apoiem os esforços dos investigadores e educadores em proporcionar um ambiente de aprendizagem promotor de sucesso académico, incentivar cursos de formação de professores em autorregulação da aprendizagem, e promover a infusão curricular de programas baseados na evidência de promoção na autorregulação.

Palavras-chave: necessidades psicológicas básicas, envolvimento em sala de aula, alunos do 1.º ciclo, intervenção baseada na narrativa, aprendizagem autorregulada

Narrative-based intervention in elementary school: Impact on students' basic psychological needs-satisfaction and classroom engagement

Abstract

Literature on engagement has reported a decrease throughout schooling, emphasizing its importance to immediate and subsequent academic performance, achievement, and school completion. According to Self-determination Theory, a supportive learning environment facilitates students' self-regulated learning (SRL) owing to the satisfaction of their basic psychological needs leading to increased student engagement. Thereupon, the current study aims to assess the impact of a self-regulation intervention program, applied by teachers, on students' basic psychological needs satisfaction and classroom engagement in elementary school. The program used a story tool, *Yellow's Trials and Tribulations,* and included 90 fourth-grade students with ages ranging from eight to 12 years old. The comparison group included 99 fourth-grade students. The study followed a quasi-experimental design, with data collected prior to and after the intervention. At the end of the intervention, the experimental group reported higher perceived competence and classroom engagement than the comparison group. Results of the present study are expected to support researchers' and educators' efforts to provide a learning environment likely to foster academic success, encourage teacher training courses in SRL, and promote the curricular infusion of SRL evidenced-based programs.

Keywords: basic psychological needs, classroom engagement, elementary students, narrative-based intervention, self-regulated learning

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Introduction

Driven by the worldwide need to promote students' self-regulated learning and engagement, several interventions have been applied in students' classrooms (e.g., Dignath et al., 2008; Fredricks et al., 2019; Martins et al., 2022; Rosário et al., 2016; Tuero et al., 2022). However, there is still a gap concerning how teachers can effectively promote these variables since most programs are usually applied by researchers (e.g., Dignath & Büttner, 2008). Thus, the present study aims to assess the efficacy of a narrative-based intervention implemented by teachers to promote students' motivational variables (i.e., basic psychological needs-satisfaction) and engagement, through the training of self-regulated learning.

Engagement: definition and empirical evidence

The construct of student engagement has been gaining interest over the past two decades. This may be due to the fact that students' low engagement has been one of the most immediate and persistent obstacle they encounter throughout their academic path (Wang & Holcombe, 2010). Literature has pointed out engagement in the school context as a relevant construct due to its impact on students' progress in learning and overall development (Hofkens & Ruzek, 2019). On the other hand, students' low engagement is likely to set off a downward spiral of maladaptive school behaviors that may even result in early school dropout (Gutiérrez & Tomás, 2019; Marks, 2000).

Student engagement in learning is defined as students' active involvement in a learning activity and encompasses four dimensions (Reeve, 2012): i) behavioral engagement refers to attention, concentration, effort, and persistence when completing a task; ii) emotional engagement concerns emotions that help the execution of the task, such as curiosity, and the absence of emotions likely to impair the task such as anger or frustration; iii) cognitive engagement refers to the use of learning strategies (e.g., elaboration) and self-regulatory strategies (e.g., planning), and the search for deep conceptual comprehension of the contents acquired; and finally, iv) agentic engagement refers to the importance of being dynamic, proactive, inquisitive while contributing to the learning process (e.g., ask questions, express opinions, and communicate own interests in class discussions). Following Reeve (2012), the emphasis put on "learning activity" in the definition of student engagement is crucial because the focus is on engagement in a specific event (i.e., a task or domain). In fact, student engagement in the classroom context, or simply put classroom engagement, focuses on the processes occurring in the classroom, such as task-related interaction or whole class discussions (see Jang et al., 2016).

Reports on engagement in school have shown a decline as students progress to upper elementary grades and upper school levels (i.e., middle and high school), reaching its lowest levels in high school (e.g., 40-60 percent of youth show low engagement; Janosz et al., 2008; Marks, 2000; Medicine &

Council, 2003; Yazzie-Mintz, 2007). These data are important, due to the role played by students' engagement in the school success in elementary school, and later in high school (Estévez et al., 2021). Grounded on this evidence, educators, school psychologists, and community organizations have expressed an increased interest in gathering better engagement data for assessment, diagnosis, and intervention (McClelland et al., 2006).

Concerning the existing literature, a considerable number of interventions have been conducted in classrooms to promote engagement (see Fredricks et al., 2019; Martins et al., 2022). These interventions had different natures (e.g., academic tasks, reading comprehension, behavior monitoring, and teachers' evidenced-based practices) and proved to be effective in promoting some or all dimensions of engagement (Martins et al., 2022). However, it is important to note that results differ depending, among other aspects, on who implements them. For example, in most studies, the intervention was implemented by researchers (e.g., Azevedo et al., 2022; Martins et al., 2022; Pereira et al., 2021; Rosário et al., 2016); data has shown greater effect sizes when comparing to those obtained when teachers were the implementers (Dignath et al., 2008; Hattie et al., 1996). According to Dignath et al. (2008), this result may be due, for example, to the lack of teachers' knowledge, training, and support or supervision. For this reason, it would be important to train the teachers to implement interventions in their classrooms and provide them with support and supervision.

Basic psychological needs and engagement

According to Reeve (2012), the satisfaction of basic psychological needs is an antecedent to engagement, and as such Self-determination Theory (SDT) provides a relevant theoretical framework for the present study. Literature in this field claims that individuals' natural inclination and progression is toward their psychological growth, internalization, and well-being (Deci & Ryan, 2000). Moreover, the environment plays a crucial role in this process facilitating or hindering the course of this natural progression. According to SDT, students, regardless of their age, nationality, gender, cultural background, or socioeconomic status, develop inherent growth tendencies (e.g., psychological needs, intrinsic motivation, curiosity) likely to contribute to their classroom engagement (Deci & Ryan, 2000; Ryan & Deci, 2020). The Basic Psychological Needs Theory (Deci & Ryan, 2000) is one of the SDT's six mini theories. Basic Psychological Needs Theory postulates perceived autonomy, competence, and relatedness as basic psychological needs universal and innate to individuals. Autonomy refers to the individual's ability to be responsible for their behaviors while self-regulating them towards an internal locus of causality (e.g., students' willingness to dedicate time and energy to study; Deci & Ryan, 2000; Niemiec & Ryan, 2009). Autonomy is likely to be satisfied when individuals experience enthusiasm and

appreciation (Ryan & Deci, 2020; Skinner & Belmont, 1993). Perceived competence relates to individuals' competence to perform meaningful assignments in a specific context, and experience mastery while completing an academic task (e.g., Conesa & Duñabeitia, 2021; Deci & Ryan, 2000). As literature reports (Ryan & Deci, 2020; Skinner & Belmont, 1993), individuals who experience positive feedback are likely to satisfy their need for competence. Lastly, relatedness describes the need to create meaningful relations and to connect with others (e.g., quality of the relationship with teachers and peers in the classroom; Deci & Ryan, 2000; Skinner & Belmont, 1993). This need is expected to be satisfied when individuals experience a sense of belongingness, respect, and security (e.g., students who feel that teachers genuinely value, and respect their work; Ryan & Deci, 2020; Van den Broeck et al., 2016).

