

**FAMILY VULNERABILITY, MENTAL HEALTH AND EXECUTIVE FUNCTIONS
IN ADOLESCENTS IN BASIC EDUCATION**

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Abstract

This article is the result of research on the influence of family vulnerability on the executive functions of adolescents in an educational institution in Tuluá, Colombia, during the year 2023. The study, a mixed-methods approach with a sequential explanatory design, included ten participants aged 11 to 17. An adaptation of the Multifactorial Exploratory Questionnaire of Cooperation and Aggression, the Montreal Cognitive Assessment, and the Rey-Osterrieth Complex Figure Test were used, complemented by semi-structured interviews. The results revealed that 40% of the participants live with family members who consume psychoactive substances; 30% report feeling misunderstood or undervalued; 40% have experienced punitive measures such as beatings, intense arguments, insults, humiliation, and disdain; 30% have a negative perception of neighborhood safety; 90% have had problems for not following family rules; 30% have difficulties expressing their feelings; 70% have negative thoughts about themselves, and 30% have had suicidal ideations. Regarding executive functions, 70% scored below expectations on the Montreal Cognitive Assessment, and their percentiles in the Rey-Osterrieth Complex Figure Test showed variability. These findings indicate that family vulnerability negatively influences executive and verbal fluency, planning, and decision-making in adolescents. Lack of emotional support and exposure to violent environments were highlighted as critical factors that deteriorate mental health and confidence in their abilities.

Keywords: Family, family vulnerability, adolescence, executive functions, decision making, fluency.

1. Introduction

Adolescence is a crucial stage of life, characterized by social, biological, and neural transformations that influence cognition and basic learning mechanisms (United Nations International Children's Emergency Fund [UNICEF], 2021a). During this period, the brain begins to transmit information more rapidly and efficiently from one region to another, facilitating the development of complex mental processes. At the same time, structural changes emerge in specific areas responsible for cognitive processes, socioemotional skills, and Executive Functions (EF), such as fluency, decision-making, impulse control, and cognitive flexibility [1]. These changes and the establishment of EF may be affected by the quality of the family and social environment.

Achieving balance in adolescent development is particularly challenging in contexts lacking positive stimuli and marked by family vulnerability, where violence and inequality can undermine adolescents' mental health, increasing the risk of various disorders [1]–[3]. In this regard, it becomes imperative to promote protective environments that strengthen mental health and well-being throughout the life course [4], recognizing that the absence of support and resources may negatively affect this process and make children and adolescents especially susceptible to complex psychological and cognitive harm [5]–[7], [1].

Based on the above, the present study aims to examine the influence of family vulnerability on executive functions, specifically on decision-making and fluency.

2. Theoretical Framework

The theoretical framework is essential because it provides a comprehensive view of how family vulnerability shapes adolescents' mental health and the development of their executive functions. It supports the study with conceptual foundations and empirical evidence, guides the interpretation of the findings, and ensures coherence between the research problem, the objectives, and the methodological approach adopted [8].

Development of Executive Functions in Adolescence

Executive functions (EF) are cognitive abilities that enable planning, organizing, and regulating thoughts and behaviors, as well as manipulating memory and information required to achieve complex goals [9]–[11], even under conditions that demand specific timing or quality criteria. Between the ages of 12 and 18, these functions undergo a consolidation process and exhibit significant development [12]–[13], which becomes evident in enhanced decision-making abilities [14], impulse control, and emotional self-regulation [1].

However, this process does not follow a linear or uniform pattern. Some adolescents experience slower development of certain EF due to biological factors [9], [15], social factors (such as relationship quality), contextual factors (linked to the family environment) [16], and socioeconomic factors (such as household income) [17]. Collectively, these factors can negatively affect the maturation and expression of EF under adverse conditions, becoming major sources of stress during this developmental stage [18]. Conversely, in supportive

environments, they may promote EF development [19]–[20], acting as protective factors against stressful life events [21].

Family Vulnerability and Executive Functions

Family vulnerability has been described as a determining risk factor for the consolidation of EF in adolescents, as it fosters the normalization and perpetuation of various forms of violence physical, psychological, structural, and symbolic [22]–[23]. This turns the home into an environment saturated with obstacles to healthy growth in all its dimensions, intensifying the challenges young people face within the family context [24]–[25], which ideally should be affectionate and peaceful [26]. Therefore, during this stage, it is essential for the family to function as a strong support network, offering trustworthy figures with whom adolescents can form meaningful bonds [27]–[28]. Feeling understood and validated helps counteract the effects of vulnerability and fosters self-confidence and personal abilities [29]–[20].

