

Fraternal Dynamics and Academic Performance of Hearing and Deaf Learners in Inclusive Schools in Burkina Faso

Sekma Gustave Zongo, Bawala Léopold Badolo

Équipe de Recherche Expériences et Processus Psychiques en Santé, Éducation et Travail/Laboratoire de Philosophie, Université Joseph Ki-Zerbo, Burkina Faso
Email: sekmagustave@gmail.com

How to cite this paper: Zongo, S. G., & Badolo, B. L. (2026). Fraternal Dynamics and Academic Performance of Hearing and Deaf Learners in Inclusive Schools in Burkina Faso. *Open Journal of Social Sciences*, 14, 140-158.
<https://doi.org/10.4236/jss.2026.144009>

Received: December 1, 2025

Accepted: April 7, 2026

Published: April 10, 2026

Copyright © 2026 by author(s) and Scientific Research Publishing Inc.
This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).

<http://creativecommons.org/licenses/by/4.0/>



Open Access

Abstract

In the Burkinabè educational context, deaf children are exposed to affective and sensory vulnerabilities that can significantly influence their sibling relationships. These dynamics may foster a sense of belonging and emotional regulation or, conversely, heighten exclusion and stigmatization. This study examines the impact of sibling anxiety on academic performance in French and mathematics. Drawing on the theoretical frameworks of Vygotsky (1978), Bowlby (1969), and Bronfenbrenner (2000), the study was conducted with 111 participants (77 students, 24 parents, and 10 teachers) in the Kadiogo and Nando regions. Research tools included the Family Drawing Test, the Sibling Relationship Questionnaire (SRQ), interview guides, and grades from harmonized examinations. Data were processed using regression analyses (SPSS 27) and manual content analysis. The analyses indicate that sibling anxiety is not a statistically significant predictor at the conventional 5% threshold. However, the study reveals marginal significance trends ($0.05 < p < 0.10$), particularly in French for the overall sample ($\beta = -0.199$; $p = 0.082$) and more specifically among deaf boys ($\beta = -0.468$; $p = 0.067$). These results reflect a more pronounced emotional vulnerability in deaf students, whose cognitive load appears saturated by tensions within the family microsystem, thereby hindering the scaffolding necessary for linguistic learning. In contrast, deaf girls demonstrate greater resilience through more robust emotional regulation mechanisms. Although limited by the small sample size ($n = 77$ learners) and confounding factors such as modest family socio-economic status, this research calls for an evolution in inclusive education systems. We advocate for the implementation of “Inclusive School Life Councils” to mediate sibling conflicts and the creation of parental awareness resources aimed at transforming the sibling bond into a source of support rather than a source of anxiety.

Keywords

Sibling Relationships, Academic Performance, Deaf Children

1. Introduction

Family dynamics are often approached through the prism of parental figures, particularly the mother and, to a lesser extent, the father. Although this focus is based on their decisive role in the emotional and cognitive development of the child (Ainsworth, 1989; Bowlby, 1969), it tends to obscure other equally influential figures, notably siblings. However, siblings constitute a dense relational space, traversed by issues of attachment, rivalry, solidarity, and differentiation (Troupel, 2017; Kramer & Conger, 2009), which can significantly impact children's developmental and educational trajectories. In educational contexts marked by emotional or sensory vulnerabilities, as is the case for deaf children, sibling relationships can play a compensatory role, reinforcing feelings of belonging and emotional regulation, or, conversely, exacerbating certain tensions related to exclusion, comparison, or stigmatization (McHale, Updegraff, & Whiteman, 2012; Guralnick, 2002). It therefore deserves special attention, both theoretically and empirically, especially in environments where educational and psychosocial resources are limited. To address this issue, we analyzed learners' academic performance in light of their anxiety attributable to sibling relationships, taking into account two moderating variables: hearing acuity and gender. This study is set in the context of inclusive schools in Burkina Faso, where hearing and deaf children coexist within the same educational environment. In these spaces, family dynamics, particularly sibling dynamics, can play an important role in the emotional, cognitive, and academic development of children, especially those who are deaf. The value of this research lies in its desire to highlight a factor that is often overlooked in studies on academic success: siblings. By exploring the links between sibling anxiety and academic performance, this study aims to enrich our understanding of the emotional determinants of success in an inclusive context. From this perspective, it seems essential to examine the effects that sibling relationships, and more specifically the anxiety that arises from them, can have on the academic trajectories of children in an inclusive context. More than just a peripheral family setting, siblings constitute a relational space that can be either structuring or destabilizing, whose impact deserves to be examined in light of psychological and contextual variables. Despite the recognized importance of sibling relationships in children's socio-emotional and cognitive development, few studies have focused on this topic in the field of education (Camdessus, 1998). This relative scarcity of research contributes to making siblings a field that is still largely neglected in the analysis of educational trajectories. Bourguignon (2003) describes siblings as a "silent element" in family dynamics, highlighting their absence in the analysis of academic performance. However, this silence is gradually diminishing. More recent research (Troupel, 2017;

