

Program for promoting executive functions and self-regulation in adolescents: Development, content validity, and feasibility

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Abstract

Executive functions (EF) are cognitive skills that enable behavioral control and underpin self-regulation (SR), including emotional regulation—central constructs of this investigation. This study aimed to develop and examine the content validity and applicability of a program designed to promote EF and SR in adolescents (10–16 years old), particularly those in socially vulnerable contexts that may negatively impact such skills. The development process comprised five stages: (1) planning (theoretical review and interviews with 21 participants to identify target population needs); (2) program development; (3) expert judges' analysis (11 specialists); (4) pilot study (20 participants); and (5) revision and finalization. Stage 1 provided theoretical foundations and relevant information regarding the needs of the target population. Stage 2 resulted in the first version of the program. In Stage 3, the Psychoeducation Module achieved a Content Validity Index (CVI) $\geq .80$ for all sections and activities. In the Activities Module (initial version with 17 proposals), 16 (94%) achieved a CVI $\geq .80$, while one activity (CVI = .60) was excluded. In the pilot study, facilitators and participants rated the activities positively, with mean ratings ranging from 3.5 to 5.0 (on a 1–5 scale), indicating good comprehension, engagement, and applicability, as well as low perceived difficulty (1.0–2.3), with minor clarity adjustments suggested. The final version of Pró-FExA (Program for the Promotion of Executive Functions and Self-Regulation) consists of a Psychoeducation Module and an Activities Module. Pró-FExA represents an innovative proposal by integrating EF and SR components across different contexts. Ongoing studies aim to examine its effectiveness.

Keywords: executive functions, self-regulation, school neuropsychology, adolescents, social vulnerability

PROGRAMA DE PROMOÇÃO DE FUNÇÕES EXECUTIVAS E AUTORREGULAÇÃO EM ADOLESCENTES: DESENVOLVIMENTO, VALIDADE DE CONTEÚDO E VIABILIDADE

Funções Executivas e Autorregulação em Adolescentes: Novo Programa

Resumo

Funções executivas (FE) são habilidades que possibilitam o controle do comportamento, compondo a base da autorregulação (AR), que inclui a regulação emocional, construtos centrais desta investigação. O objetivo deste estudo foi desenvolver, analisar a validade de conteúdo e a aplicabilidade de um programa de promoção de FE e AR para adolescentes (10–16 anos), especialmente em situações de vulnerabilidade social, que impactam negativamente tais habilidades. O desenvolvimento seguiu cinco etapas: (1) planejamento (revisão teórica e entrevistas com 21 participantes para mapeamento de demandas); (2) construção; (3) análise de juízes (11 especialistas); (4) estudo piloto (20 participantes); e (5) revisão e fechamento. A etapa 1 forneceu subsídios teóricos e informações sobre as necessidades do público-alvo. A etapa 2 resultou na primeira versão do programa. Na etapa 3, o Módulo de Psicoeducação obteve IVC $\geq 0,80$ em 100% das seções/atividades. No Módulo de Atividades (versão inicial, 17 propostas), 16 (94%) atingiram IVC $\geq 0,80$; 1 atividade apresentou IVC = 0,60 e foi excluída. No estudo piloto, aplicadores e participantes avaliaram positivamente as atividades, com médias entre 3,5 e 5,0 (em escala de 1 a 5), indicando boa compreensão, engajamento e aplicabilidade, com baixa dificuldade (1,0–2,3) e ajustes pontuais de clareza. A versão final do Pró-FExA (Programa de Promoção de Funções Executivas e Autorregulação) é composta por um Módulo de Psicoeducação e um Módulo de Atividades. O Pró-FExA representa uma proposta inovadora ao integrar componentes de FE e AR em diferentes situações. Estudos em andamento visam examinar sua efetividade.

Palavras-chave: funções executivas, autorregulação, neuropsicologia escolar, adolescente, vulnerabilidade social

PROGRAMA DE PROMOCIÓN DE LAS FUNCIONES EJECUTIVAS Y LA AUTORREGULACIÓN EN ADOLESCENTES: DESARROLLO, VALIDEZ DE CONTENIDO Y VIABILIDAD

Funciones Ejecutivas y Autorregulación en Adolescentes: Nuevo Programa

Resumen

Las funciones ejecutivas (FE) son habilidades que permiten el control del comportamiento y constituyen la base de la autorregulación (AR), que incluye la regulación emocional, constructos centrales de esta investigación. El objetivo fue desarrollar, analizar la validez de contenido y evaluar la aplicabilidad de un

programa de promoción de FE y AR para adolescentes (10–16 años), especialmente en contextos de vulnerabilidad social que afectan negativamente estas habilidades. El desarrollo siguió cinco etapas: (1) planificación (revisión teórica y entrevistas con 21 participantes para identificar demandas); (2) construcción; (3) evaluación por jueces (11 especialistas); (4) estudio piloto (20 participantes); y (5) revisión final. La etapa 1 aportó fundamentos teóricos y datos sobre necesidades del público objetivo; la etapa 2 produjo la primera versión del programa. En la etapa 3, el Módulo de Psicoeducación alcanzó un Índice de Validez de Contenido (IVC) $\geq 0,80$ en todas las secciones. En el Módulo de Actividades (17 propuestas), 16 (94%) lograron IVC $\geq 0,80$ y una fue excluida (IVC = 0,60). En el estudio piloto, aplicadores y participantes evaluaron positivamente las actividades (promedios de 3,5 a 5,0 en una escala de 1 a 5), indicando buena comprensión, participación y aplicabilidad, con baja dificultad (1,0–2,3) y ajustes menores de claridad. La versión final del Pró-FExA, compuesta por un Módulo de Psicoeducación y un Módulo de Actividades, constituye una propuesta innovadora que integra componentes de FE y AR en diversas situaciones. Estudios en curso examinan su efectividad.

Palabras clave: funciones ejecutivas, autorregulación, neuropsicología escolar, adolescente, vulnerabilidad social

Executive functions (EF) are a set of self-regulatory cognitive processes that enable goal-directed behavior. These functions play a fundamental role in the performance of new and/or challenging activities and, in turn, support cognitive, emotional, and behavioral functioning throughout the various stages of the life cycle (Diamond, 2013; Dias & Malloy-Diniz, 2023). According to Diamond's model (2013), the core triad of EF comprises working memory, inhibitory control, and cognitive flexibility. Moreover, the existence of more complex components, such as organization and planning, problem-solving, and reasoning, is suggested to emerge from the articulation of the core EF (Diamond, 2013).

The proper development of executive functions (EF) favors various aspects of life, being related to learning skills and good school performance (Ahmed et al., 2019; Cortés-Pascual et al., 2019; Dias et al., 2022); success in professional life (Bailey, 2007; Barkley & Murphy, 2011); higher quality in interpersonal relationships (Boer & Elias, 2022; Romero-López et al., 2018); and more adaptive outcomes in mental health (Zelazo, 2020). Conversely, the underdevelopment of these skills is associated with various impairments, including cognitive rigidity, difficulties in attentional control, and limitations in planning, learning, and social competence (Dias & Malloy-Diniz, 2020). These impairments also constitute risk factors for psychopathology, in a transdiagnostic way (Zelazo, 2020), and for risky behaviors such as substance abuse (Assis et al., 2019; Dougherty et al., 2013; Freichel et al., 2025).