Additionally, the positive influence of parental figures has been shown to stimulate executive functioning, particularly decision-making and fluency. Democratic parenting styles promote participation and autonomy, making it possible to exercise independent thinking and critical reasoning [30], preparing adolescents to face challenges effectively and thoughtfully [31]. Likewise, attending to a child's needs from early childhood and providing adequate verbal stimulation fosters cognitive flexibility, verbal fluency, and the ability to generate ideas fluidly and efficiently in a short time [32]–[10].

Mental Health and Well-Being in Vulnerable Environments

The discussion thus far highlights the relationship between mental health and parenting practices, as parental figures play a shaping role in behavior by transmitting both adaptive and maladaptive behavioral models [20]. These patterns significantly influence mental health, especially when recurrent family stressors accumulate (UNICEF, 2021b) or when adolescents are exposed to dysfunctional parenting styles [32]–[33]. Such conditions put them at risk of lacking the emotional tools and resources characteristic of functional families, such as safety, respect, and understanding, potentially leading to internalizing symptoms like anxiety and depression, as well as externalizing symptoms such as aggression or hyperactivity [34].

Therefore, discussing mental health requires recognizing that it goes beyond the absence of disorders. It involves a state of emotional, psychological, and social well-being that allows individuals to face stressful situations adaptively and resiliently, regardless of their developmental stage [4]–[35]. This holistic perspective acknowledges mental health as an integral sphere of human life that encompasses the capacity to build healthy relationships, cope with challenges, and achieve well-being in all its dimensions [36].

3. Methodology

This article stems from a broader research project conducted between February and November 2023, which examined the influence of family vulnerability on the consolidation and development of executive functions (EF) in students from grade 7-5 at the Gimnasio del Pacífico Educational Institution, located in Tuluá, Valle del Cauca, Colombia. The study

followed a mixed-methods approach using a sequential explanatory design to ensure a comprehensive understanding of the phenomenon [37]–[38]. This design involved an initial phase of quantitative data collection that guided the formulation of the second qualitative phase, which complemented and deepened the understanding of the quantitative findings [39]–[42]. The population consisted of 34 adolescents from grade 7-5 at this institution, 9 girls and 25 boys, aged between 11 and 17 years, most of whom belonged to low socioeconomic strata. Based on this characterization, an intentional non-probabilistic convenience sampling method was used to select 10 students who met the established inclusion criteria: being enrolled in grade 7-5; willingness to participate; having parental authorization through informed consent; and not presenting disabilities or medical conditions that could affect EF.

The study variables were family vulnerability and EF, for which analytical indicators were established, including family types, parenting styles, and different executive functions, in order to clarify their dimensions and characteristics. For the quantitative phase, an adaptation of the Multifactorial Exploratory Questionnaire of Cooperation and Aggression (CEMCA) [43] was used, focusing on three specific sections considered most relevant to the research objectives: “personal vulnerability,” “family vulnerability,” and “family environment,” totaling 82 items, of which 59 were selected. Additionally, 28 extra items related to personal and behavioral problems within the family and environment were included, validated by a social work professional.

Subsequently, two tools were used to assess the EF of the participants. First, the Montreal Cognitive Assessment (MoCA) [44], which, although originally designed for geriatric populations, has increasingly been used with younger groups [45]–[46]. Its use was deemed appropriate as a screening and cognitive analysis tool for minors, given that it assesses a wide range of cognitive and executive functions beyond the detection of neurocognitive disorders or dementia. Second, the Rey-Osterrieth Complex Figure Test (ROCFT) [47], an instrument that has proven effective for evaluating planning, organization, spatial memory, and cognitive flexibility—fundamental components of EF [48]–[49].

Although the MoCA and ROCFT are not specifically designed to measure executive fluency, their subtests provide sufficient criteria to evaluate this ability. Fluency, defined as the capacity to process information and produce effective responses in the shortest possible time, can be inferred from their results. In the MoCA, the language subtest requires participants to list words beginning with the letter “P” within one minute, measuring speed and efficiency in generating verbal responses under time constraints. In the ROCFT, the quality of the drawing, drawing type, and time needed for completion reflect the ability to rapidly process, plan, and manipulate visual and spatial information. Together, these analyses enabled the determination of participants’ fluency quality, providing a robust evaluation of this key EF.

For the qualitative phase, a semi-structured interview guide was developed and validated to further explore and deepen the results obtained from the quantitative instruments [50]. This made it possible to identify participants’ difficulties and strategies related to decision-making [51], such as insecurities, lack of emotional support, and the presence of family conflicts—

factors that directly affect adolescents' planning and emotional regulation when making decisions.