In sum, students must fulfill their basic psychological needs in order to learn, and function positively in the classroom (e.g., student engagement; Deci & Ryan, 2000; Reeve, 2012; Reeve & Lee, 2014). SDT sustains that the fulfillment of these basic psychological needs allows an increase in students' autonomous motivation and school engagement, and an indirect enhancement of academic achievement. In fact, as prior research found, students with their basic psychological needs fulfilled in the class are prone to engage in their school learning (Hughes et al., 2008; Niemiec & Ryan, 2009; Reeve, 2012; Schuitema et al., 2016), which positively repercusses in students' willingness to acquire knowledge, develop socially and cognitively, experience gratification, and progress in schooling (e.g., Finn, 1993; Marks, 2000; McClelland et al., 2006; Newmann, 1992).

Engagement and self-regulation

Deci and Ryan (2000) state that the natural tendency to internalize and integrate regulation is facilitated through the individuals' basic psychological needs. The fulfillment of these needs is supported as students engage in the relevant behaviors. For example, the satisfaction of students' basic psychological needs assists proactivity and autonomous motivation, both essential aspects for the promotion of student engagement in the classroom (Archambault & Dupéré, 2017; Deci & Ryan, 2000). Moreover, classroom engagement can be promoted through self-regulation of behavior, peer support of responses requiring effortful control, delay of gratification, self-control, and self-discipline (Fitzpatrick, 2012). According to Zimmerman's (2000) model, self-regulation is a multidimensional construct that refers to the individual's efforts to orchestrate feelings, thoughts, and actions displayed to attain self-set goals. Following Rosário et al. (2017, 2019) self-regulation is a dynamic, cyclical, and recursive process encompassing three phases: planning, execution, and evaluation (full description of this author's model in the method section). To learn class contents and be engaged in class, students are expected to use a set of cognitive strategies such as working memory or problem-solving strategies, but also be able to

focus attention and inhibit disadvantageous behaviors, overcoming background constraints (Fitzpatrick, 2012). The use of these skills as tools to help attain goals involves self-regulation and the exercise of willful control over behavior (Archambault & Dupéré, 2017; Fitzpatrick, 2012). In this sense, it seems pertinent to promote self-regulation competencies to fulfill students' basic psychological needs and, consequently, engagement.

Purpose of the study

Students' engagement is an important indicator of students' motivation, learning potential, and school success in elementary school, and later in high school (Côté-Lussier & Fitzpatrick, 2016; Estévez et al., 2021). To promote students' engagement, researchers have been setting school-based interventions with different natures (e.g., academic tasks, reading comprehension, behavior monitoring; Martins et al., 2022). Of the existing interventions, the narrative-based intervention is referred to as a powerful educational tool (Rosário et al., 2017; Rosário, Högemann, et al., 2019). The main idea is that students acquire SRL strategies through reading and discussing the story plot. Moreover, through this process, students are encouraged to use metacognitive skills likely to help them satisfy their psychological needs and consequently improve engagement. Supported by prior data stressing that students who self-regulate their learning are prone to be mentally active during the learning process, this intervention is based on the belief that all students are capable to learn, when they decide to learn and to self-regulate their motivation and learning process (Rosário et al., 2004; Rosário & Polydoro, 2012). The in-class learning environment (e.g., teachers are attentive and receptive to students' needs, or the disruption in the classroom) and teachers' motivating styles play an important role in promoting student autonomous motivation and engagement (Reeve, 2012). In fact, teachers may play an active role in increasing students' classroom engagement; for example, by helping them set goals to improve class behavior, or select the best suited self-regulated learning strategies to improve the quality of their work. This closeness with students' work presents teachers as suited candidates to implement educational interventions in class (Perry et al., 2020; Schuitema et al., 2016; Skinner & Pitzer, 2012). However, teachers need to be trained on this topic and be provided with support and supervision to effectively implement the intervention (e.g., Dignath et al., 2008).

Moreover, Whitebread et al. (2013) state that it is easier to teach students SRL strategies while they are young and willing to learn SRL strategies, shape behaviors, and build their self-efficacy. Elementary school is a critical developmental period for students' learning because students are expected to learn basic skills (e.g., reading and math; Hill et al., 2008) and acquire essential knowledge to ground future learning experiences (Reyna & Brainerd, 2007). In the Portuguese educational system, fourth-

grade is important because it is the last year of elementary school and sets the transition to middle school. In the Portuguese middle school (fifth- and sixth-grades), students are delivered ten subjects by different teachers, the class increases in size, the workload is heavier (e.g., more homework assignments), and finally, students are expected to engage in increased autonomous study time (Cleary & Zimmerman, 2004). This transition can be challenging for students regarding self-regulation and socialization demands, especially for those lacking a wide repertoire of self-regulation strategies essential to succeed in school (Cleary & Zimmerman, 2004; McClelland et al., 2006; Zimmerman, 2000).

Taken all together, it seems pertinent for elementary school teachers to promote SRL strategies aiming to enhance students' satisfaction of basic psychological needs and classroom engagement before their transition to middle school. Hence, the present study, following a quasi-experimental design, aims to assess the impact of an SRL training program based on the narrative-tool *Yellow's Trials and Tribulations* (Rosário et al., 2007b), implemented by teachers, in promoting fourth-grade students' satisfaction of basic psychological needs and classroom engagement. Findings are expected to support researchers and educators' efforts to provide a classroom environment that will improve learning and academically successful experiences, encourage teacher training courses in SRL, and promote the curricular infusion of SRL programs tailored to students' educational needs. It is hypothesized that the intervention will promote the satisfaction of students' basic psychological needs and classroom engagement.

Method

Context and Participants

The current investigation is a part of the *Rainbow Project* of *Gulbenkian Academies of Knowledge* funded by Calouste Gulbenkian Foundation. The goal of this Foundation was to promote the socio-emotional skills of children and youth through funding the implementation of evidence-based interventions in several education settings (i.e., public and private, not-for-profit organizations). Firstly, Calouste Gulbenkian Foundation contacted Dr. Pedro Rosário to include the narrative-based intervention with the story-tool *Yellow Trials and Tribulations* (Rosário et al., 2007) as one of the Reference Methodologies of *Gulbenkian Academies of Knowledge.* Any public and private, not-for-profit organizations applied for funding to one of the Reference Methodologies sponsored by the Foundation. Every research team responsible for a Reference Methodologies of *Gulbenkian Academies of Knowledge* was expected to train the implementers of the evidence-based intervention, as well as monitor their implementation and assess the impact of the intervention.