Laurin et al., 2012) has opened up this complex and multifaceted topic. It reveals the richness of sibling interactions and their explanatory potential in educational trajectories. This research highlights that siblings are not only a source of emotional socialization, but also a structuring factor in learning and academic performance. Other studies have shown that deaf children, due to their specific mode of communication, are highly sensitive to family tensions in a context where their brothers or sisters do not know sign language (Lavigne, 2016). This vulnerability seems to be particularly pronounced among deaf boys who, according to Kushalnagar et al. (2011), are more exposed to emotional disorders linked to intra-family dynamics in the absence of fluid communication with their siblings. Unlike their hearing counterparts, who can more easily mobilize internal and external resources to regulate sibling anxiety, deaf boys often face linguistic and social barriers that hinder their emotional regulation mechanisms (Vanistendael & Lecomte, 2002). In addition, Kushalnagar et al. (2011) point out that deaf girls often develop coping strategies that mitigate the impact of family tensions on their learning. However, although these various studies are insightful, they were conducted in specific sociocultural contexts, which may limit their transferability to other contextual realities. They therefore need to be continued in educational environments that have been little explored, such as those of Burkina Faso, in order to develop a more detailed understanding that is contextualized and adapted to local realities.

The study thus took a cross-disciplinary approach, combining the contributions of attachment theory (Bowlby, 1969), socioconstructivism theory (Vygotsky, 1978), and the ecological model of human development (Bronfenbrenner, 2000). These approaches offer complementary insights into how sibling interactions, mediated by individual and contextual characteristics, can shape the educational trajectories of deaf and hearing children. Drawing on the contributions of Bowlby, Vygotsky, and Bronfenbrenner, sibling interactions, whether supportive or anxiety-provoking, cannot be dissociated from individual characteristics (gender and hearing status) and the educational environments in which they occur.

This research aims to examine the influence of sibling relationships, and particularly the anxiety that arises from them, on the academic performance of learners in inclusive schools in Burkina Faso, taking into account the moderating variables of sensory status and gender. We conclude that sibling anxiety has a significant negative influence on the academic performance of learners in inclusive schools in Burkina Faso.

2. Methodology

In order to evaluate the academic performance of deaf and hearing learners in inclusive schools, in relation to sibling anxiety, a mixed approach was adopted. This approach allows for the combination of statistical and content analyses, which provide both a quantitative and qualitative interpretation of the phenomena studied. In this section, we present the scope of the study, the population concerned, the sampling techniques and composition of the samples, the data collec-

tion methods and tools, the methods of administering the instruments, the data processing and analysis procedures, and the ethical considerations related to the research.

2.1. Scope of the Study

The study is set against the backdrop of the high prevalence of hearing disorders in sub-Saharan Africa, where deaf people face major challenges in accessing information, schooling, and continuing their education (Granier, 2020; Tshimbadi, Tshiswaka, & Matanda, 2011).