For data processing, descriptive statistical measures were applied to the quantitative data [52], in addition to using the scoring standards of the psychometric tests for interpretation. For the qualitative data, a content analysis approach was used for the interviews, employing a categorization and coding matrix to identify patterns that provided a comprehensive understanding of the relationship between family vulnerability and EF in the adolescents studied. To ensure confidentiality, as participants were minors, each interviewee was assigned initials: ESM (Male Interviewee) and ESF (Female Interviewee), followed by a number (01, 02, ..., 010) according to the interview order.

4. Results

The analysis of the quantitative phase showed that family life presents various dimensions that are relevant when considering vulnerability. These include alcohol and psychoactive substance (PAS) use, social and health conditions, support networks, household roles and responsibilities, discipline and corrective practices applied to children, the community environment, psychosocial problems, socioeconomic conditions, discrimination, rejection or exclusion, the family environment, mental health, and life projects.

Alcohol and PAS use

Regarding alcohol consumption, 90% ($n = 9$) reported not having serious problems related to its use; however, during the interviews, six participants stated that they had consumed small amounts in family settings under parental supervision. On the other hand, PAS use is common among 30% ($n = 3$) of the participants, while 40% ($n = 4$) indicated that members of their family use PAS and even provide them, representing a potential risk and suggesting low supervision or parental neglect.

Social and health conditions

Social and health conditions indicate that none of the participants suffer from a serious illness, with a low prevalence of such illnesses ($n = 2$) and disabilities ($n = 1$) within their families. The most significant issue identified was exposure to illegal activities in their homes or neighborhoods ($n = 4$), suggesting that some participants face potential dangers that affect their well-being and generate feelings of insecurity.

Support network

Seven participants (70%) perceive that their families provide emotional support, making them feel understood and valued. However, it is important to consider the 30% who do not perceive such support, as they report feeling neglected, misunderstood, undervalued, or isolated—experiences that negatively affect family bonding and may impact academic performance, potentially leading to obstacles such as school interruption. Additionally, some ($n = 5$) reported that their parents express disappointment in them or regret having had them ($n = 3$), leaving them emotionally unprotected. This was confirmed in the interviews, where participants stated

that they “seek support outside the home,” which may not provide adequate guidance for their development or the formation of a life plan.

Roles and responsibilities

Regarding roles and responsibilities, half of the adolescents assume adult responsibilities (50%), an additional burden that reduces their time for recreational activities, generating stress, anxiety, and emotional exhaustion. This deprives them of a normal childhood, hinders the formation of meaningful peer relationships, and limits opportunities to explore their interests and passions freely.

Furthermore, adolescents perceive inequity in the distribution of responsibilities and decision-making within the household, which indicates a lack of fairness and the invisibilization of their voices. This reveals an absence of spaces that encourage critical thinking, autonomy, and decision-making abilities.

This lack of participation in decision-making may negatively affect the skills required to perform this process appropriately and autonomously, such as planning, organization, and problem-solving, compromising their development when adolescents do not have opportunities to practice these EF within a supportive family environment. This was evidenced in the narratives of several participants, who reported difficulties making decisions due to insecurity and lack of support. For example: “I always think there are better things than what I choose” (ESF04, August 2023); “I am very indecisive (...) I don’t know how to make a decision, I am very indecisive” (ESM07, August 2023); “I got used to (...) them helping me make decisions in almost everything, (...) I can almost never make them on my own” (ESFM08, August 2023).

When asked whether the same occurred when organizing their time and planning tasks, they responded: “In that, I am also very indecisive” (ESM07, August 2023); “I almost always go to my friend’s house, and she helps me with everything” (ESFM08, August 2023).

Discipline and corrective practices

The results show considerable risk in this area, as 40% of the adolescents ($n = 4$) reported experiencing corrective actions such as hitting, intense arguments, insults, humiliation, contempt, and silent treatment, without any prior negotiation. Although physical punishment was reported as less frequent, other corrective practices still have significant negative effects on participants’ mental health. Physical punishments were evident in statements such as: “My mom pinches me when she scolds me and when she doesn’t scold me too” (ESF03, February 2023); “They scold me, and sometimes my dad has even hit me with a stick” (ESF02, August 2023).

The impacts of other types of corrective practices were reflected in excerpts such as: “Sometimes you feel bad because if they don’t listen to you, you feel sad; when my mom doesn’t listen to me or pay attention to me” (ESM07, August 2023); “They almost always ignore me; the only one I talk to the most at home is my sister... but she also makes me feel really bad (...) they make me feel less than my sister, they compare me and all that” (ESF08, August 2023).