Although executive functions (EFs) are essential at all stages of development, childhood and adolescence stand out as sensitive windows – both for the maturation of EFs and for the implementation of interventions. Adolescence, the focus of this article, is a stage of development marked by significant neurobiological changes, including the progressive maturation of the prefrontal cortex, intense myelination, and a reduction in synaptic density (Blakemore & Choudhury, 2006). These changes slowly and progressively foster the development of EFs, expanding the capacity for inhibitory control, abstract reasoning, planning, and emotional regulation, central aspects for the development of autonomy and identity as well (Friedman & Miyake, 2017; Zelazo, 2020).

Beyond neurobiological maturation, these skills develop through interaction with environmental demands and pressures. During adolescence, external demands for self-regulation intensify: greater academic engagement, more complex and autonomous decision-making, increased social responsibility, and strengthened interpersonal relationships are expected. At this stage of development, better executive functions are associated with greater resilience, more consistent academic performance, and a lower incidence of emotional and behavioral symptoms (Zelazo, 2020; Boer & Elias, 2022). In this sense, the importance of preventive interventions that strengthen these skills is reinforced, helping prevent or minimize future difficulties and promoting more adaptive coping resources to meet the increasingly complex demands of adolescence, preparing young people also for the challenges of adult life.

Self-regulation (SR), in turn, can be understood as a broader construct encompassing emotion regulation and motivation (Hofmann et al., 2012; McClelland & Cameron, 2012). The

capacity to control impulses and subsequently regulate or modify behavior has also been associated with an interdependence between self-regulation (SR) and executive functions (EF) (Robson et al., 2020). Thus, in line with the findings on EF, a meta-analysis showed that SR in childhood was able to predict a series of outcomes, such as academic achievement, aggressive behavior, unemployment, and health indicators (e.g., cigarette, alcohol and other drug use, obesity, and depression) in late childhood, adolescence, and even adulthood (Robson et al., 2020). The authors' proposed delimitation of SR aligns with Diamond's (2013) model, which recognizes overlap between SR, especially with the inhibitory component of EF. In other words, SR would include the ability to inhibit responses, attentional inhibition, and the maintenance of adequate levels of emotional, motivational, and cognitive activation. Therefore, it is important to consider neuropsychological interventions that promote the coordinated development of SR and EF.

In this context, the meta-analysis by Murray et al. (2022) stands out, which investigated interventions in SR for adolescents, defining them as the ability to manage one's own behavior, cognition, and emotions in pursuit of goals. Based on an analysis of 33 empirical studies, the authors identified five types of intervention (cognitive regulation strategies, emotional regulation, parental training, physical activity, and working memory). They found that the overall effect size of the interventions was small ($g = 0.12$). However, when analyzing by type of approach, they found that only interventions focused on emotional regulation showed a significant positive effect, albeit of small magnitude ($g = 0.20$; $p = 0.012$), both for outcomes in the emotional ($g = 0.24$; $p = 0.006$) and behavioral domains ($g = 0.20$; $p = 0.043$). Thus, the evidence suggests that emotional regulation would be the approach with the greatest direct impact on SR capacity and the greatest potential for generalization during adolescence. Given these results, they also suggest that the cumulative benefit of interventions that promote both emotional and cognitive regulation remains open to future investigation (Murray et al., 2022).

Thus, it is understood that there is a relative overlap between EF and SR. That is, SR can be understood as a broader construct in which EF participates (Diamond, 2013; Hofmann et al., 2012; McClelland & Cameron, 2012). Therefore, EFs are considered as neurocognitive foundations that enable self-regulated behavior and, ultimately, SR (Dias & Malloy-Diniz, 2023).

Although the literature on SR and EF is extensive, intervention programs focused on components of EF and SR available in a national context are predominantly concentrated on children in early childhood education and the initial years of elementary school (e.g., Dias & Seabra, 2013; Cardoso & Fonseca, 2016; Carvalho & Abreu, 2024; Flor et al., 2023). Initiatives specifically aimed at adolescence remain scarce, despite the potential of this phase as a window of opportunity for neurocognitive strengthening (Blakemore & Choudhury, 2006). A recent proposal was the π FEx-Academics program (Dias et al., 2023; Steffen et al., 2023), directed at high school and university students. Nevertheless, there is a relative lack of proposals that integrate the understanding of SR, to also contemplate the promotion of emotional regulation and executive functions – especially for the age group corresponding to the second cycle of

elementary school, which covers the transition from childhood to adolescence, and particularly in contexts of greater vulnerability to neurodevelopment.

In these contexts, factors such as material deprivation, lack of appropriate stimulation, and exposure to chronic stressors can negatively impact neurodevelopment, being associated with impairments in cognitive components, among which executive functions and reactive intelligence stand out broadly (Cuartas et al., 2022; Johnson et al., 2016; Lawson et al., 2018; Tomaz & León, 2021; Vrantisidis et al., 2020; Zelazo, 2020).

Given the scarcity of interventions for stimulating EF and SR beyond childhood, encompassing students from middle school onwards, and the high sensitivity to change characteristic of this period of life, the objective of this study arose: the development of the Program for the Promotion of Executive Functions and Self-Regulation – teens (Pró-FExA). This program is a neuropsychological intervention aimed at stimulating EF and SR from the beginning of adolescence, focusing on the age ranges of 10–11 years and 15–16 years. The Brazilian Statute of Children and Adolescents (*Estatuto da Criança e do Adolescente* – ECA) recognizes the age range of 12 to 18 years as ‘adolescence’ (Brazil, 1990). However, in this study, this age delimitation was not strictly applied, primarily because of a gap identified in the literature. Despite this, the World Health Organization (WHO) defines adolescence as ages 10–19 (WHO, n.d.), so, for brevity, adolescence was used throughout this article without specifying pre-adolescence.

Aligned with the challenges of this age group, the Pró-FExA program was designed to address both academic learning situations and interpersonal relationships. Its activities were designed to target specific components of EF and to integrate emotional regulation, encompassing the broader SR concept. It is based on the premise that promoting these skills is possible by providing opportunities for experiences and activities that engage and stimulate them continuously, that are meaningful and relevant to the individual (Diamond & Ling, 2020), and that facilitate generalization by constituting relatively complex activities that engage more than one specific component, approximating “real-world” contexts (Zelazo et al., 2024). Furthermore, Pró-FExA was designed for contexts of socioeconomic vulnerability, structured with low-cost materials, and intended for applicability across diverse educational contexts (formal or non-formal).