In the case of the current study, one group of public schools situated in the south of Portugal selected the Rainbow Reference Methodology to address the educational needs of the institution. In this sense, the experimental group of the current study sample is comprised of 90 students, ages ranging between eight and 12 years old (M = 9.27, SD = .517), enrolled in the group of schools that applied to *Gulbenkian Academies of Knowledge.* Participants in this condition were enrolled in four classes. Following the agreement made with *Gulbenkian Academies of Knowledge*, each institution is responsible to select a comparison group to assess the impact of the Reference Methodology used. In this context, the coordinator of the *Gulbenkian Academy of Knowledge* contacted the school administrator of another public group of schools with similar sociodemographic characteristics. The comparison group was comprised of 99 students, ages ranging between eight and 12 years old (M = 9.20, SD = .477) enrolled in six classes. In total, the participants were 189 fourth-grade students (98 girls) with ages ranging between eight and 12 years old (M = 9.23, SD = .49). Parents/legal guardians of the participant children enrolled in the intervention and comparison group gave their written informed consent.

Procedure

Participants in both groups followed the national curriculum for the fourth-grade. The comparison group did not engage in the intervention and followed the curriculum as usual. To date, the teachers of the students in this condition had not enroll in training on SRL strategies. The experimental group enrolled in ten 60-minute sessions on a weekly basis from March to June. The intervention program was rooted in a story-tool, *Yellow's Trials and Tribulations* (Rosário et al., 2007b), and was carried out in the classroom setting. Every week one or two chapters of the book were read out loud, and students were invited to discuss the experiences of the rainbow colors and the SRL processes underlining them. The discussion was guided by the implementer and the in-class questioning followed the three types of knowledge (i.e., declarative, procedural, and conditional; Rosário et al., 2019).

Data were collected by a research assistant in the classroom context. Data from classroom engagement and basic psychological needs measures were collected prior to the beginning of the program (i.e., pretest) and at the end of the program (i.e., posttest). The intervention program was implemented by the schoolteachers who, prior to the intervention enrolled in a 50-hour training program focused on motivational and SRL theoretical frameworks. The implementation of the intervention was monitored by the research team through videoconference monthly sessions.

Yellow's Trials and Tribulations narrative-based intervention

The current intervention program is based on the story-tool *Yellow's Trials and Tribulations* (Rosário et al., 2007b) which narrates the adventures experienced by the colors while looking for their

friend *Yellow*, who disappeared unexpectedly. The intervention program aims to promote children under 10 years old SRL strategies (e.g., goal setting, time management, and help to seek; Azevedo et al., 2022; Rosário et al., 2004; Rosário, Núñez, et al., 2019). Based on a social cognitive approach, the intervention program defends that students' self-regulation and motivation are influenced by the learning environments and contextual variables (Rosário et al., 2007a). Narratives are important educational tools very useful to structure life events (Bruner, 1986). In this line of reasoning, Rosário's research team (Azevedo et al., 2022; Cunha et al., 2021; Pereira et al., 2019, 2021; Rosário et al., 2016; Tuero et al., 2022) launched a research line investigating the use of stories as tools to help students organize and understand experiences through narratives and train a wide range of SRL strategies.

The stories play an essential role in children's development; therefore inviting students to look at the characters and story plot (e.g., analyzing and reflecting on the problem-solving strategies displayed by the characters) is expected to help them learn and grow (Rosário et al., 2007a). According to Azevedo et al. (2022), story-tools present students with the opportunity to learn and discuss problem-solving strategies and challenges presented in contexts distinct from theirs, but while discussing the story plot and the strategies used by the characters, students are encouraged to transfer the contents acquired to their own learning context and life. For example, one of the chapters narrows the story of a bird-teacher who encouraged bird-students to fly; with wings closed birds do not fly, used to say the bird-teacher. In class, students are expected to transfer the strategies learned in this chapter to their regular school activities (e.g., writing a composition, and solving math problems; Rosário et al., 2017, 2019). This proximity with the characters' challenges fosters children's discussion with peers about the distinct options and strategies to be followed, and enhances the development of a positive attitude towards the strategic contents instigated by the narrative (Rosário et al., 2017). The SRL strategies incorporated in the narrative are taught to students, who are encouraged to apply what they've learned to the challenges in their daily life; hopefully, these efforts translate to children's positive involvement in learning (Schunk, 1998). For example, Downer et al. (2007) reported that teachers who organize their classes to encourage students to develop critical thinking (e.g., prediction, analysis, comparison) and build a deep understanding of concepts, are more capable of holding their attention and interest in class than those teachers who focused the instruction on basic and rote skills. Therefore, the intervention of the present study was implemented by the schoolteachers based on the assumption that it could be promising to have SRL programs as part of the national curriculum.

The SRL Model

The model underlining the *Yellow's Trials and Tribulations* (Rosário et al., 2007b) story-tool is the PLEE (i.e., planning, execution, evaluation) cyclical model of Rosário et al. (2004), which is addressed in each chapter of the story. The PLEE model is based on Zimmerman's cyclical model, which comprises three phases: forethought, performance or volitional control, and self-reflection (Zimmerman, 2000). The forethought phase comprehends an analysis of tasks and motivational beliefs, which means, the definition of goals, self-efficacy, and orientation towards those same goals. The second phase, the performance phase, integrates self-control and self-observation skills, which translate into self-instruction, time management, and metacognitive monitoring. Finally, the self-reflection phase comprises self-judgment and self-reaction. PLEE adds a recursive nature to Zimmerman's model. In each of the PLEE phases, individuals are expected to plan, execute, and evaluate their behaviors (e.g., during the planning phase, besides thinking and designing a plan, individuals are expected to set it, and afterward evaluate this plan of action against their self-set goals; Rosário et al., 2004; Rosário & Polydoro, 2012). This model comprises three recursive phases: i) planning, in which students must think about what they want to do and how and when they will do it; setting a plan for this purpose; ii) the execution phase is displayed when the plan is put into practice; and iii) the evaluation phase, which describes the efforts to analyze the outputs against the self-set goals. Importantly, each phase of learning informs the subsequent phase, resetting the self-regulated learning cycle.

Session Structure

In the current study, each session began with the scenario arrangement, followed by a review of the content delivered in the previous session (i.e., reviewing prior events of the story and lessons learned). Subsequently, participants were invited to read one or two chapters of the book out loud and explore and discuss the experiences of the rainbow colors and the SRL processes underlining them. Finally, there was a practical activity and take-home message. As previously mentioned, in-class discussions were grounded on the three types of knowledge: declarative (i.e., What is?), procedural (i.e., How?), and conditional (i.e., When? Where? Why?; Rosário et al., 2017, 2019). This protocol allowed students to reflect on the narrative as well as on the behaviors, feelings, and accomplishments of the characters, attributing meaning and structure to their learnings while developing prospective applications of these strategies in their daily lives.