Community environment

Although all participants reported feeling safe in their community, the interviews revealed experiences of insecurity and hostility, such as theft, presence of weapons in the home, neighborhood conflicts, and even being tempted to engage in criminal activities: “They invited me to rob a house”; “Recently, someone broke into my house and stole my dad’s gun; he found out who it was (...) the thief was going to hit me (...) I hit him with a brick” (ESM01, August 2023); “It’s not really a place where you can feel protected, because at any moment someone can break into your house without warning” (ESF02, August 2023). Additionally, 30% (n = 3) mentioned that recreational spaces near their homes are not considered safe, which may limit opportunities for socialization and the development of social skills. This apparent contradiction may be due to the normalization of violence in their environment, where insecurity has become a routine part of daily life.

Psychosocial Problems

One of the participants (10%) reported having been repeatedly expelled from her home, which negatively affects her confidence and well-being, as she feels unprotected and abandoned by her mother. Although the absence of child abuse and sexual abuse is a positive sign of protection and safety, there is a high prevalence of serious behavioral problems and family tensions due to disobedience, as 90% of the adolescents reported having problems for not complying with their parents’ expectations. Additionally, 40% of the sample experienced family separation or divorce, leading to sadness, isolation, and a tense environment caused by constant conflicts between parents, affecting the well-being of the minors.

Socioeconomic Conditions

It was found that the respondents have a socioeconomic level without significant challenges, making this dimension a non-risk factor. All stated that family income is sufficient to cover basic needs, and 90% (n = 9) reported no significant debts nor the need for external financial support. Furthermore, 80% indicated that no one in their family has experienced unemployment, as their level of education has provided access to stable job opportunities. Regarding health and housing quality, 90% of the adolescents live in spacious, comfortable, and safe homes with basic services, free from overcrowding, and have medical insurance or are affiliated with a healthcare provider. Most (90%) also noted that illnesses in their households have not caused stress or additional financial strain.

Discrimination, Rejection, or Exclusion

On one hand, 60% (n = 6) reported that their neighborhoods promote inclusion and equal opportunities; on the other hand, 40% perceived their neighborhood as not very inclusive and discriminatory. Additionally, 20% have experienced discrimination or exclusion within their community, indicating ongoing challenges in achieving fully inclusive environments. Within the family context, 30% reported experiencing discrimination, and 50% stated they have been rejected for their way of being or thinking. Despite this, 90% perceived that their families encourage respect and tolerance toward differences. This suggests that although values of

respect are promoted, discriminatory dynamics may still occur unnoticed, affecting minors—perhaps due to the previously mentioned phenomenon of normalization.

Family Environment

A total of 90% reported open and respectful communication at home, with 70% feeling that their opinions and preferences are respected even when disagreements arise, facilitating free expression. However, the remaining 30% still face difficulties expressing their feelings, reflecting insecurities and a need to strengthen spaces for communication and respect. The qualitative phase revealed that a harmonious family environment without conflict is key to free expression, mutual respect, and trust, highlighting the importance of feeling heard without censorship or criticism. For example, when asked if they felt comfortable expressing themselves, one participant responded: “Yes. (And do you express your thoughts?) ... Yes. (Is there good communication?) ... Yes, mostly with my dad, not so much with my mom” (ESM01, August 2023). Another stated: “Yes, mostly with my brother. (Only with him?) ... Well, I do trust my parents, but they scold me a lot, so... my brother is the one who has been there for me” (ESF04, August 2023). Meanwhile, some experience difficulties: “No, they criticize me a lot... they say I’m useless” (ESF02, August 2023). Another explained:

“No (...) because last year I listened to one type of music and now I listen to another, and they say (...) it’s very rude, and also because of how I dress; they’re even forbidding me from wearing shorts, so I don’t feel comfortable there” (ESF04, August 2023).

Another relevant aspect relates to tolerance: more than half ($n = 7$) stated that their families tend to argue in the face of any conflict. Additionally, four participants (40%) reported not sharing common interests with their relatives, which may affect family cohesion and dynamics; meanwhile, 60% do share common interests, which is important for strengthening emotional bonds. Participation in family activities is also divided, with 40% indicating that such activities are absent in their home. This suggests the need to promote strategies that encourage shared activities to strengthen family ties, especially since most value family unity, with 80% considering it very important and 70% feeling close to and enjoying time spent with their families.

The interviews emphasized the family’s importance for emotional well-being. Security and emotional support within the home emerged as essential factors for satisfaction, highlighting the family as a refuge for facing challenges: (Are you happy?) “Yes, (...) because I have everything (...) home, family, mom, dad, siblings” (ESM01, August 2023). When asked whether they felt safe and protected at home, participants said: “They take good care of me so I don’t go out, so I don’t hang around with the wrong people, and so I don’t consume anything harmful” (ESM06, August 2023). Another shared: “My mom is always telling me what’s right and what’s wrong, and... well... my grandmother too (...) they always try to teach me things I might do that aren’t correct” (ESF09, August 2023).