In Burkina Faso, limited schooling and school dropout rates among deaf children are a cause for concern. Data from the Directorate for the Promotion of Inclusive Education, Girls' Education and Gender (DPEIEFG) (2024) show an uneven regional distribution of deaf students in primary schools, with a total enrollment of 600. The Kadiogo region alone has 326 deaf students, representing more than half of the national total. The Gouiriko, Nazinon, Nando, Goulmou, and Yadéga regions have relatively similar numbers. The other regions have a very low prevalence (≤ 10 deaf students per region). In this context, the Kadiogo region stands out as a prime area for study due to its particularly high number of deaf students. In addition, the Nando region, close to Ouagadougou, which has an intermediate number of deaf students compared to regions with comparable numbers, was also selected as a field of investigation for this study.

2.2. Target Audience

The main participants in the study are deaf and hearing learners in preparatory classes, aged 6 to 11, from a variety of socioeconomic backgrounds, mostly disadvantaged or modest. These students were chosen because their age was suitable for the family drawing test. The secondary units of the study are the parents and teachers of deaf and hearing students. They were interviewed about sibling communication, sibling dynamics, and academic performance.

2.3. Sampling and Samples

Table 1. Number of participants by gender.

Participants	Number by gender		
	Male	Female	Total
Deaf learners	16	16	32
Hearing learners	20	25	45
Parents of students	10	14	24
Teachers	05	05	10
TOTAL	51	60	111

Source. Research data (2024).

The study participants were selected from the target population in accordance with the principles of purposive sampling. **Table 1** provides an overview.

The sample comprises a total of one hundred and eleven (111) participants divided between the sexes (51 male vs. 60 female).

2.4. Research Methods and Techniques

The study drew on existing models and the results of previous research. It used a variety of tools to understand the link between the quality of sibling relationships and academic performance, taking into account possible biases related to the subjectivity of the responses.

2.4.1. Data Collection Tools

The data collection tools used were: the family drawing test, a questionnaire survey, interviews, observation, and academic performance assessment tests.

- The family drawing test

This allows children, particularly deaf children, to express their feelings about their family through a nonverbal medium. From the age of 6, children can represent their family through drawing (Corroller, 2003). The family drawing test is a projective tool that reveals family conflicts and emotional bonds (Minkowski cited by Widlöcher, 1965). It is accessible, quick, and easy to administer. It allows for a nuanced interpretation of the family atmosphere. It offers a complementary reading of the other tools. It was administered individually in random order. We asked each child to draw a family as they imagined it. Keen not to stifle their spontaneity, we did not give them detailed explanations or precise instructions for completing the drawing. The students were given a sheet of A4 paper, a pencil, and colored pencils, but were not allowed to use a ruler or eraser. At the end of the activity, they had to write the corresponding meaning next to each character. Deaf students were given the same materials. However, based on a family photo, the instructions were translated into sign language by an interpreter (a student or teacher). They were given extra time to ask questions and reinforce their understanding of the instructions.

- Observation

The observation technique proposed by Louis Corman (1964) is a way of analyzing how children represent their families and the emotional dynamics at play within them. It aims to explore the unconscious mechanisms linked to attachment and emotions, supplementing the interpretation of the drawing with behavioral clues. The grid includes an identification section (age and gender of the child) and three columns for observing the order in which the characters are drawn, the attitudes and hesitations of the artist towards the characters, and the time taken to complete the drawing.

- Questionnaire survey

The primary instrument employed to evaluate sibling dynamics was the Sibling Relationship Questionnaire (SRQ), originally developed by Furman and Buhrmester in 1985 (Furman & Buhrmester, 1985). This standardized instrument facilitates the exploration of two fundamental dimensions of the fraternal relationship: pos-