Treatment Integrity

To assure the integrity of the intervention, after each session, the implementer teacher evaluated the adherence to protocol by filling in a session sheet (i.e., grid with all steps of the session and open space records of the difficulties faced, and notes about students' participation and aspects needed to improve), which they had to send to the research team by email. The adherence to protocol and the

performance of the implementers was monitored through the analysis of the session sheets and the monthly discussions via videoconference with the research team. In these sessions, teachers had the opportunity to discuss doubts, challenges, and difficulties experienced in the intervention process. The research team provided support to the teachers' educational needs.

Instruments and Measures

Personal data

Participants were asked about their gender and age.

Basic Psychological Need Satisfaction

In order to assess each dimension of the basic psychological needs (i.e., autonomy, competence, and relatedness) items reported in previous studies were used (Jang et al., 2012, 2016; Reeve & Sickenius, 1994). Students answered this measure through a 5-points Likert scale (1 = strongly disagree, 5 = strongly agree; Jang et al., 2016). The autonomy dimension was evaluated through five items (e.g., "In this class, I feel free"; Jang et al., 2012). The competence dimension was evaluated through six items (e.g., "In this class, I feel successful in terms of completing difficult tasks and projects"; Jang et al., 2016; Reeve & Sickenius, 1994). Finally, the relatedness dimension was evaluated through four items (e.g., "I feel a close sense of connection with people in this class"; Jang et al., 2016; Reeve & Sickenius, 1994). Items were originally written in English, therefore, a back-to-back professional translation was made to adapt the measure to the Portuguese context. Then the scale was fulfilled by a group of five children in order to check for comprehension. These children did not participate in the intervention study. Two items were changed to accommodate children's understanding. For example, the item "In this class, I feel competent" was changed to "In this class, I feel that I can do the tasks". The scale has shown high internal consistency in previous studies (Jang et al., 2012, 2016) and in the present study, the scores on this measure were also internally consistent (i.e., autonomy: α = .75, competence: α = .83, relatedness: α = .76).

Classroom engagement

Classroom engagement was assessed as a multidimensional construct featuring behavioral, emotional, cognitive, and agentic dimensions. Participants answered the 19 items adapted from the engagement measure of Jang et al. (2016) using a 5-points Likert response scale (1 = strongly disagree, 5 = strongly agree). This measure focuses on students' effort, attention, and commitment when initiating and participating in classroom learning activities as well as on their emotions throughout those activities (Jang et al., 2016). Behavioral, emotional, and agentic dimensions of engagement were assessed with five items each (e.g., "When I'm in this class, I listen very carefully.", "When we work on something in

this class, I feel interested.", and "I let my teacher know what I need and want.", respectively), while cognitive engagement was assessed by four items (e.g., "When reading for this class, I try to explain the key concepts in my own words."; Jang et al., 2016). The items were also originally written in English, and back-to-back translated to adapt the measure to the Portuguese context. Then the scale was fulfilled by a group of five children in order to check comprehension. These children did not participate in the intervention study. Three items were changed to accommodate children's understanding. For example, the item "I let my teacher know what I need and want" was changed to "I let my teacher know what helps me learn". This scale has shown strong psychometric properties in previous investigations (Jang et al., 2016) and in the present study, the scores on this measure were also internally consistent (i.e., behavioral engagement: α = .81, emotional engagement: α = .82, cognitive engagement: α = .80, agentic engagement: α = .77).

Data analysis

The present study analyzed the impact of *Yellow's Trials and Tribulations* (Rosário et al., 2007b) narrative-based intervention (i.e., independent variable) on students' basic psychological needs (i.e., dependent variable) and classroom engagement (i.e., dependent variable). As the three dimensions of basic psychological needs and the four dimensions of engagement are related (Reeve, 2012; Ryan & Deci, 2000) a Multivariate Analysis of Variance (MANOVA) was performed for each construct. Since data was collected at two different times (i.e., pretest and posttest) this MANOVA included repeated measures (Field, 2009). Firstly, an exploratory analysis was performed to verify the assumptions required to conduct MANOVA (Field, 2009). The statistical analyses were run using the quantitative data processing program IBM SPSS version 27.0.

The effect size was calculated using the partial eta-squared coefficient ($\eta 2_p$) as described in Piñeiro et al. (2019). The coefficient values were interpreted through the Cohen (1988) benchmarks: null effect: $\eta 2_p$ < 0.01 (d < 0.09); small effect: $\eta 2_p$ = 0.01 to $\eta 2_p$ = 0.058 (d = 0.10 – d = 0.49); medium effect: $\eta 2_p$ = 0.059 to $\eta 2_p$ = 0.137 (d = 0.50 – d = 0.79); and large effect: $\eta 2_p \geq 0.138$ (d ≥ 0.80).

Results

Table 1 provides the descriptive statistics of all dependent variables of interest to the current study (i.e., basic psychological needs and engagement dimensions) in the pretest and posttest. Preliminary analyses were conducted to examine whether there were any differences between the two groups at the pretest. No statistically significant differences were found, which allows inferring any differences in the experimental group in the posttest can be due to the intervention.

Table 1

Descriptive statistics

		Experimental group		Comparison group	
		Pretest	Posttest	Pretest	Posttest
Perceived Autonomy	*M*	3.53	3.70	3.47	3.65
	SD	.78	.75	.93	.95
Perceived Competence	*M*	4.08	4.42	4.17	4.20
	SD	.60	.71	.69	.76
Perceived Relatedness	*M*	4.32	4.36	4.38	4.37
	SD	.62	.90	.56	.69
Behavioral Engagement	*M*	4.25	4.41	4.30	4.20
	SD	.57	.60	.55	.69
Emotional Engagement	*M*	4.27	4.372	4.35	4.20
	SD	.60	.719	.60	.76
Cognitive Engagement	*M*	3.86	4.21	4.04	3.92
	SD	.800	.79	.80	.93
Agentic Engagement	*M*	3.86	4.15	4.01	3.91
	SD	.69	.80	.819	.98

Table 2 displays the correlations between the dependent variables. All the variables were positively correlated at .05 or .01 *p* values, except for autonomy (pretest) with relation to relatedness (posttest), behavioral engagement (posttest), emotional engagement (posttest), and cognitive engagement (pretest), also cognitive engagement (pretest) with relation to cognitive engagement (posttest). Significant Pearson correlation coefficients ranged from .16 to .82.