Mental Health

Mental health is a significant area of concern, as all participants experience difficulties managing worry. A large majority (80%) have felt distress without an apparent cause, and another notable portion (70%) reported having negative thoughts about themselves, indicating self-esteem problems. Additionally, one third (30%) have had suicidal thoughts, largely triggered by parental behavior: “I always make gifts or do nice things for her (the mother), but... she just laughs at me... and... she doesn’t like what I do,” “I thought about it (...) I stayed on the terrace thinking for a moment... but I regretted it (...) I thought about jumping off the terrace, but... I didn’t do it” (ESF08, August 2023). Another participant stated: “My mom paid more attention to my brother (...) it made me really angry, and I wondered why I was born if she was going to pay more attention to him or be better with him” (ESF09, August 2023). These voices highlight the urgent need to address their emotional support needs. Furthermore, 50% reported difficulties relating to others, suggesting low socialization skills. Although most have good support, all show some degree of mental health affectation, indicating that this dimension is highly susceptible even in a favorable environment.

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Life Project

Within the narratives, participants demonstrated strong motivation toward life goals, which acts as an important protective factor. First, there is a clear trend among seven participants toward pursuing educational goals: “My life goal is to study... get a degree and leave the country” (ESM01, August 2023); “To be a psychologist” (ESF02, August 2023); and “start a degree and pursue specializations in what I want to become” (ESF09, August 2023). There is also a focus on “personal improvement,” suggesting motivation to grow as individuals, likely in response to difficulties and challenges in their lives, including family vulnerability: “move forward, have money (...) be happy” (ESM07, August 2023).

Similarly, having “a profession” reflects an orientation toward economic stability, showing clearly defined goals and motivation to achieve them: “I have future plans, God willing; my mom is going to pay for my university and everything, so why would I use drugs knowing it will ruin my future” (ESF09, August 2023). The desire to “help their parents” also denotes gratitude and suggests that, despite existing difficulties, participants value the family’s role in their aspirations and goals.

Taken together, these life projects provide young people with clear motivation to make decisions consistent with their objectives and to stay away from potential obstacles, while fostering expectations, transformation, and satisfaction.

Evaluation of Executive Functions

Table 1 presents the participants’ results, which range from 24 to 29. Although this variability is not wide, it demonstrates significant differences in cognitive performance. The average score obtained by the sample was 25.6 points, suggesting that, overall, cognitive and executive capacity shows some difficulties, as it is slightly below the cutoff point (26). While this may indicate specific areas of concern in the evaluated population, the aim of this article focuses

primarily on the language subtest, which measures verbal fluency as an executive function by assessing adolescents' ability to process information and produce responses effectively within a short period of time.

Table 1. Results of the application of the Montreal Cognitive Assessment.

Subject N°	1	2	3	4	5	6	7	8	9	10
Age	14	16	12	12	17	13	12	13	12	13
Executive Visuospatial (5/5)	3	3	5	3	3	5	3	4	3	4
Identification (3/3)	3	3	2	3	2	3	3	3	3	2
Attention (6/6)	3	3	6	5	6	5	5	5	6	6
Language (3/3)	2	2	2	3	2	3	2	3	1	3
Abstraction (2/2)	2	2	2	2	2	2	1	1	2	1
Delayed Recall (5/5)	4	5	3	3	3	5	4	4	1	5
Orientation (6/6)	6	6	6	6	6	6	6	6	6	6
Cognitive Reserve	1	1	1	1	1	1	1	1	1	1
Normal Total ($\geq 26/30$)	24	25	27	26	24	29	25	27	24	25

Source: Prepared by the authors based on data obtained from the application of the test, 2023.

The data presented can be interpreted as follows:

- **Score of 3:** Two participants (Subjects 4 and 9) achieved the maximum score of 3, indicating a high capacity to process information and respond effectively.
- **Score of 2:** Five participants (Subjects 1, 2, 3, 6, and 8) obtained a score of 2. However, although they demonstrate moderate linguistic skills, they do not reach the expected optimal performance level, suggesting areas that require improvement.
- **Score of 1:** Two participants (Subjects 5 and 7) exhibited notable difficulties with a score of 1, reflecting low verbal fluency.
- **Score of 0:** One participant (Subject 10) obtained a score of 0, indicating significant difficulties in verbal fluency.