itive aspects, captured by the “Warmth/Closeness” subscale, and negative aspects, measured by the “Conflict/Rivalry” subscale. Prior to the data collection phase, the original version underwent a rigorous process of translation and adaptation to the linguistic and socio-cultural realities of Burkina Faso. This procedure ensures the relevance and comprehensibility of the items for the learners within our sample. In the framework of this research, the construct of sibling anxiety was specifically operationalized through the dimension of conflict and rivalry. While anxiety is, by nature, an internal psychological state, it is objectified here through the measurement of repeated negative interactions. This methodological approach is based on a dual articulation. On one hand, conflict serves as an indicator, or proxy, as the SRQ assesses the frequency and intensity of arguments, criticism, and competition. Indeed, according to the seminal authors, a high score on this subscale is significantly correlated with increased levels of anxiety in children. On the other hand, the recurrence of these negative interactions generates a permanent tension that acts as a major environmental stressor. Consequently, this climate mobilizes the learner’s psycho-affective resources, creating an emotional burden likely to impede concentration and academic performance. Finally, the relevance of this operationalization is supported by the scale’s robust psychometric properties, validated among both primary and secondary school students. In this regard, the internal consistency of the “Conflict/Rivalry” subscale, with a Cronbach’s alpha ranging from 0.82 to 0.86, confirms that the items reliably capture relational tension. In sum, this tool constitutes a reliable lever for analyzing the anxiogenic component of the sibling dynamics under investigation. The following items assess the frequency and intensity of negative interactions. “How often do you argue with your brother or sister?” “How often does your brother or sister criticize you?” “How often does he/she make fun of you?” “How often do you disagree on important issues?” “How often does your brother or sister try to dominate you?” “How often do you feel competitive?” “How often do you get angry with each other?” This scale has been validated with elementary and high school students. It has excellent internal consistency, as shown in **Table 2** below.

Table 2. Psychometric validation.

Subscale	Cronbach’s alpha
Conflict/rivalry	0.82 to 0.86
Warmth/closeness	0.91 to 0.93

Source. *Furman & Buhmester (1985)*.

The data collected through the questionnaire made it possible to analyze the differences between deaf and hearing students in terms of sibling dynamics, identify specific vulnerabilities related to hearing status, and formulate intervention strategies to improve students’ learning conditions and well-being.

- Interviews

Interviews were chosen for their qualitative richness. They allowed us to explore perceptions, experiences, and cultural representations related to deafness, sibling relationships, and their effect on academic performance. They also offered methodological flexibility (adjustment of questions, clarification of answers). Triangulation of these data with those from the family drawing test, observation grid, and survey questionnaire reinforced the validity of the results. Three separate interview guides were developed: one for students, another for parents, and a third for teachers.

The interview guide for students was used to deepen the interpretation of the family drawing by exploring emotional and relational representations. After an introduction to the test and a confidence-building exercise, each child was asked a general question: Can you tell me what you drew? Targeted questions were also asked about the children's feelings toward each character, their preferences, and their perceptions of the kindness of family members. Finally, each child was asked to freely interpret their drawing and validate it.

The parent interview guide was used to gather parents' perceptions of sibling communication and emotional relationships between children through an introduction and confidence-building exercise, and a description of sibling and parental communication and interactions.

The teacher interview guide aimed to link sibling dynamics and academic performance. It included questions on communication and linguistic accessibility, teaching strategies to compensate for gaps, and observations of classroom behavior related to sibling tensions.

Summative assessments include homework and quarterly tests, which are standardized in Burkina Faso and organized by the provincial directorates of the Ministry of Basic Education, Literacy, and Promotion of National Languages (MEBAPLN). The tests were designed by teachers and educational supervisors in accordance with the curriculum progression. They limit the bias associated with complacent assessments.

Specific assessment tests were developed on a theoretical and empirical basis, in collaboration with teachers, to assess the French and mathematics skills of deaf and hearing students. Our choice of these subjects was guided by the fact that they are the instrumental disciplines that form the foundation for learning in other disciplines. Furthermore, it is in these subjects that the academic performance of deaf students can best be compared with that of hearing learners (Sarrazin-Auriol, 2010). Based on the identified tasks in use, items were constructed according to a competency model (Weil-Barais, 2004). Thanks to the competency model, each student is assessed against an empirical standard that ensures fairness between deaf and hearing students. Designed for these two groups of children, the tests in French (language) and mathematics reduce communication-related biases and reveal contextual differences. Their development with teachers ensures content validity and consistency with teaching practices.