Table 2

Pearson correlation coefficients

		1		2		3		4		5		6		7	
	Time	1	2	1	2	1	2	1	2	1	2	1	2	1	2
1.Perceived Autonomy	1	-	.28**	.50**	.17*	.35**	.10	.30**	.13	.34**	.12	.38	.16*	.46**	.24**
	2		-	.30**	.68**	.26**	.50**	.27**	.44**	.36**	.42**	.35**	.55**	.39**	.55**
2.Perceived Competence	1			-	.38**	.48**	.23**	.63**	.32**	.60**	.27**	.63**	.41**	.65**	.39**
	2				-	.31**	.63**	.38**	.61**	.40**	.59**	.37**	.70**	.39**	.67**
3. Perceived Relatedness	1					-	.45**	.34**	.25**	.38**	.32**	.43**	.33**	.45**	.41**
	2						-	.25**	.46**	.248**	.44**	.25**	.46**	.29**	.51**
4.Behavioral Engagement	1							-	.57**	.67**	.38**	.58**	.36**	.55	.35**
	2								-	.46**	.75**	.43**	.56**	.37**	.55**
5.Emotional Engagement	1									-	.51**	.63**	.42**	.60**	.44**
	2										-	.39**	.66**	.40**	.61**
6.Cognitive Engagement	1											-	.49	.73**	.50**
	2												-	.52**	.82**
7.Agentic Engagement	1													-	.63**
	2														-

* $p < .05$.

** $p < .01$.

Regarding basic psychological needs, as displayed in Table 3, results indicate no statistically significant multivariate group effect, Wilks' Lambda = .991, $F(3, 175) = .536$, $p = .658$, $\eta 2_p = .009$, a statistically significant multivariate time effect, Wilks' Lambda = .926, $F(3, 175) = 4.677$, $p = .004$, $\eta 2_p = .074$, and a statistically significant multivariate group x time interaction effect, Wilks' Lambda = .942, $F(3, 175) = 3.578$, $p = .015$, $\eta 2_p = .058$ (see also Figures 1-3).

Table 3

Summary of basic psychological needs univariate analyses of repeated measures

	Group effect		Time effect		Time x Group effect	
	F	*p*	F	*p*	F	*p*
Perceived autonomy	.23	.63	5.28	<.05	.00	.95
Perceived competence	.55	.46	10.41	<.001	6.99	<.01
Perceived relatedness	.14	.70	.08	.78	.18	.67

Univariate results revealed that of the three basic psychological needs, perceived relatedness had no statistically significant effects (see also Figure 3). On the other hand, a significant effect of time on perceived autonomy was found, $F(1, 177) = 5.81$, $p < .05$, $\eta 2_p = .029$. Data also showed a significant effect of time, $F(1, 177) = 10.405$, $p < .001$, $\eta^2_p = .056$, and group x time interaction, $F(1, 177) = 6.994$, $p < .01$, $\eta 2_p = .038$, in perceived competence. Regarding these variables, pairwise comparisons revealed that from pretest to posttest, students in the experimental group reported higher perceived competence (see also Figure 2). Pairwise comparisons also revealed that both groups increased perceived autonomy over time, although in the posttest the groups did not differ (see also Figure 1).

Figure 1

Graphical representation of the levels of Perceived Autonomy over the two moments

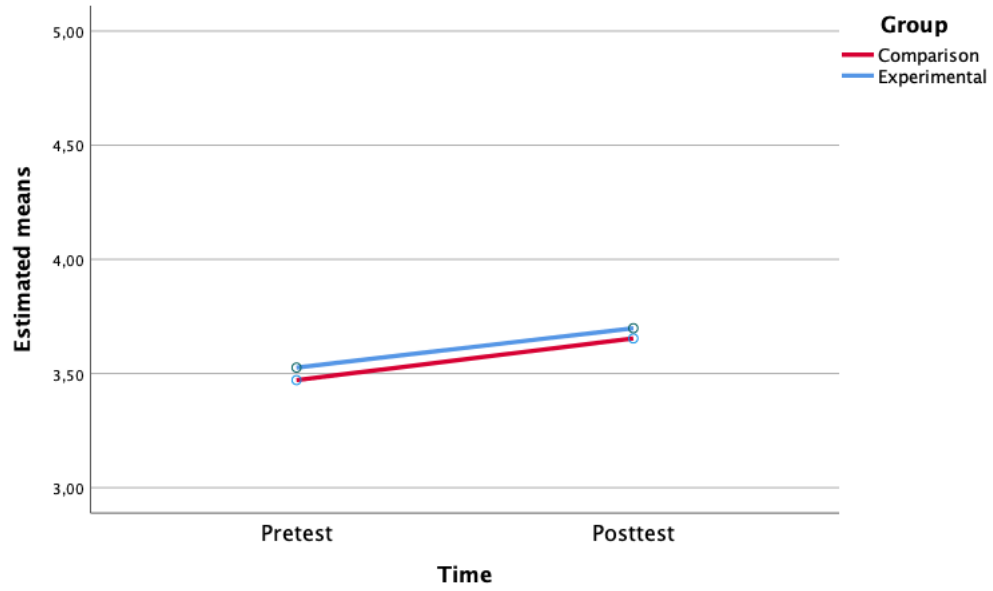


Figure 2

Graphical representation of the levels of Perceived Competence over the two moments

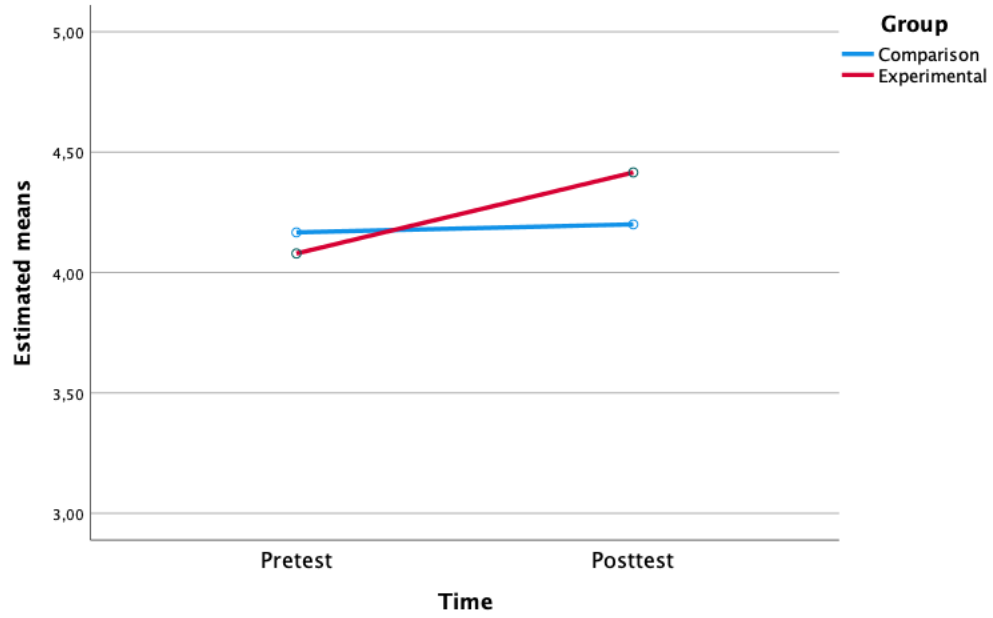
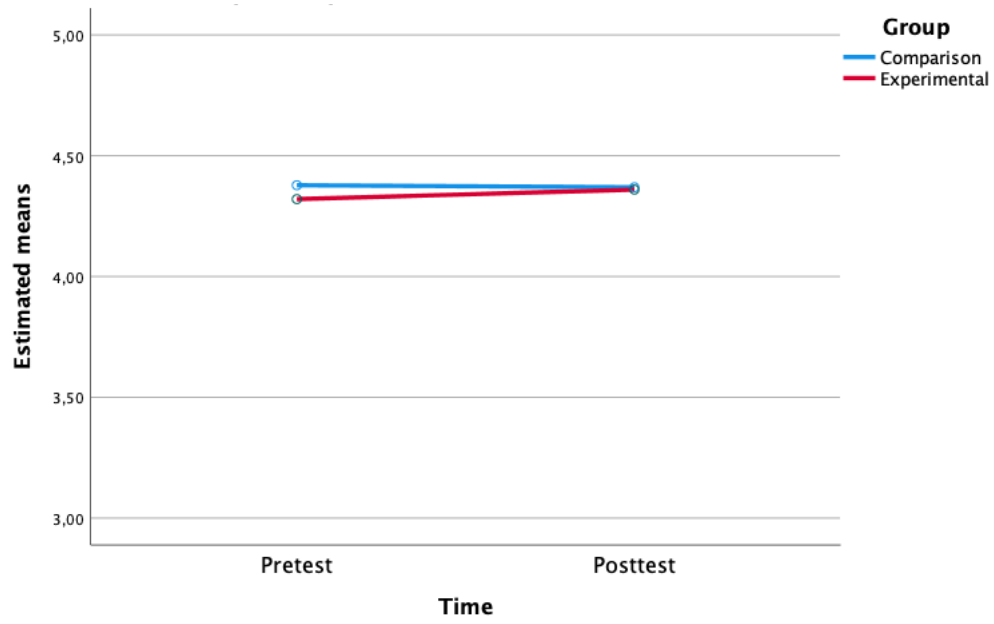