Subsequent analysis of these results revealed that most of the adolescents assessed have moderate verbal fluency, reflecting reasonable fluency in terms of processing and producing responses. However, there is variability in the scores, with some individuals demonstrating high fluency and others showing significant difficulties. This could suggest that family vulnerability and unstimulating or non-communicative environments may negatively influence fluency development:

(Do you feel heard and valued in your family? Why?): No, because... at home when I arrive, I unload my bag, nobody checks what I have, what I don't have, nobody asks me how my day went, nothing. It's like I'm in the way of everyone when I go home. (Do you feel that this distance, or this lack of attention from your parents, affects you in any way?) ... Yes... (In what way?) ... Because, I mean, they don't pay attention to me, and I feel like I'm a burden in the house, like nobody cares about me (ESF02, August 2023).

My mom sometimes doesn't seem to listen to me, and sometimes you feel bad because if they don't listen to you, you feel sad when my mom doesn't listen to me and doesn't pay attention to me; she hardly ever does (ESM07, August 2023).

Now, Tables 2 and 3 present the results obtained in the two phases of the TFCR. It is important to clarify that, for the purposes of this article, only the type of drawing and the execution time will be considered, since both criteria best reflect the ability to plan and the speed of processing visual and spatial information, key components of fluency. The accuracy and richness of the drawings, while relevant to other functions such as working memory, are not the primary focus in the assessment of this specific context. Therefore, the analysis will focus on how the types of drawings and execution times indicate adolescents' ability to process and produce responses quickly and effectively.

Ahora bien, en las tablas 2 y 3 se presentan los resultados obtenidos en las dos fases del TFCR, siendo importante aclarar que, para los propósitos del presente artículo, solo se tendrán en cuenta el tipo de dibujo y el tiempo de ejecución, debido a que ambos criterios reflejan mejor la capacidad de planificación y rapidez en el procesamiento de información visual y espacial, componentes clave de la fluencia; la exactitud y la riqueza del dibujo, aunque relevantes para otras funciones como la memoria de trabajo, no son el enfoque principal en la evaluación de este contexto específico. Por lo tanto, el análisis se centrará en cómo los tipos de dibujo y los tiempos de ejecución indican la capacidad de los adolescentes para procesar y emitir respuestas de manera rápida y eficaz.

Tabla 2. Resultados y percentiles en la fase de copia del Test de Figura Compleja de Rey, según los baremos del manual original.

Subject No.	Age	Type of drawing	Percentile of drawing according to age	Drawing type time (minutes)	Percentile in the copy according to age
1	14	II	50	3	75
2	16	III	25	3	50
3	12	IV	10	3	99
4	12	II	75	4	50
5	12	IV	10	7	10
6	17	I	75	5	10
7	13	II	50	6	10
8	12	II	75	6	10
9	12	II	75	5	25
10	13	I	75	6	10

Source: Prepared by the author based on data obtained from the application of the test, year 2023.

The data presented are understood as follows:

Type of drawing:

- **Type I (Subjects 6 and 10):** begins from the central rectangle and is common among adolescents over 15 years old, indicating a rational structure and efficient planning.
- **Type II (Subjects 1, 4, 7, 8, and 9):** was the most common among the participants and is characterized by starting with the details encompassed within the central structure. Although it is not the most efficient type, it demonstrates basic and intentional planning.
- **Type III (Subject 2) and IV (Subjects 3 and 5):** these types are less structured and suggest primitive planning of visual information.

Drawing time:

- **Percentile 10 (Subjects 5, 6, 7, 8, and 10), 25 (Subject 9), and 50 (Subjects 2 and 4):** most participants completed the task within 4 to 6 minutes, a trend that, although possibly related to greater attention to details or a tendency to avoid errors, may also indicate potential difficulties in processing speed.
- **Percentile 75 (Subject 1) and 99 (Subject 3):** reflect speed and accuracy in the task.

With the initial analysis of these results, an influence of the family environment on planning and organization (necessary for fluency) could be suggested. Adolescents with Type I and II drawings, which show efficient and basic planning respectively, tend to perceive their family environments as stable and protective, although sometimes inconsistent: (“Are you happy? Why?”) “Yes, because I have everything—house, home, dad, mom, siblings” (ESM01, August 2023); “Yes, because lately I feel safe with my parents, friends, relatives, so that gives me the security of being well with them” (ESF04, August 2023).

On the other hand, Type III and IV drawings, which are less structured, suggest adolescents who face instability and a lack of support within their families. Additionally, longer drawing times may be associated with difficulties in concentration and organization, influenced by an inattentive or conflictive family environment. “No, I am not happy because I am not comfortable at home” (ESF02, August 2023); “I don’t know if I’m really happy, but... I mean, I know I’m happy, but there are moments when you don’t feel happy” (ESM07, August 2023); “I’m missing my parents’ love, but I got used to it—I am happy” (ESF08).