2.4.2. Administration of Survey Tools

The methods used to administer survey tools vary depending on the type of tool, the objectives of the survey, and the target population. Prior to administration, the survey questionnaire and interview guides were pre-tested for validation. Ten (10) learners, including five (5) deaf and five (5) hearing learners, four (4) parents, including two (2) women and two (2) men, and two (2) school teachers were involved in this pre-test. This pre-test allowed us to adjust our questions to meet our needs. On occasion, the question of which child the parents prefer was removed from the interview guide designed for parents. It is embarrassing and gives rise to bias. With the questions adjusted, we went into the field to conduct our investigations after validating our methodological framework. We administered the family drawing, noted observations, conducted interviews, administered the survey questionnaire, recorded student grades, and administered assessment tests in mathematics and French. When, where, and under what conditions?

2.5. Method of Processing and Analyzing the Data Collected

The children's drawings were subjected to a graphic analysis using a grid specially designed for this purpose. The content of the discourse produced during the interviews was analyzed manually. Data relating to academic performance and questionnaires were statistically analyzed using SPSS software, version 27 (IBM software). Based on the regression analyses performed in this software, data, tables, and graphs explaining the phenomenon studied were generated and interpreted.

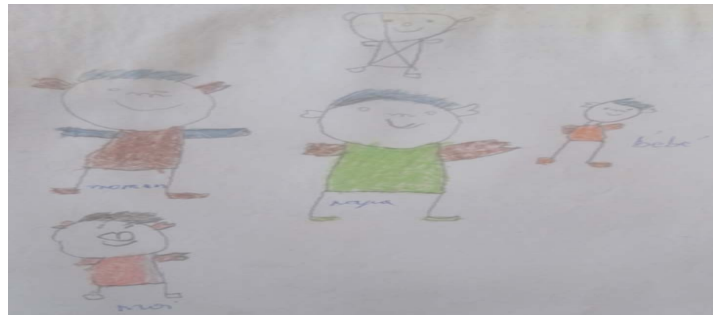
2.6. Ethical Considerations

We complied with our obligation to protect participants and respect their rights with regard to their free and informed consent and the confidentiality of their data. To ensure compliance with ethical guidelines for research involving children, prior to data collection, we sought authorization from the Ministry of Basic Education, Literacy, and Promotion of National Languages, the Ministry of Justice, and the Ministry of Women's Empowerment and Humanitarian Action. These authorizations are a guarantee of our responsibility towards the institutions involved in the study and the actors targeted for data collection. Next, the respondents were informed in advance of the purpose of the research. They were also reassured of the confidentiality of the data processing in order to preserve the opinions expressed by the participants. Ethical considerations also required us to maintain anonymity and use pseudonyms to refer to the individuals surveyed. The confidentiality we demonstrated is a principle whose mandatory observance is recorded in the interview guides.

3. Results

The graphic representations from the family drawing show that sibling figures are sometimes devalued or even omitted. This devaluation can be interpreted as the expression of latent anxiety generated by siblings (Troupel, 2017), reflecting un-

resolved conflicts, emotional rivalries, or feelings of injustice. The following drawing is illustrative.



Source. Survey data (2024).

Drawing 1. A family with siblings in conflict, drawn by a deaf girl.

The first character depicted is a child who has been crossed out before the two parents are drawn. This gesture expresses an unresolved conflict with her brother. The author drew herself last, placing herself apart from the other members of the family. This distancing reflects feelings of inferiority, exclusion, and isolation. We can see a marked emotional distance between her and her family, particularly her siblings. Ultimately, this situation appears to be a source of anxiety for the child, which could affect their commitment to school and their performance.