Figure 3

Graphical representation of the levels of Perceived Relatedness over the two moments



Concerning engagement, Table 4 shows no statistically significant multivariate group effect, Wilks' Lambda = .993, $F(4, 174) = .295$, $p = .881$, $\eta 2_p = .007$, no statistically significant multivariate time effect, Wilks' Lambda = .955, $F(4, 174) = 2.032$, $p = .092$, $\eta 2_p = .045$, and a statistically significant multivariate group x time interaction effect, Wilks' Lambda = .899, $F(4, 174) = 4.898$, $p = .001$, $\eta 2_p = .101$.

Table 4

Summary of engagement univariate analyses of repeated measures

	Group effect		Time effect		Time x Group effect	
	F	*p*	F	*p*	F	*p*
Behavioral Engagement	1.10	.30	.62	.43	9.74	<.01
Emotional Engagement	.31	.58	.21	.65	6.11	<.05
Cognitive Engagement	.24	.63	3.99	<.05	14.51	<.001
Agentic Engagement	.20	.66	3.20	.08	13.59	<.001

Univariate results showed significant effect of time, $F(1, 177) = 3.985$, $p < .05$, $\eta 2_p = .022$, and group x time interaction, $F(1, 177) = 14.514$, $p < .001$, $\eta 2_p = .076$, in cognitive engagement. Data also reported a significant effect of group x time interaction in behavioral engagement, $F(1, 177) = 9.743$, $p < .01$, $\eta 2_p = .052$, emotional engagement, $F(1, 177) = 6.111$, $p < .05$, $\eta 2_p = .033$, and agentic engagement, $F(1,$

177) = 13.589, $p < .001$, $\eta 2_p = .071$. Regarding these variables, pairwise comparisons showed an increase in the experimental group, from pretest to posttest, in reported behavioral, emotional, cognitive, and agentic engagement (see also Figures 4-7). Comparison group revealed a statistically significant decrease in reported emotional engagement from pretest to posttest (see also Figure 5).

Figure 4

Graphical representation of the levels of behavioral engagement over the two moments

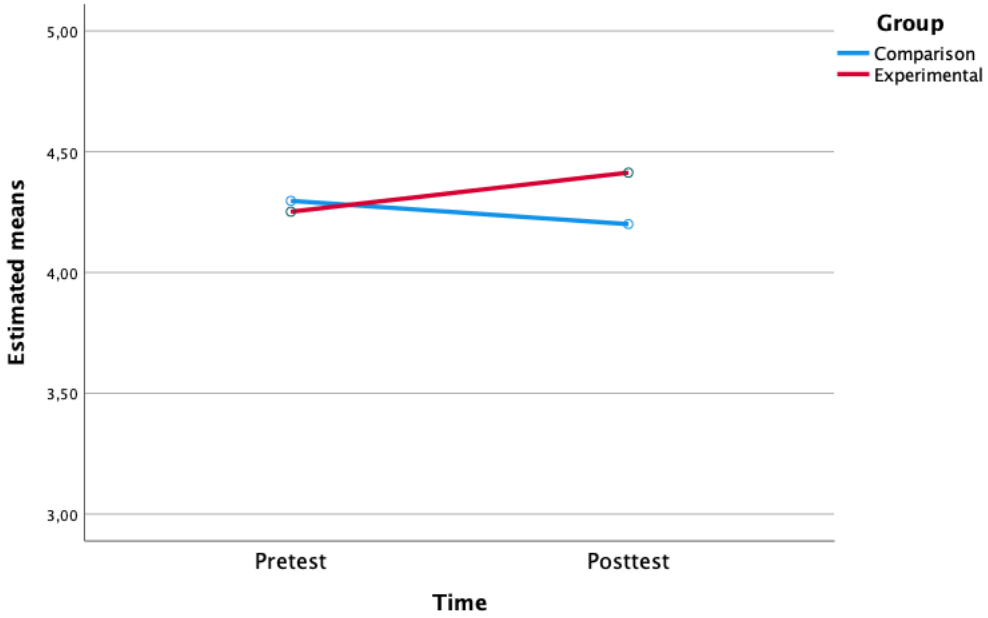


Figure 5

Graphical representation of the levels of emotional engagement over the two moments