Table 3. Results and percentiles in the memory reproduction phase of the Rey Complex Figure Test, according to the norms of the original manual.

Suj. N°	Age	Type of drawing	Percentile of drawing type according to age	Drawing time (minutes)	Percentile of drawing time according to age
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1	14	I	75	2	75
2	16	II	50	2	75
3	12	V	10	2	75
4	12	II	75	2	75
5	12	II	75	4	25
6	17	I	75	3	75
7	13	II	50	3	75
8	12	II	75	3	75
9	12	II	75	4	25
10	13	I	75	3	75

Source: Prepared by the author based on data obtained from the application of the test.

Based on these findings, the following interpretation is plausible:

Drawing types:

- **Type I (Subjects 1, 6, and 10) and Type II (Subjects 2, 4, 5, 7, 8, and 9):** the participants showed improvement in memory reproduction, indicating progress in planning and visuoconstructive strategies when working memory is used simultaneously.
- **Type V (Subject 3):** this type is considerably less structured and more disorganized; it suggests that the individual has difficulties remembering and reproducing the figure in a coherent and accurate manner, indicating lower fluency, as it reflects challenges in processing and manipulating information quickly and effectively.

Drawing time:

- **Percentile 75 (Subjects 1, 2, 3, 4, 6, 7, 8, and 10):** they completed the task in 2 to 3 minutes, showing considerable speed, although this may have occasionally compromised accuracy and planning. This suggests that although they process information quickly, their fluency is not always accompanied by effective organization and planning.
- **Percentile 25 (Subjects 5 and 9):** they demonstrated slower but more efficient processing, completing the task in a longer period, which allowed for a more organized and accurate execution, reflecting better fluency that prioritizes accuracy over speed.

Thus, the analysis of the TFCR (Table 3) reveals significant variability in the fluency of the evaluated adolescents, in which most demonstrated a moderate to high capacity to process and manipulate visual and spatial information, with markedly different execution times between the copy phase and the memory reproduction phase. This indicates that they are better at processing information quickly once they have had the opportunity to become familiar with some kind of information. For example, some described their decision-making process as follows: "I make, let's say, a comparative chart of the good things it brings and the bad things

(...) there are decisions I think about quickly” (ESM05, August 2023); even prioritizing speed: “I don’t stay thinking for a while, I mean, I decide what I’m going to do and I do it” (ESF09, August 2023).

4. Discussion

This article explored the relationship between family vulnerability and executive functions (EF) in lower secondary school adolescents in Tuluá, Colombia. Based on a mixed-method study [53]-[54]-[55]-[56]-[57]-[58]-[59]-[60]-[61], the impact of family vulnerability on adolescents’ decision-making and fluency was analyzed. The purpose of examining this relationship was to understand how family contexts intertwine with the executive difficulties experienced by the adolescents. To address this objective, three key dimensions of analysis were identified as influencing their EF: environments of violence (both at home and in the community), family emotional support, and mental health.

In the community setting, delinquency and violence can desensitize individuals, leading them to perceive violence at home as something normal [62]. This normalization increases the likelihood of adopting violent behaviors within family relationships, as reported by 40% (n = 4) of participants. It favors acceptance of violence as a method of control, especially in contexts lacking prevention programs and with cultural beliefs that perpetuate inequality [63]. Such dynamics may also affect EF, as seen in subjects 5 and 7, who scored below expectations on the MoCA and on three of the four TFCR indicators analyzed.

For this reason, constant exposure to different forms of violence represents a significant challenge for healthy adolescent development [64]. It leads families to adopt violent parenting models marked by negligence, rejection, and discrimination. This pattern was observed in the study, where half of the adolescents reported having been rejected at some point by their families due to their way of being or thinking, as well as having experienced discrimination or exclusion (30%) and violence both inside and outside the family environment. Consequently, these parenting styles generate a hostile and conflictive environment that negatively affects well-being [25], the development of social skills, and decision-making ability [65].

This approach allows us to infer that the family is not only a group of individuals sharing a home; rather, a range of motivations, emotions, and conflicts coexist within their social interactions, making subjectivity ever-present. Thus, the family environment is composed of a plurality of meanings that develop and occur simultaneously [66]. Emotional support must therefore always be present, as it is essential in adolescent development and can serve as a solid foundation for improving mental well-being and fostering the creation of social skills [64].