3.1. Sibling Anxiety and Academic Performance

Sibling anxiety has a slight influence on academic performance in mathematics ($F = 2.777$, $p = 0.100$), with an explained variance of 3.6%. The predictive effect of sibling anxiety on performance is negative and insignificant ($\beta = -0.189$, $p = 0.100$). In French, sibling-induced anxiety explains 4% of the variance in performance ($F = 3.101$; $p = 0.082$). A negative effect is observed, with marginal significance at the 10% threshold ($\beta = -0.199$; $p = 0.082$).

Table 3 below summarizes all the data mentioned.

Table 3. Sibling anxiety and academic performance.

Academic performance	Learners' anxious siblings		R^2
	β	p	
Mathematics	-0.189	0.100	0.036
French	-0.199	0.082	0.040

Source. Survey data (2024).

The analysis of the data presented in the previous table reveals that the anxiety felt by learners toward their siblings exerts a negative influence on their academic results. However, at the conventional significance threshold of 5% ($p < 0.05$), this influence does not prove to be statistically predictive, for either Mathematics (β

= -0.189 ; $p = 0.100$) or French (beta = -0.199 ; $p = 0.082$).

Nevertheless, a more nuanced reading of the results highlights a marginal trend in French. Indeed, with a p -value of 0.082, the influence of sibling anxiety becomes statistically significant at the 10% threshold. This result suggests that while the effect may be subtle, sibling tensions constitute a stressor whose impact is particularly tangible in linguistic disciplines.

This observation suggests that the relational climate within the sibling group, while not an absolute determinant, acts as a latent risk factor for success in French a subject that requires significant cognitive and emotional availability for decoding and communication.

3.2. Hearing Status and Performance of Learners Anxious about Their Siblings

In the rest of the analysis, the relationship between the presence of siblings perceived as a source of anxiety and academic performance was examined.

- Academic performance of deaf students anxious about their siblings

In mathematics, the academic performance of deaf learners is weakly explained by sibling anxiety ($F = 3.032$; $p = 0.092$), which accounts for 9.2% of the variance. This anxiety has a negative impact, without reaching statistical significance (beta = -0.303 ; $p = 0.092$). In French, the academic performance of deaf learners is very little influenced by sibling anxiety ($F = 4.020$; $p = 0.093$), with only 9.1% of the variance explained. Here again, the contribution is negative and insignificant (beta = -0.302 ; $p = 0.093$). The data used in these analyses are presented in **Table 4** below.

Table 4. Sibling anxiety and academic performance of deaf learners.

Academic performance	Learners' anxious siblings		R^2
	Beta	p	
Mathematics	-0.303	0.092	0.092
French	-0.302	0.093	0.091

Source. Survey data (2024).

An examination of the data shows that the anxiety felt by deaf learners toward their siblings does not constitute a significant predictor of academic performance at the conventional 5% threshold ($p < 0.05$), whether in Mathematics (beta = -0.303 ; $p = 0.092$) or French (beta = -0.302 ; $p = 0.093$).

However, a more flexible interpretation of the results reveals that this variable becomes a significant predictor at the 10% threshold ($p < 0.10$). This marginal significance suggests that, although the effect is not powerful enough to be affirmed with absolute certainty, sibling anxiety acts as a latent stressor that negatively impacts academic outcomes.

Indeed, the proximity of the p -values (0.092 and 0.093) to the critical threshold

indicates a real trend. In the context of deafness, where intra-family communication can be a source of tension, these results underscore that the relational climate with siblings is a noteworthy risk factor that should be taken into account in the psycho-educational support of students.

- Academic performance of hearing students who feel anxious about their siblings

In mathematics, academic results are slightly influenced by sibling anxiety ($F = 3.000$; $p = 0.090$), with an explained variance of 6.5%. The effect is negative and non-significant ($\beta = -0.255$; $p = 0.090$). A statistical trend is observed in mathematics, unlike in French ($F = 2.211$; $p = 0.144$), where the influence is more diffuse, accounting for only 4.9% of the variance. The data used in these analyses are presented in **Table 5** below.

Table 5. Sibling anxiety and academic performance of hearing students.