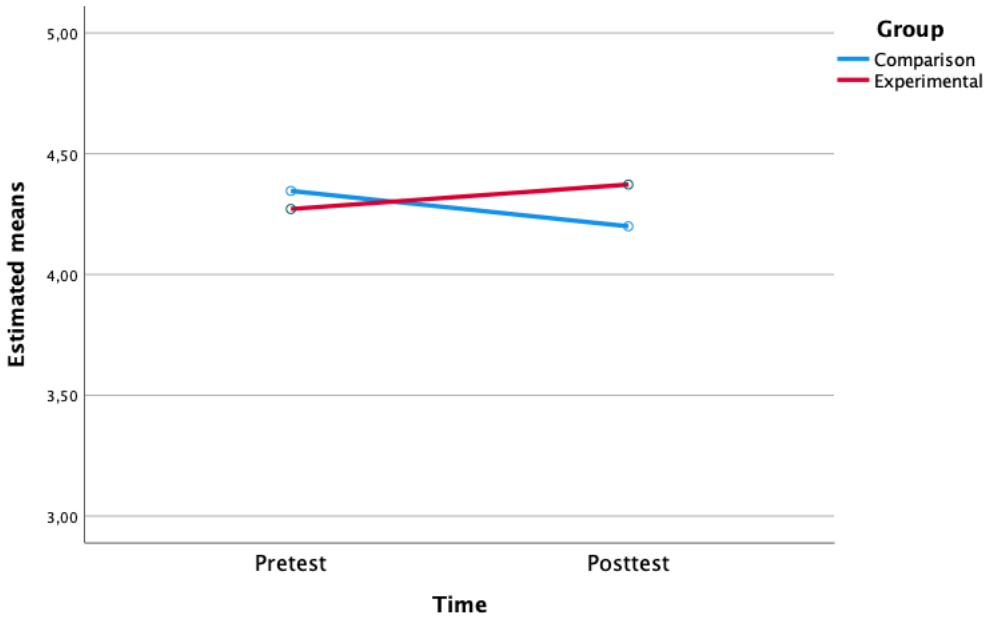


Figure 6

Graphical representation of the levels of cognitive engagement over the two moments

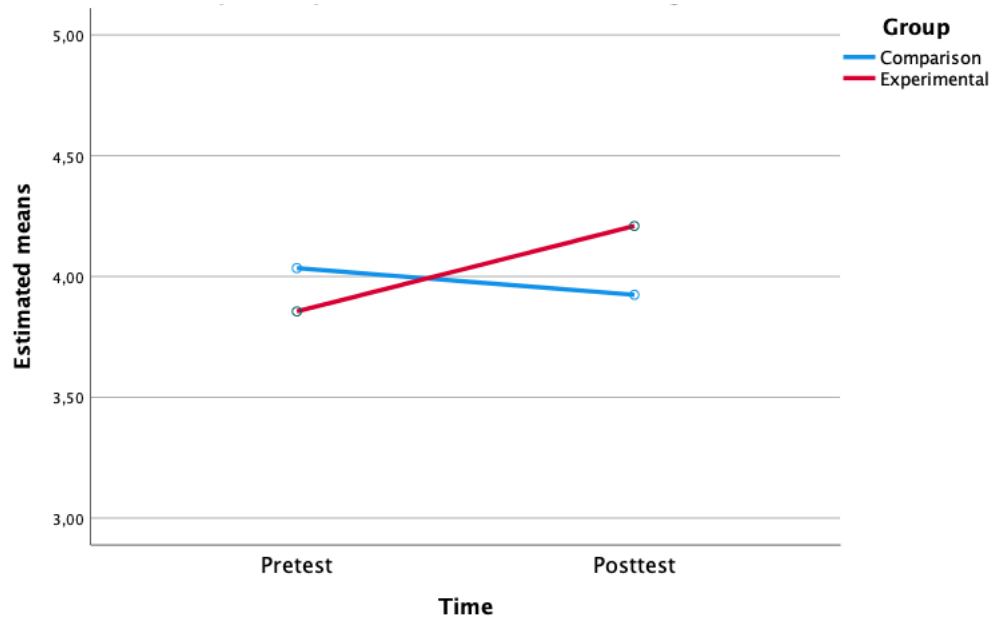
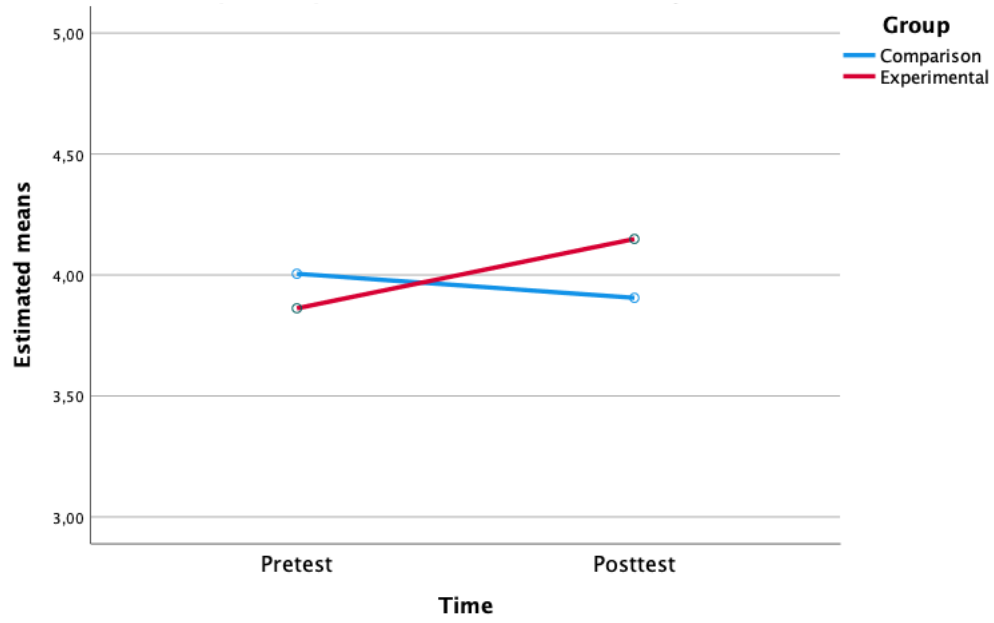


Figure 7

Graphical representation of the levels of agentic engagement over the two moments



Discussion

Engagement is mentioned in the literature as an important asset for students' development and success in elementary school and subsequent levels of schooling (Estévez et al., 2021; Hofkens & Ruzek, 2019). The fact that rates of low engagement among students are increasing (Martins et al., 2022) and disengaged students are likely to struggle academically (Rosário et al., 2017), brings educators and

researchers great concern about the topic (McClelland et al., 2006). Following the proposition that basic psychological needs are an antecedent of engagement (Deci & Ryan, 2000; Reeve, 2012; Ryan & Deci, 2020), students are expected to fulfill their basic psychological needs in order to learn, and engage in the classroom (Deci & Ryan, 2000; Reeve, 2012; Reeve & Lee, 2014). Elementary school is a critical developmental period for students' learning (Hill et al., 2008). In the Portuguese educational system, fourth-grade is important because it sets the transition from elementary to middle school (e.g., a more demanding school level). On this basis, the present study aimed to assess the impact of *Yellow's Trials and Tribulations* (Rosário et al., 2007b) narrative-based intervention, implemented by teachers, on fourth-grade students' basic psychological needs satisfaction and classroom engagement. We hypothesized that students who benefit from SRL training, implemented by teachers, would have their basic psychological needs more satisfied and display higher classroom engagement levels, than counterparts in the comparison group.