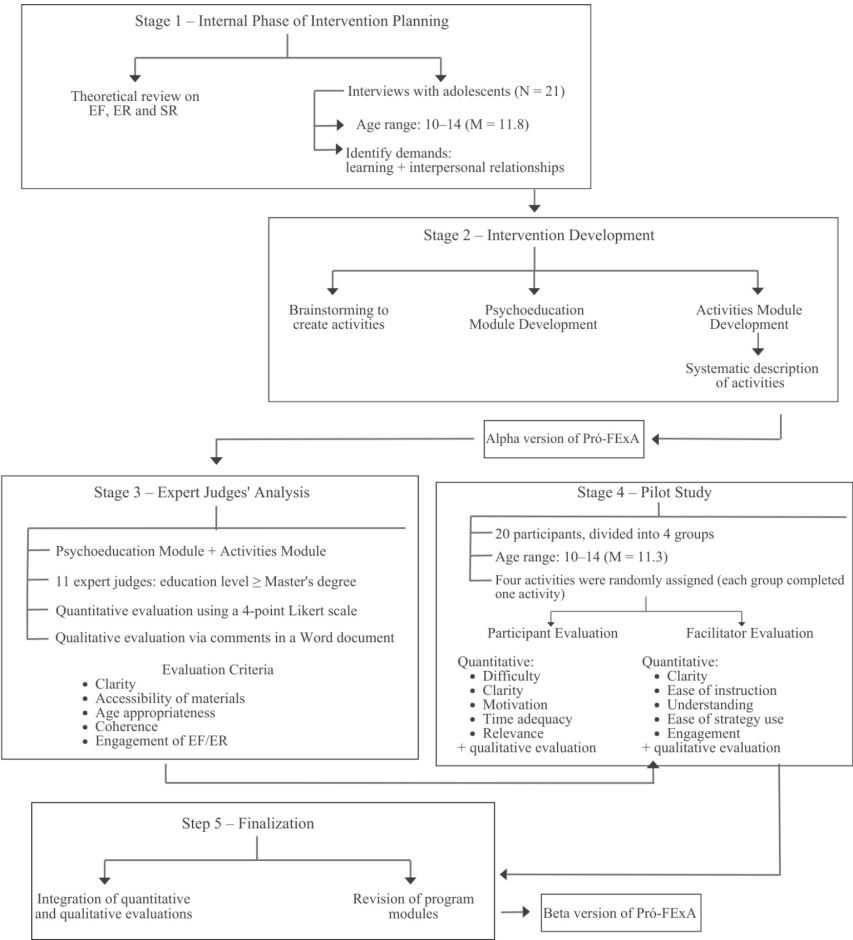
Finally, it is worth highlighting that the program integrates knowledge from cognitive neuropsychology and comprises activities aimed at strengthening skills relevant to academic performance, social engagement, and decision-making during adolescence – with potential repercussions throughout life.

Method

This study, with a qualitative-quantitative design, on program construction was developed in five stages, involving different groups of participants: [1] Internal phase of planning the intervention; [2] Development of the intervention; [3] Analysis by expert judges; [4] Pilot

study; and [5] Integration of expert analysis and pilot study and finalization. Figure 1 presents the flowchart of the entire process.

Figure 1
Development flowchart for the Pró-FExA program



Participants

Stage 1 aimed to gain insight into everyday challenges associated with executive function difficulties by conducting interviews with 21 adolescents. The participants ranged in age from 10 to 14 years ($M = 11.8$; $SD = 1.18$), with 52.4% of the group being females. All individuals were served by the Socialization and Strengthening of Bonds Service (*Serviço de Convivência e Fortalecimento de Vínculos – SCFV*) located in the state of São Paulo. In Stage 3, 11 expert judges

participated. The judges were chosen for convenience, and all had at least a master's degree (Table S1 in the Supplementary Material provides a detailed description of each judge). Stage 4 involved 20 adolescents aged 10–14 years ($M = 11.3$; $SD = 1.45$), 65% male. The participants were adolescents regularly enrolled in public schools, without a prior clinical diagnosis or uncorrected sensory impairment. Selection was by convenience among participants linked to the partner SCFV. They were organized into small groups for the pilot application of some of the proposed activities: seven participated in Activity 1, three in Activity 3, four in Activity 13, and six in Activity 2 of the Psychoeducation Module. In addition to these participants, three facilitators conducted the activities for this stage, working in pairs throughout. The participants in stages 1 and 4, served by the SCFV, came from low-socioeconomic communities and families in situations of social vulnerability, and attended this institution outside of school hours (therefore, a convenience sample). There were no exclusion criteria

Instruments and Procedures

This study was approved by the Research Ethics Committee (CAAE: 80358724.4.0000.5440). The program's development followed a five-stage procedure, adapted from the method described by Dias et al. (2021). The team that developed the intervention consisted of 2 psychologists with knowledge and experience in neuropsychology and the development of interventions in school/educational contexts; 2 psychologists with knowledge and experience in child and adolescent development; and undergraduate and graduate students.

Stage 1: Internal Phase of Intervention Planning

The first stage involved two main actions: (1) theoretical review and (2) identification of the target population's needs. A non-systematic literature review was conducted on EF, SR, emotion regulation (ER), and constructs. Related to this, the aim was to define the concepts adopted and identify viable intervention activities. In parallel, semi-structured interviews were conducted with the adolescents. A semi-structured script developed by the researchers was used, containing open-ended questions about challenges faced in daily school, social, and emotional life. An example of a question was: *"In our daily lives, we face certain difficulties and challenges in various places where we are. Could you name five challenges or difficulties that you face in your daily life?"* The interviews were conducted individually in a private room at the partner institution and lasted an average of 20 to 30 minutes. The data obtained helped to tailor the program to the target population's needs.

Stage 2: Intervention Development

Based on the information gathered in the first stage, four actions were conducted: 1) brainstorming (to identify/generate possible activities); 2) Psychoeducation Module development; 3) Activities Module development; 4) systematic description of the activities. After these four

actions, the alpha version of the program, named Pró-FExA (Promotion of Executive Functions and Self-Regulation), was finalized.

Step 3: Expert Judges' Analysis

The modules of the Alpha version of Pró-FExA were submitted to expert evaluation. The alpha version of the program was divided into modules and parts, and assigned to subsets of experts based on their areas of expertise, to reduce fatigue bias and ensure higher-quality analysis. Thus, the judges were organized into groups to review different parts of the program: Psychoeducation Module: 5 judges; Activities Module: 5 judges evaluated each half of this module (due to its length), with 2 judges evaluating all modules. These two judges acted as synthesis evaluators, reviewing the entire set to verify consistency between the modules and uniformity in the application of the criteria.

Each judge received a copy of the program version, accompanied by an Evaluation Protocol (Cardoso & Fonseca, 2016; Dias et al., 2021). Using a Likert scale ranging from 1 to 4 (1 – strongly disagree, item is not adequate/representative; 4 – strongly agree, item is adequate/representative), the following criteria for each section/activity were evaluated: a) plausibility; b) suitability to the group context; c) clarity; d) accessibility of materials; e) age appropriateness; f) coherence with the objective; and g) engagement of EF/ER. In the Activities Module, the experts also indicated which skills they considered for each activity and assigned a priority order from 1 to 4 (in which 1 is the predominant/“primary” skill, and so on). Finally, they assessed the difficulty of the facilitator and the participant in understanding each activity, from 1 (very easy) to 4 (very difficult). There was also an open field for the inclusion of qualitative data, suggestions for changes and/or restructuring activities, and general comments to improve the activities.