Academic performance	Hearing students anxious about siblings		R^2
	<i>Beta</i>	<i>p</i>	
Mathematics	-0.255	0.065	0.090
French	-0.221	0.144	0.049

Source. Survey data (2024).

The analysis of the results shows that the academic performance of hearing learners is not significantly predicted by sibling anxiety at the conventional 5% threshold. However, at the 10% threshold, this influence becomes statistically significant in Mathematics ($\beta = -0.255$; $p = 0.090$), suggesting a real, albeit moderate, trend. In contrast, the effect remains non-significant in French ($\beta = -0.221$; $p = 0.144$), where the p-value falls further from the critical thresholds.

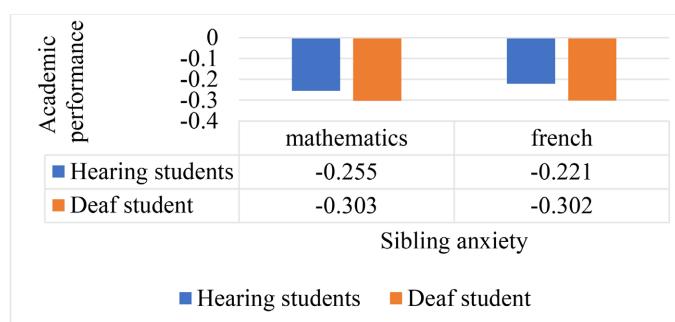
Nevertheless, to move beyond a strict reading of probabilities, a comparative graph of the academic results between deaf and hearing learners who reported some form of sibling-related anxiety was developed. This visual support serves to highlight the observed trends and underscores the differential vulnerability of the two groups when faced with family stressors.

- Anxiety-inducing siblings and comparative performance of deaf and hearing students

Figure 1 illustrates the effect of anxiety felt by learners, caused by their brothers or sisters, on their academic performance according to their hearing status (hearing or deaf). It highlights the differential trends observed between the two groups.

Sibling-induced anxiety does not significantly predict the academic performance of deaf learners in either mathematics ($\beta = -0.303$; $p = 0.092$) or French ($\beta = -0.302$; $p = 0.093$) at the 5% threshold. Similarly, among hearing students, this form of anxiety is a significant predictor of academic performance in mathematics ($\beta = -0.255$; $p = 0.090$) at the 10% threshold, but remains non-signifi-

cant in French (beta = -0.221 ; $p = 0.144$) even at the 10% level.



Source. Survey data (2024).

Figure 1. Academic performance of deaf and hearing students anxious about their siblings.

However, the trends observed in the comparative figure show that deaf learners who experience anxiety related to their siblings perform more poorly academically than their hearing counterparts in both mathematics and French. This trend, while not statistically significant at the conventional 5% threshold, appears to be confirmed by the data.

3.3. Anxious Siblings and Academic Performance According to Hearing Status and Gender

The anxiety generated by siblings seems to affect academic performance differently depending on the hearing status and gender of the learners.

- Anxious siblings and academic performance of deaf boys

In mathematics, sibling anxiety has a weak explanatory effect on the academic performance of deaf boys ($F = 2.055$; $p = 0.174$), accounting for 12.8% of the variability. The contribution is negative and insignificant (beta = -0.358 ; $p = 0.174$). In French, the results indicate a slightly more pronounced influence: anxiety caused by siblings explains 21.9% of the variability in the academic performance of deaf boys ($F = 3.934$; $p = 0.067$). However, this contribution remains negative and statistically insignificant (beta = -0.468 ; $p = 0.067$). However, this contribution remains negative and statistically non-significant at the 5% level ($p = 0.05$).

The corresponding data are presented in **Table 6** below.

Table 6. Sibling anxiety and academic performance among deaf boys.

Performances	Anxiety among deaf boys attributable to brothers or sisters		R^2
	Beta	p	
Mathematics	-0.358	0.174	0.174
French	-0.468	0.067	0.219

Source. Survey data (2024).