Results of the present study confirmed, partially, our hypotheses since statistically significant differences were found between the experimental group and the comparison group regarding behavioral, cognitive, and agentic engagement dimensions over time, but the same did not happen for the three basic psychological needs, once no statistically significant differences were found between the two groups in perceived autonomy and relatedness. Regarding basic psychological needs, current data indicated no statistically significant multivariate effect of group, and a statistically significant multivariate effect of time, and group x time interaction. With effect sizes null ($\eta 2_p$ = .01), medium ($\eta 2_p$ = .07), and small ($\eta 2_p$ = .06), respectively. Findings suggest that perceived autonomy increased over time in both groups, with a large effect size ($\eta 2_p$ = .03). Such a fact can be due to students' satisfaction of autonomy-need through the experience of enthusiasm and appreciation, opportunities for choice, and the encouragement of responsibility for their actions (Cook & Artino, 2016; Ryan & Deci, 2020; Skinner & Belmont, 1993). Since the classroom environment provides for the fulfillment of students' needs (Conesa & Duñabeitia, 2021; Reeve, 2012) such an increase in autonomy over time may indicate an effect of the context. We cannot conclude that the differences found are due to the intervention. Another factor that may help explain these results is the lack of transference from the program to the classroom since self-reported measures are addressed to the classroom context and may not be capturing the effect of the intervention.

Data also revealed that all students had their need for perceived competence satisfied, but for students who benefited from the intervention, this need was even more satisfied. As previously mentioned, for the basic psychological needs to be satisfied certain conditions must be met. Regarding perceived competence, for the satisfaction of this need positive feedback and optimal challenge are necessary (Cook

& Artino, 2016; Ryan & Deci, 2020; Skinner & Belmont, 1993). Current findings suggest that the characteristics of the narrative tool are effective in promoting the conditions for the perceived competence need to be satisfied. In turn, the satisfaction of the need for relatedness is achieved through a sense of belongingness, respect, and security (Cook & Artino, 2016; Deci & Ryan, 2000). Results of this measure showed that no statistically significant results were found. Such findings could be explained by the difficulty of changing as a result of the overly high pretest levels (i.e., ceiling effect; Austin & Brunner, 2003).

Regarding engagement, statistically significant results were found in group x time interaction, with a medium effect size ($\eta 2_p = .10$). This showed that the results of the present study followed prior literature on *Yellow's Trials and Tribulations* narrative-based intervention and showed to impact positively in promoting students' engagement (Rosário et al., 2016). Data showed small effect sizes for the behavioral and emotional engagement, and medium effect sizes for cognitive and agentic engagement. Statistically significant results were found in pairwise comparisons for behavioral, cognitive, and agentic engagement, which translates that from pretest to posttest, students reported higher engagement in these dimensions. Perceived competence relates to the experience of mastery while completing an academic task (e.g., Conesa & Duñabeitia, 2021; Deci & Ryan, 2000). Following Martins et al. (2022), students who placed great importance on task mastery goals reported higher active cognitive engagement (i.e., the use of metacognition and self-regulation) which could explain the satisfaction of perceived competence-need and consequently the improvement of cognitive engagement. Also stated in the literature is that opportunities to satisfy the need for competence support individuals' self-regulation (Deci et al., 1996). Since cognitive engagement refers to the use of learning and self-regulatory strategies (Reeve, 2012), such an increase in the experimental group could be explained by the use of these strategies throughout the intervention. Likewise, the satisfaction of perceived competence can also be linked to the improvement of engagement since students that believe in their capacity (competence) and propensity to achieve success in school, and recognize themselves as autonomous are more prone to be behaviorally and emotionally engaged (Patrick et al., 1993). Concerning emotional engagement, although there was a statistically significant increase in the experimental group and a statistically significant decrease in the comparison group, in the posttest the groups did not differ significatively.

In sum, these preliminary results are promising while indicating that this intervention could be a valuable tool for addressing students' engagement in the classroom. However, some interesting data on basic psychological needs were found, since only competence showed statistically significant differences. Thus, it would be interesting to explore how teachers can, in their daily lives, promote the satisfaction of

these needs. It would also be interesting to understand how the training team can help teachers to transfer what they have learned from the program to the classroom context.

Limitations and Future Research

Some limitations should be addressed in this study. The first limitation is that we did not gather follow-up data. So, while the intervention produced positive results, future studies could consider investigating its long-term effects by planning experimental designs with follow-up measures. Our results did not report an effect of the intervention on perceived autonomy. Thereby, the self-reported measures, that are focused on the classroom context, may not be capturing the effect of the intervention due to a lack of transference from the program to the classroom. As only pre and posttest data were collected, we have no information regarding the satisfaction of needs and promotion of engagement relative to the intervention. In this line of thought, future studies could assess the satisfaction of students' basic psychological needs and intervention engagement. Furthermore, the decrease in emotional engagement in the comparison group is an intriguing result to reflect on. It might be interesting for future research to analyze and conduct studies to map basic psychological needs and engagement throughout the school year to understand how these variables progress throughout time.

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Appendix

Universidade do Minho

Conselho de Ética

Comissão de Ética para a Investigação em Ciências Sociais e Humanas

Identificação do documento: CEICSH 024/2020

Relatores: Emanuel Pedro Viana Barbas Albuquerque e Marlene Alexandra Veloso Matos

Título do projeto: *Aprender a Aprender: Projeto Arco-íris*

Equipa de Investigação: Pedro José Sales Luís da Fonseca Rosário (IR), Centro de Investigação em Psicologia (CIPsi), Escola de Psicologia, Universidade do Minho; Armanda Pereira (PhD), investigadora Pós-doc no CIPsi; Jennifer Cunha (PhD), investigadora júnior no CIPsi; Daniela Rosendo (MSc), bolseira de investigação no CIPsi; Sandra Mesquita (MSc), bolseira de investigação no CIPsi; Sara Teixeira (MSc), bolseira de Investigação no CIPsi; Ana Guimarães (MSc), bolseira de investigação no CIPsi; Dulce Lopes (MSc), bolseira de investigação no CIPsi; Maria Clara Vieira (MSc), bolseira de investigação no CIPsi; Patrícia Sousa (MSc), bolseira de investigação no CIPsi

PARECER

A Comissão de Ética para a Investigação em Ciências Sociais e Humanas (CEICSH) analisou o processo relativo ao projeto de investigação acima identificado, intitulado *Aprender a Aprender: Projeto Arco-íris.*

Os documentos apresentados revelam que o projeto obedece aos requisitos exigidos para as boas práticas na investigação com humanos, em conformidade com as normas nacionais e internacionais que regulam a investigação em Ciências Sociais e Humanas.

Face ao exposto, a Comissão de Ética para a Investigação em Ciências Sociais e Humanas (CEICSH) nada tem a opor à realização do projeto, emitindo o seu parecer favorável, que foi aprovado por unanimidade pelos seus membros.

Braga, 26 de maio de 2020.

O Presidente da CEICSH

(Acílio Estanqueiro Rocha)

Anexo: Formulário de identificação e caracterização do projeto