Stage 4: Pilot study

A pilot study was conducted to verify the applicability/feasibility of the Pró-FExA program, with emphasis on participants' and facilitators' experiences. Considering the common structure among the activities, four were randomly selected for application: activities 1, 3, and 13 from the Activities Module and activity 2 from the Psychoeducation Module. Each activity was conducted by a pair of facilitators in distinct groups of participants, totaling four applications. The facilitators who implemented the activities had previously participated in the development and review stages of the program and, before the start of the implementations, received guidance on the objectives of each activity, the sequence of implementation, and the method of recording, ensuring the quality of the implementation. The evaluation was conducted through two structured forms: The first one was the participant form, focusing on evaluating aspects of the activity. The level of difficulty and space for comments were also considered. The aspects evaluated were clarity of the activity, motivation for its completion, time adequacy, and relevance to daily life, answered in a 5-point Likert scale (1 = very bad, 5 = very good). Difficulty was also measured on a 5-point scale (1 = very easy, 5 = very difficult). The second one was the applicator

form, which, in addition to the space for qualitative comments included an evaluation of the activity's clarity for the facilitator, ease of instruction, participant understanding, ease of strategy use, and participant engagement, also assessed on a 5-point Likert scale. This protocol was completed individually by the pair of facilitators in each situation. For both, participants and facilitators (except for the difficulty criterion for participants), the average response to each criterion across activities was used, with a cutoff of ≥ 3 to maintain the activity. Therefore, acceptability and feasibility criteria were defined a priori, encompassing clarity, relevance, engagement, and age appropriateness, and were evaluated through forms administered to facilitators and participants. These indicators served as the basis for the descriptive analysis of the program's applicability. The final field allowed recording impressions and suggestions for improvement.

Stage 5: Integration of judges' analysis and pilot study and finalization.

After completing each stage of the Judges' Analysis and Pilot Study, the team carefully reviewed the protocols and organized the qualitative observations. By integrating quantitative and qualitative data from the judges and, subsequently, the pilot study results, it was possible to consolidate the final version of Pró-FExA, the beta version.

Data Analysis

The data analysis used qualitative and quantitative approaches to ensure theoretical relevance, practical applicability, and alignment with the target population's demands. Initially, a Similarity Analysis was performed using IRAMuTeQ software based on interviews with adolescents attending SCFV. The qualitative, semi-structured interview identified difficulties related to learning and interpersonal relationships, enriching the program's development and providing situations as a "backdrop" for the activities developed.

Regarding the quantitative data, the Content Validity Index (CVI) (Alexandre & Coluci, 2011) was used, calculated based on the proportion of judges who assigned a score of 3 or 4 to each evaluated criterion. Activities with a CVI below 0.80 in any criterion were revised or excluded. Specifically, in the content analysis of the module's activities, the judges indicated which executive functions they considered recruited in each activity and their order of predominance (1 to 4; with 1 being the primary or predominant demand of the skill, and so on). The agreement between the judges was calculated by averaging the judges' responses (with endorsed skills scored 1 or 2) and treating endorsed skills as primary, so that scores closer to 1 indicate the most engaged skill, or the skill assessed as "primary" or predominant in a given activity. This model was devised because the activities are complex and do not engage or recruit a single skill. Thus, in addition to agreement among judges regarding the content of each activity, these averages provide insight into the level at which each content is represented in the activity. For the application and comprehension difficulty indices (from 1 – very easy to 4 – very difficult), a simple arithmetic mean was calculated. Thus, the descriptive framework for interpretation was

derived from the theoretical distribution of the scale, where values close to 2.5 would suggest medium difficulty; indicators above 3 may indicate difficulty with impacts on application/understanding.

In the pilot study, the data from the questionnaires were analyzed separately for facilitators and participants. In both cases, the mean Likert-scale ratings were calculated for each criterion/aspect evaluated. For the participants, the average score for the 'Difficulty Level' item was also calculated. The mean ratings presented correspond to simple arithmetic means. Measures of dispersion were not calculated due to the small sample size and variation among activities, as the analytical focus was descriptive and exploratory, consistent with the nature of a pilot study. The descriptive framework for interpretation was derived from the scale's theoretical distribution (range 1–5), with values > 3 indicating minimal adequacy. For 'Difficulty Level', values close to 3 were taken as indicative of medium difficulty, based also on the position of the mean value within the scale. The team read the qualitative responses from facilitators and participants and used them to adjust the form and content of the final beta version of the program.

Results

The results will be presented based on the stages of the program's development.

Stage 1: Internal Phase of Intervention Planning

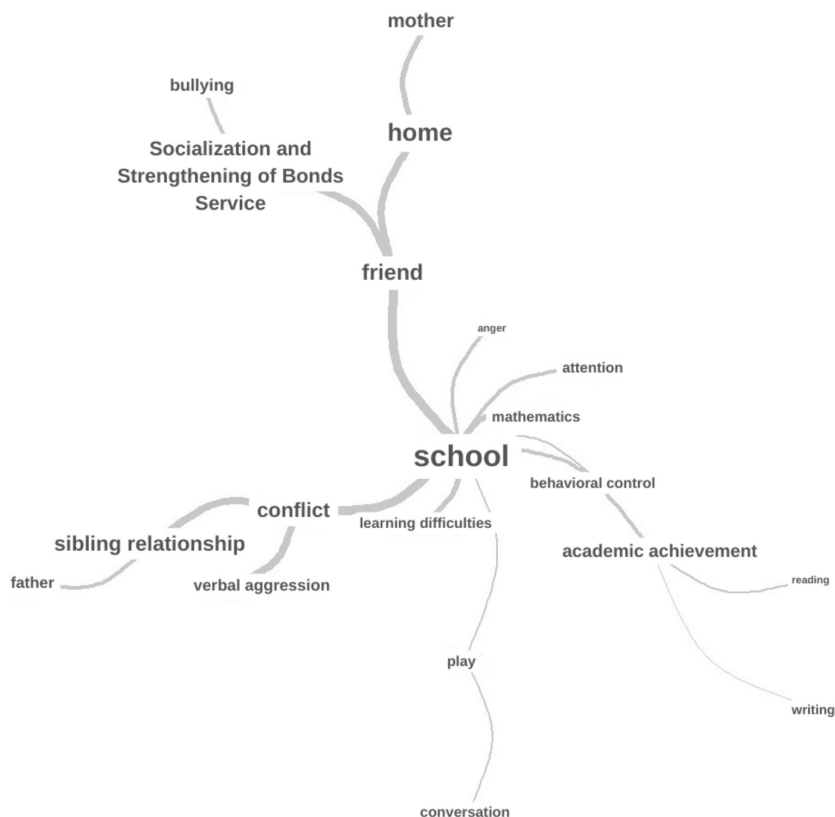
This stage allowed for the initial structuring and theoretical foundation of the program, defining the conceptual framework for understanding executive functions and, more broadly, self-regulation, and allowing for the inclusion of emotional regulation as a target construct of the intervention. The theoretical foundation of EF was primarily based on Diamond (2013), who considered the core skills of inhibitory control, working memory, and cognitive flexibility, as well as planning/organization, as complex EF. SR was understood as the ability to control attention, emotion, and actions (McClelland & Cameron, 2012), that is, it includes EF, even though it is distinct from its individual components, being the result of applying EF to effective behavior/performance (Dias & Malloy-Diniz, 2023; Hofmann et al., 2012; McClelland & Cameron, 2012). The non-systematic survey of activities and programs with similar proposals helped identify important benchmarks. It was possible to extract relevant elements regarding the structure of the modules, the format of the activities, and the use of playful resources, which served as inspiration for the material's development. At this stage, the relevance of a psychoeducational phase also became evident (Faith et al., 2022).