Furthermore, issues related to substance use, socioeconomic conditions, support networks, discipline and corrective measures, and mental health—among others reflected in this article—show that the family can exert either a protective or harmful influence depending on its internal dynamics and conflict management. A democratic parenting style creates a safe and supportive environment, promotes healthy relationships, and acts as a protective factor against these threats. This is reflected in subjects 1 and 2, who reported using psychoactive substances and lacked consistent or protective family and social environments. In contrast, subjects 9, 10, and

5, who have strong family support systems, do not use substances; indeed, subject 5 reported successfully resisting offers to consume them.

On the other hand, family vulnerability and non-stimulating environments negatively affect the development of verbal fluency, as language gaps among participants are associated with parental negligence. According to the interviews, parents create barriers of silence or maintain aggressive behaviors, reducing interaction, lowering stimulation, and consequently delaying language development [52]. MoCA results show that eight participants (80%) scored 2 or below on the language subtest, indicating moderate to low linguistic abilities, with five scoring 2, two scoring 1, and one scoring 0—revealing significant difficulties.

Difficulties in this EF limit communicative abilities since they relate to the lack of safe and understanding spaces. According to participants' accounts, this shortage generates tension when expressing themselves. This inability to confidently communicate their thoughts, emotions, or needs may generate internal conflicts [67], putting their mental health at risk by increasing the likelihood of maladaptive responses, such as seeking attachment outside the family environment or allowing dysfunctional situations to persist without intervention [68].

Regarding this last aspect, approximately 80% reported emotional difficulties both within the family and in social relationships, experiencing frequent distress and problems managing emotions such as sadness or anger. This is a high-risk situation, since they sometimes do not feel valued, which weakens self-confidence, undermines self-esteem, and prevents them from recognizing their own abilities an issue that may be aggravated by the fact that none of them receive professional support in this area.

This phenomenon is reinforced by the interviews, where adolescents mentioned difficulties in making both basic and complex decisions. These difficulties stem from the lack of spaces that foster autonomy and critical thinking—factors that emerge as influential in the decision-making process—resulting in complications when seeking information and reflecting on their choices [69]-[70]-[71]-[72]-[73]-[74], and impacting their ability to function in different environments [65].

5.

6. Conclusions

The research process made it possible to understand that pedagogical practices, far from being neutral or merely technical acts, are scenarios where meanings, knowledge, and forms of subjectivity are contested. Teaching experience, in dialogue with the social and cultural realities of the context, is configured as a political act that produces situated knowledge and transforms both the one who teaches and the one who learns. In this sense, the research reaffirms the urgency of understanding pedagogy as a living field, nourished by encounter, critical reflection, and the ability to question the conditions of possibility of the educational act itself [75]-[76]-[77].

Likewise, the study shows that teaching and learning processes acquire meaning when they succeed in connecting the experiences of subjects with disciplinary knowledge and the social

contexts that shape them. The classroom thus emerges as a space of mediation between the individual and the collective, where knowledge construction is oriented toward emancipation and cognitive justice. This perspective requires rethinking teacher education not only in terms of competencies but as a reflective practice that promotes autonomy, creativity, and ethical responsibility in relation to social realities [78]-[79]-[80]-[81].

Furthermore, the findings indicate that critical pedagogical practices open possibilities for institutional transformation, insofar as they challenge established structures and promote new forms of coexistence, participation, and collective knowledge building. In this way, the teacher ceases to be a mere executor of educational policies and becomes an intellectual committed to social transformation, capable of interpreting and re-signifying their work through research, creativity, and community action [77]-[78]-[80]-[81].

Finally, this research invites continued exploration of the relationship between pedagogy, subjectivity, and context, recognizing that every educational practice involves an act of interpretation and ethical positioning toward the world. Education, conceived through this lens, transcends institutional boundaries and becomes a permanent process of humanization, dialogue, and resistance against logics of homogenization and exclusion. Hence, critical and emancipatory pedagogies remain a historical necessity and a political commitment to a more just, plural, and democratic society [75]-[77]-[79]-[80].

Limitations and Future Research

It is important to clarify that this study has several limitations. The sample is relatively small, and the specific socioeconomic context of the participants makes it difficult to generalize the results [70]. Nevertheless, the findings reported here serve as an important indication regarding the situation of exposure to violence during adolescence.

For future research, it is recommended to expand the sample size and consider including diverse socioeconomic and cultural contexts. Additionally, longitudinal studies could provide a more comprehensive understanding of how family vulnerability impacts the development of certain executive functions. It would also be beneficial to investigate potential interventions that could mitigate the negative effects of family vulnerability on the consolidation of executive functions in adolescents. Likewise, it is essential to implement parent education programs focused on assertive communication and emotional regulation, using democratic parenting styles. Finally, psychosocial and mental health prevention and promotion plans should be created, including strategies that strengthen emotional resilience.

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