One distinctive feature of this stage was the conduct of semi-structured interviews with adolescents. The qualitative approach enabled us to capture the real demands of the target population, particularly regarding learning and interpersonal relationships. The analysis of the interviews, performed through the Similarity Analysis technique revealed the presence of recurring themes, as shown in Figure 2, highlighting: 1) low school performance; 2) learning difficulties, focusing on reading and writing; 3) difficulties in emotional regulation; 4) difficulties

in establishing and maintaining interpersonal relationships; 5) bullying in the school environment; and 6) conflicts in the home environment (mainly with siblings). These findings guided the definition of the objectives and content of the activities, ensuring greater alignment between the program's proposal and aspects of the target population's lives.

Figure 2

Similarity Analysis Based on the Interviewees' Discourse



Note. Similarity analysis allows the identification of more frequent words, as represented by size and centrality, and their co-occurrence patterns through connections among terms. Thicker connections represent stronger associations; that is, they indicate more frequent co-occurrences. The identified linking pattern highlights the centrality of the theme “school” and, from it, more prominent themes and terms.

Stage 2: Intervention Development

The articulation between the theoretical mapping and the interviewees' discourses enabled the structuring of the Pró-FExA program into two main modules: Psychoeducation and Activities. Both were developed collaboratively during team meetings, resulting in the program's

alpha version. The Psychoeducation Module was developed to introduce the main components of EF, which are also associated with SR, including inhibitory control, working memory, cognitive flexibility, organization and planning, and emotional regulation. The content is organized into sections with accessible language, everyday examples, illustrative images, and a group activity at the end of each topic. The module also includes instructions for the facilitator, suggestions for supplementary materials, and a final concluding section. The Activities Module consisted of 17 practical proposals, each with a defined objective, necessary materials, detailed instructions, a moment for reflection and metacognition, and suggestions for adaptation to the application context. The activities were designed to promote the development of cognitive and emotional skills playfully and functionally, in contexts that simulate interpersonal interactions, academic activities, or other problem-solving situations.

Stage 3: Expert Judges' Analysis

In the case of the Psychoeducation Module, the evaluation focused on overall analysis, since each section addressed a specific, previously defined component. The judges' analysis showed content validity indices (CVI) ≥ 0.80 in all sections and activities analyzed. Furthermore, indices of difficulty in application and understanding indicated low complexity, suggesting the material's viability. The results are shown in Table 1.

Regarding the Activities Module, the content-demand analysis found that most activities were judged by the judges to involve more than one executive component. The cognitive demands assigned are described in Table 2, which shows the agreement among judges regarding the skills involved in each activity (considering only the skills endorsed as 1 or 2, i.e., the main identified demands) and the means of the scores given to the target constructs. Numbers closer to 1 indicate greater relevance (primary demand) of a given skill in each activity.

For example, activity 1, "Social Detective Game," scored 1.2 in cognitive flexibility and 1.6 in emotional regulation, highlighting these as primary and secondary demands. There was also overlap between the skills identified by the judges and those predicted by the authors in the development of the activities, confirming the consistency between the proposal and the evaluation in most situations. The results are shown in Table 2.

After the content analysis of the activities (Table 2), an overall analysis (Table 3) showed that the experts evaluated the established criteria positively. The CVI, with a cutoff point of 0.80, confirmed the quality of the activities (94% of the activities with CVI > 0.80), except for activity 6, "Monitoring Conflicts and Bullying", with a CVI of 0.60 in the age appropriateness criterion. The application and understanding difficulty indices indicated low to medium complexity, suggesting the viability of the module (although it is an arbitrary index, it was determined that a difficulty indicator close to 2.5 would be suggestive of medium difficulty and those above 3 would indicate a level of difficulty that could impact the application and understanding of the activity, being outlined as a cutoff point for its elimination).

In the qualitative analysis, the judges suggested adjustments, such as replacing terms for age appropriateness, increasing the time allotted for activity 13 (“Task Circuit”), including the topic “adaptation suggestions” in some activities, and reordering the activities. The recommendations were compiled and addressed one by one in a team meeting, being incorporated into the beta version of Pró-FExa. Furthermore, based on both, qualitative observations and quantitative evaluation, activity 6, “Monitoring Conflicts and Bullying,” was eliminated in the program revision.

Table 1
Overall analysis of the Psychoeducation Module

Module Component	Content Validity Index (CVI)							Difficulty Index**		
	Suitability – educational context	Suitability – group context	Clarity – Facilitator	Materials	Suitability – age range	Clarity of examples*	Consistency with the objective	FE Engagement	Facilitator	Participant
Sections										
1. Educating about Executive Functions	1	1	1	1	1	1	1	1	—	—
2. Inhibitory Control	1	1	1	1	1	1	1	1	—	—
3. Working Memory	1	1	1	1	1	0,8	1	1	—	—
4. Cognitive Flexibility	1	1	1	1	1	0,8	1	1	—	—
5. Organization / Planning	1	1	1	1	1	1	1	0,8	—	—
6. Emotional Regulation	1	1	1	1	1	1	1	1	—	—
7. Closing Session	1	1	1	1	1	0,8	0,8	0,8	—	—
Activities										
1. Self-Control Cards	1	1	1	1	1	—	1	1	1	1,4
2. Market Day, but don't peek at the list!	1	1	1	1	1	—	1	1	1	1,8
3. Mental Juggling	1	1	1	1	1	—	1	1	1	2
4. Party Planning!	1	1	1	1	1	—	1	1	1	2,2
5. Under-standing Emotions	1	1	1	1	1	—	1	1	1	2

* Criteria applied only to module sections
** Criteria applied only to module activities

Table 2

Analysis of the content demands of the Activities Module in the initial version of the program

		Inter-Rater Agreement (%)					Means of judges' ratings				
Activities	Author-Predicted Engaged Skills (Descending Order of Demand)										
		IC	WM	CF	O/P	ER	IC	WM	CF	O/P	ER
1. Social detective game	CF - ER			100		100		3	1,2	4	1,6
2. Group event planning	O/P		40	40	100		3	2	2	1	3
3. Debating and reflecting	CF			100	60	40	3,5	3	1	2,5	3
4. Thinking from Another's perspective!	CF - ER			100	20	60	3	3	1	2,5	2,3
5. Generating alternatives	CF - ER			100		100	4	3	1,2	3	1,6
6. Monitoring conflicts and bullying	ER			80		100	5	3	2	4	1
7. Consequences of actions	IC	100	20	60	20		1	2,3	2	3,3	
8. Not everything is as it seems	IC - WM	60	100	40			1,8	1,4	2,6	3	
9. Learning to regulate emotions	ER	40		20		100	2,7	3	2,5		1
10. Entrepreneurship	O/P		40	20	100		4	2	2	1	3
11. Planning my tasks	O/P		60		100			2	3	1	
12. Listing, prioritizing, organizing	O/P - CF		20	80	100			2,5	2,2	1	
13. Task circuit	CF	40	60	100			2	2,6	1		3
14. Practicing self-control	WM - O/P	100			80	20	1,4	4	3,3	1,8	3,3
15. Mind mapping	O/P - WM		100		100			1,6	3	1,4	
16. Text-based puzzle	WM - CF		100	100				1	2	3	
17. Collaborative Storytelling	CF - WM - O/P		80	80	40			2	1,4	2,6	

Note. IC – Inhibitory Control; WM – Working Memory; CF – Cognitive Flexibility; O/P – Organization/Planning; ER – Emotional Regulation. In the judges' response, more than one executive function could be indicated for each activity. The following coding system was adopted: 1 – skill primarily engaged/demanded in the activity; 2 – skill secondarily engaged/demanded in the activity, and so on. Thus, values closer to 1 indicate greater agreement that the skill is primarily or predominantly required in the activity. "Inter-rater agreement" = percentage of experts who indicated each skill as primary or secondary (ratings 1 or 2)

Table 3
Overall analysis of the Activities Module.

Content Validity Index (CVI)								Difficulty Index	
Activity	Suitability - education- al context	Suitability - group context	Clarity	Materials	Suitability - age range	Consistency with the objective	EF En- gage- ment	Facili- tator	Partici- pant
1. Social detective game	1	1	1	1	1	1	1	1,8	2,2
2. Group event planning	1	1	1	1	1	1	1	1,6	1,6
3. Debating and reflecting	1	1	1	1	1	1	1	2,2	2,2
4. Thinking from another's perspective!	1	1	1	1	1	1	1	1,6	1,8
5. Generating alternatives	1	1	1	1	1	1	1	1,6	2,2
6. Monitoring conflicts and bullying	0,8	0,8	1	1	0,6	1	0,8	2,2	2,4
7. Consequences of actions	1	1	1	1	1	1	1	1,8	2,2
8. Not everything is as it seems	1	1	1	1	1	1	1	2	2,4
9. Learning to regulate emotions	1	1	1	1	1	1	1	2	2,4
10. Entrepreneurship	1	1	1	1	1	1	1	1,8	2,8
11. Planning my tasks	1	1	1	1	1	1	1	1,8	2,4
12. Listing, prioritizing, organizing	1	1	1	1	1	1	1	1	1,8
13. Task circuit	1	1	1	1	1	1	1	1	1,4
14. Practicing self-control	1	1	1	1	1	1	1	1	1,2
15. Mind mapping	1	1	1	1	1	1	1	1,8	2,2
16. Text-based puzzle	1	1	1	1	1	1	1	1,2	1,6
17. Collaborative storytelling	1	1	1	1	1	1	1	1,4	1,6

Note. CVI = proportion of judges who assigned ratings of 3 or 4 (on a scale of 1-4) to the evaluated criteria. Cutoff point = 0.80.

Stage 4: The Pilot Study

The pilot study allowed us to gather important data on the applicability of Pró-FExA. The application protocols were analyzed separately for facilitators and participants. For facilitators, as shown in Table 4, the mean scores assigned to each criterion for each activity indicated a cutoff score for acceptance in Activity 2 of the Psychoeducation Module, based on facilitators' ease of instruction and participants' understanding of the activity. On the other hand, Activity 3 of the Activity Module scored below the cutoff for the criterion of the strategy's ease of use for participants.

The indicators above, combined with the qualitative reports from the protocol facilitators, were used to adjust the activities. In activity 2 of the Psychoeducation module, for example, it

was suggested to set time limits and clarify steps in the instruction section; in activity 3 of the Activities Module, new rules were proposed. The suggestions were incorporated and, where relevant, generalized to other activities, contributing to the refinement of the entire program.

Regarding participant evaluation, the mean scores assigned to each activity indicated a threshold for acceptance in Activity 3 of the Activity Module only for the motivation criterion. In contrast, the other criteria showed satisfactory results across all activities. As for the “Level of difficulty”, all activities were classified as acceptable, posing no barriers to completion, as shown in Table 4. Concerning the protocol's qualitative aspects, participants reported positive experiences with the activities. As a suggestion for adaptation, the difficulty in understanding classmates' handwriting in activity 1 of the Activity Module was highlighted in the General Guidelines section of the program's introductory part.

Table 4

Evaluation by facilitators and participants – Beta version – in the pilot application of the Pró-FExA activities

Activities randomly selected for evaluation	Evaluation by the facilitators*			
	Activity 2 – Psychoeducation Module	Activity 1	Activity 3	Activity 13
Criteria				
Ease for you, the facilitator, to understand the activity	5	5	5	5
Ease of instructing the activity to the participants	3	4,5	3,5	4
Participants' understanding of the activity	3	4	3,5	4
Ease of strategy use by the participants	4	4	2,5	4
Participant's engagement in the proposed activity	4	4,5	3,5	4
	Evaluation by participants			
	Mean (N=6)**	Mean (N=7)	Mean (N=3)	Mean (N=4)
Ease of understanding the activity	5	4,7	3,6	3,75
Motivation to perform the activity	4,5	4,8	3	4,75
Adequacy of the activity duration	4,6	3,4	4	4
Relevance of the activity to my daily life	5	4,7	3,3	4,25
Difficulty level***	1	1	2,3	1,75

* Mean of the scores assigned by the two facilitators for each activity. The scale ranges from 1 (very poor, poor applicability or understanding) to 5 (excellent applicability and good understanding).

** Mean of the scores assigned by the participants for each activity. The number of participants varies by activity and is indicated in parentheses. The scale ranges from 1 (very poor) to 5 (excellent).

*** The scale ranges from 1 (very easy) to 5 (very difficult).

Stage 5: Integration of judges' analysis and pilot study and finalization

The program review occurred in team meetings and stemmed from the integration of qualitative and quantitative results derived from: 1) judge evaluation and 2) a pilot study. In this sense, immediately after the judges' analysis, activity 6, “Monitoring Conflicts and Bullying,” was

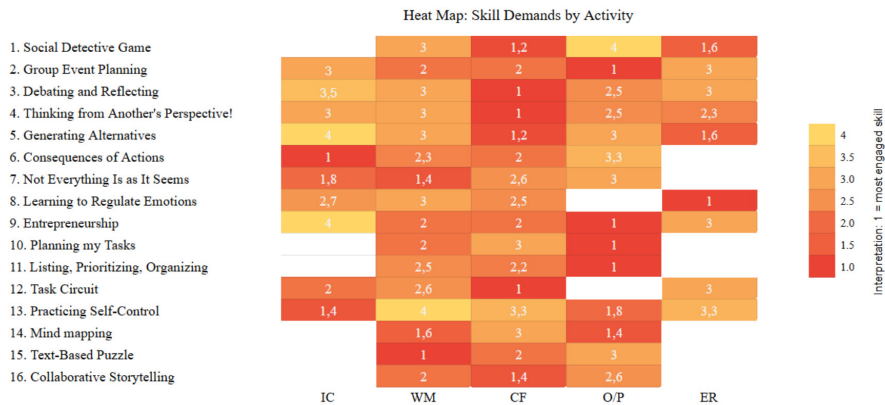
excluded from the program due to its unsuitability for the target age population and at the suggestion of three of the five judges, given potential difficulties in managing behaviors in a group context. The remaining activities in the module underwent a review process and, when necessary, were rewritten and readjusted. The activities within the Activities Module were rearranged according to the judges' suggestions.

The results of the pilot study also guided a review of the applied activities and their generalization to other activities in the program, especially including better time limits for activities and activity stages, better specification of activity rules/activity stages, and, where applicable, suggestions for more topics for discussion or application (in activities that require a specific theme or content). Furthermore, some points and qualitative comments could be better addressed by providing a clearer understanding of the general application aspects. Therefore, a section of "General Guidelines" was incorporated, which includes topics such as: 1) adaptation and contextualization of instructions by the facilitator for the target population; 2) writing activities, with legible handwriting; 3) mixing groups with students of different learning "levels"/difficulties, especially regarding reading; and 4) structuring of verbal contributions in group discussions using a mediating tool – a "talking stick".

The final version of the program included a "General Guidelines" section, a Psychoeducation Module, and an Activities Module with 16 activities. The final version of the intervention's structure is available in the Supplementary Material. Figure 3 presents a heat map, based on the judges' analysis (see Means of judges' ratings in Table 2), which visually summarizes the executive demand in each activity maintained in the final version of the new program. Despite differences, there is relatively good coverage of all constructs throughout the program.

Figure 3

Heat map of executive function demands across activities in the final version of Pró-FExA



Discussion

This study aimed to construct and investigate the evidence for the content validity and applicability of the Pró-FExA, an intervention program for executive functions (EF) and self-regulation (SR). Designed for adolescents, the program was conceived for use across varied educational contexts, broadening its reach to the target population. Designed as a preventive intervention, it articulates psychoeducation and practical activities that simulate everyday situations and promote metacognition, bringing stimulation closer to ecological validity. In this sense, planning for the transfer of gains was incorporated from its development, aligning with current discussions on the stimulation of EF in the context of life skills, so that learning and application of the trained skills is more direct, increasing the chances of transfer and generalization (Zelazo et al., 2024). This proposed intervention also aligns with the SR understanding adopted in the study, as a broader capacity resulting from the application of EF to attentional, behavioral, and emotional control (Dias & Malloy-Diniz, 2023; Hofmann et al., 2012; McClelland & Cameron, 2012). The method adopted was based on a previous development study, which has already enabled the development of theoretically grounded interventions with empirical evidence of effectiveness (Dias et al., 2021, 2023).

The choice to target adolescents stems from a gap observed in previous programs, which mostly focus on children, neglecting a crucial period of development. Adolescence is marked by an intense developmental leap that underlies the development of EF and SR, influenced by both neurobiological maturation and environmental and contextual factors (Blakemore & Choudhury, 2006; Friedman & Miyake, 2017; Zelazo, 2020). Thus, preventive intervention at this time can enhance both academic performance (Ahmed et al., 2019; Robson et al., 2020) and social and emotional adaptation (Murray et al., 2022). In addition, social vulnerability contributes to risk factors, including various forms of deprivation linked to low socioeconomic status (Johnson et al., 2016) and the negative impact of toxic stress on these skills (Zelazo, 2020). In Brazil, an estimated nine million children and adolescents experience extreme socioeconomic vulnerability and ongoing exposure to adversity (United Nations Children's Fund [UNICEF], 2025). Consequently, there is both a need and an opportunity for interventions designed to mitigate the harmful effects of social vulnerability and to enhance EF and SR within these groups. The present study represents an initial step toward this objective.

The development process

The development of the Pró-FExA program was inspired by the model described by Dias et al. (2021), with five stages: planning; construction; expert analysis; pilot study; and review and integration. The planning stage included defining the theoretical basis and identifying needs through semi-structured interviews with adolescents, which revealed academic and socio-emotional difficulties. This interview sub-stage proved essential for achieving a more comprehensive understanding of the target population's context. The design of Pró-FExA was guided by models of EF and SR, particularly Diamond's (2013) model and the understanding of

SR as a broader capacity to control attention, emotion, and actions (McClelland & Cameron, 2012). Based on these frameworks, the program's activities were designed to teach about EF and emotion regulation (Psychoeducation Module), to promote literacy in these skills, and to stimulate, in an articulated way, the cognitive and emotional components of SR through the Activities Module. For example, the activities demand impulse control, goal setting, and the identification and management of emotions, and thus promote the engagement of these processes in situations that approximate those of adolescents' daily lives. Therefore, it is expected that this theoretical-practical structure will offer opportunities to exercise EF and SR deliberately and, in this way, support skill improvement and the expansion of the self-regulatory repertoire in everyday contexts. This hypothesis about the mechanism of action of Pró-FExA is based on the conclusion that the most effective activities for promoting these skills should engage and challenge them continuously and in different ways, be meaningful and relevant to participants, and promote motivation and engagement (Diamond & Ling, 2020). The development phase allowed for systematizing and operationalizing the previous phase and resulted in the alpha version of the program, composed of a Psychoeducation module and an Activities module.

The version resulting from this process was submitted to expert review. In the development of measurement instruments, this is a relevant step for content validation and assessment of the overall quality of the instrument (Cohen et al., 2021). Similarly, expert review ensured evidence of content validity, reinforcing the activities' relevance in stimulating the target skills. Overall evaluation of the activities also corroborated their adequacy, comprehensibility, and relevance. In conjunction with the quantitative data, the qualitative suggestions enabled important adjustments, including adapting the language, replacing images, and adding practical guidance. Previous studies of neuropsychological interventions (e.g., Colling et al., 2024; Dias et al., 2021) have already used this same procedure.

The pilot study, which also plays an important role in instrument development, allowed for the review and improvement of activities and instructions. This stage has proven relevant for reflecting on the instrument development processes, contributing to the improvement and maturation of both the instruments themselves and the research (Benassi et al., 2023). The pilot study was applied to the target population, with feedback from the facilitators and participants.

Analysis of participant protocols provided indicators of motivation, clarity, and level of difficulty, elements that allow us to verify whether the program is not only theoretically sound but also functional and engaging in daily life. Similarly, the facilitators' feedback provided a practical perspective on execution, highlighting aspects such as duration, instruction clarity, and adjustments to group activities. The exchange of experiences within the research's social context is essential, as the interaction between researchers and the target population is fundamental to the program's validity (Benassi et al., 2023). In other words, more than ensuring that the activities seem appropriate for the audience, the aim was to ensure that they can be implemented in real-world contexts and are perceived as meaningful by the adolescents. This aspect allows us

to infer the viability and applicability of the developed program. This understanding also aligns with the concept of ecological validity in neuropsychology.

Program structure and its distinguishing features

The search for ecological validity permeated the entire program development process. The term “ecological validity” is increasingly used in research on tests of executive function (EF). However, there are criticisms and conceptual disagreements about the term, especially regarding what would be necessary for an instrument to be considered ecological (Suchy et al., 2024). Transposing this concept from the evaluation area to that of intervention, the aim was to ensure the ecological validity of the program by designing activities based on or resembling real demands (as reported in the interview in stage 1) and which, based on this and on the proposed reflection, could generate gains that could be more easily transferred to other contexts and activities, that is, that may facilitate real-world performance (drawing an analogy to the concepts of verisimilitude and veridicality, respectively).

The commitment to ecological validity is evident in the Psychoeducation Module, where all examples and activities draw on everyday situations faced by most teenagers, such as a soccer game, a grocery list, or school readings. The module presents complex skills by linking them to the concrete reality of participants, facilitating their understanding and recognition of when these skills are applied in their daily lives. Faith et al. (2022) emphasized the importance of promoting literacy about EF among students and teachers. For the authors, executive difficulties are among the greatest challenges in learning situations, and providing psychoeducational opportunities to promote executive literacy helps students understand their difficulties and recognize that they have the resources to address them.

Following the program, the Activities Module presents tasks that simulate participants' daily lives, immersing them in activities similar to those they perform. These tasks involve, for example, planning a party, going to the market, or recognizing emotions in themselves and their colleagues. Furthermore, the activities were designed to engage multiple EF simultaneously, more closely aligning with the understanding of SR (Dias & Malloy-Diniz, 2023; Hofmann et al., 2012; McClelland & Cameron, 2012), as occurs in the real world, articulating cognitive flexibility, working memory, inhibitory control, organization and planning, and emotional regulation. Deliberate, non-automated behavior does not involve a single isolated component of EF, but rather the integrated coordination of multiple executive processes that work together to guide action and sustain self-regulated behavior (Diamond, 2013). It is worth noting the judges' analysis, which found that all professionals indicated the recruitment of more than one EF across all proposed activities.

Finally, the activities include a metacognitive segment: the individual's awareness of their own mental processes and their ability to control them (Santos, 2017). The practice of reflecting on the task becomes essential for engaging the skill in other similar everyday situations outside the program context. This engagement occurs because the metacognition promoted by

the activities aims to increase the participant's awareness of their cognitive processes (EF recruited in the task) and to allow them to assume greater control over them, to evaluate and modify them for the execution of objectives and tasks (Reis, 2023). Based on metacognition at the end of each activity, it is expected to facilitate the adolescent's transfer of learning from the activity to similar demands in their daily life. Reflection and metacognition help adolescents understand when and how to apply their skills/strategies, and the inclusion of this component in EF training has been associated with greater potential for transferring gains (Zelazo et al., 2024).

Limitations of the study and future directions

Despite the progress in providing a novel program in the national context, some limitations must be considered. Above all, in the pilot study, only a restricted set of activities could be applied, which limits the overall perception of the program. Thus, since the selection of activities was based on sampling, not all strategies and theoretical dimensions of the Pró-FExA were equally tested in this study; future editions and revisions may be informed by empirical experience. Furthermore, the number of participants in this stage was reduced, restricting the evaluation of applicability. Also, variation in N across activities may affect the accuracy of the means ratings presented; however, this is considered an expected limitation in exploratory pilot studies with small samples.

Regarding the next steps for studying the program, a quasi-experimental study is underway with adolescents served by the same partner SCFV in this first stage of development. Furthermore, there are plans for new effectiveness investigation studies with adolescents served by a foundation that assists children and adolescents from low-income communities and families, and with adolescents serving socio-educational measures involving deprivation of liberty. It is suggested that future research evaluate not only the program's effectiveness but also its effects on adolescents' academic, social, and emotional indicators, as well as its applicability across different institutional contexts and with different agents.

Finally, this study hopes to be a first step towards an effective contribution to School Neuropsychology, as an area that applies knowledge of neuropsychology to the understanding of learning and development throughout the entire life cycle (Federal Council of Psychology [CFP], 2025), still incipient in Brazil. Beyond the program itself, it is hoped that the method described here and the discussions fostered will also strengthen the practice of school neuropsychologists, whether in formal settings or in other educational areas.

Final Considerations

The Pró-FExA program was developed based on well-defined methodological stages, supported by previous studies, and guided by social demands. The entire development process included consideration of its ecological validity and its potential to transfer benefits. The development process described here led to the final version of the program, which presents initial evidence of applicability/feasibility and content validity. The current version should be the

focus of effectiveness studies, with the potential to serve as an innovative resource in school neuropsychological intervention and to strengthen executive functions and address learning disabilities in adolescents, especially those in vulnerable situations. It should be noted that the current study focused exclusively on the program's design, content validity, and preliminary feasibility and acceptability, without assessing its effectiveness. Should Pró-FExA demonstrate efficacy in enhancing executive function and self-regulation, it will be accessible free of charge on the websites of the partner laboratories involved in its development.

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APPENDIX 1

Figure S1.
Judges' Characteristics

ID	Undergraduate Degree	Academic Degree	Years of experience in the field*
Judge 1	Psychology	Master's degree	11 years
Judge 2	Physical Education/Pedagogy	PhD	3 years
Judge 3	Psychology	PhD	8 years
Judge 4	Psychology	PhD	3 years
Judge 5	Psychology	Master's degree	9 years
Judge 6	Psychology	Master's degree	8 years
Judge 7	Psychology	Master's degree	8 years
Judge 8	Psychopedagogy	PhD	11 years
Judge 9	Biological Sciences	Master's degree	5 years
Judge 10	Psychology	Master's degree	7 years
Judge 11	Psychology	Master's degree	7 years

* Neuropsychology, research, teaching and/or practice

Figure S2*Final structure – beta version – of Pró-FExA Program*

Technical Information	
- Overall objective of the program - Program overview - Target population - Who can deliver the program? - Implementation mode - Program structure - Suggested timeline	
General Guidelines	
Adaptation and contextualization - Written Activities - Group activities External mediation for interaction regulation.	
Modules and components	
Psychoeducation	Activities
- Presentation - Instructions for the facilitator - “Inhibitory Control” Section - “Working Memory” Section - “Cognitive Flexibility” Section - “Organization and Planning” Section - “Emotional Regulation” Section - Appendix with one activity per section: - Activity 1: Self-Control Cards - Activity 2: Market Day, but no peeking at the list! - Activity 3: Mental Juggling - Activity 4: Getting the party ready! - Activity 5: Getting to Know Emotions	- Activity 1: Social Detective Game - Activity 2: Group event planning - Activity 3: Debating and reflecting - Activity 4: Thinking from another's perspective! - Activity 5: Generating alternatives - Activity 6: Consequences of actions - Activity 7: Not everything is as it seems - Activity 8: Learning to regulate emotions - Activity 9: Planning my tasks - Activity 10: Listing, Prioritizing, Organizing - Activity 11: Entrepreneurship - Activity 12: Task Circuit - Activity 13: Practicing self-control - Activity 14: Mind Mapping - Activity 15: Text-based puzzle – Can you put the pieces together? - Activity 16: Collaborative Storytelling

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