The academic performance of deaf boys is not significantly predicted by the anxiety they feel toward their siblings in mathematics (beta = -0.358 ; $p = 0.174$).

However, in French (beta = -0.468; $p = 0.067$), it is predicted at the 10% significance threshold.

- Anxious siblings and academic performance of hearing boys

In mathematics, anxiety related to siblings explains only 4.8% of the variance in academic performance ($F = 0.917$; $p = 0.351$), with an equally negative and insignificant contribution (beta = -0.220; $p = 0.351$). In French, this anxiety explains 14.5% of the variance in academic performance ($F = 3.049$; $p = 0.098$). Although the contribution is negative, it is not significant (beta = -0.381; $p = 0.098$). However, in French ($p = 0.098$), there is a marginal significance at the 10% threshold.

Table 7 below illustrates these results.

Table 7. Sibling anxiety and academic performance in hearing boys.

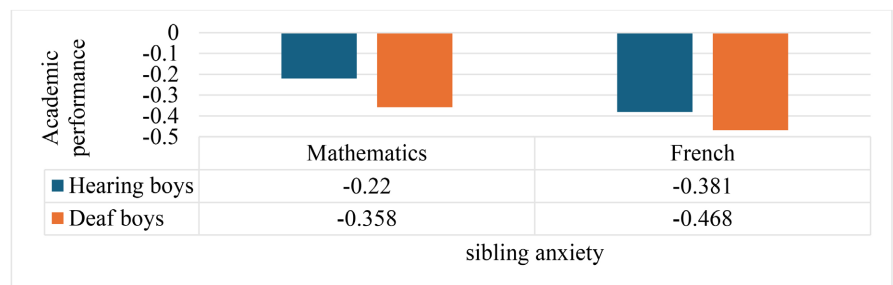
Performances	Anxiety among hearing boys attributable to siblings		R^2
	Beta	P	
Mathematics	-0.220	0.351	0.048
French	-0.381	0.098	0.145

Source. Survey data (2024).

Sibling-induced anxiety is not a significant predictor of hearing boys' academic performance in mathematics (beta = -0.220; $p = 0.351$). However, in French (beta = -0.381; $p = 0.098$), it constitutes a marginally significant predictor at the 10% threshold.

- Anxiety caused by siblings and comparative performance of deaf and hearing boys

The following **Figure 2** illustrates the comparative performance of deaf and hearing boys based on the anxiety generated by their siblings.



Source. Survey data (2024).

Figure 2. Academic performance of deaf and hearing boys who are anxious about their siblings.

Sibling-induced anxiety is not a significant predictor of the academic performance of deaf boys in mathematics (beta = -0.358; $p = 0.174$) and French (beta = -0.468; $p = 0.067$). Similarly, among hearing boys, this form of anxiety does not constitute a significant predictor of academic success in mathematics (beta = -0.220; $p = 0.351$) and French (beta = -0.381; $p = 0.098$).

However, the trends observed in the graph show that anxious deaf boys exhibit greater academic vulnerability in mathematics ($\beta = -0.358$; $p = 0.174$) and French ($\beta = -0.468$; $p = 0.067$) than their hearing counterparts in both mathematics ($\beta = -0.220$; $p = 0.351$) and French ($\beta = -0.381$; $p = 0.098$). Although the results are not statistically significant at the 5% threshold, the comparison of beta coefficients (β) yields crucial information for the discussion:

- The effect is more pronounced among deaf students: In French, the coefficient is -0.468 for deaf students compared to -0.381 for hearing students.
- Proximity to the 10% threshold: For both groups in French ($p = 0.067$ and $p = 0.098$), we observe marginal significance.

- Anxious siblings and academic performance of deaf girls

In mathematics, this trend is confirmed: anxiety caused by siblings accounts for only 6.1% of the variance in the academic performance of deaf girls ($F = 0.903$; $p = 0.358$), with a negative and insignificant contribution ($\beta = -0.246$; $p = 0.358$). In French, the effect is even weaker: only 2.2% of the variability in academic performance is attributable to this form of anxiety ($F = 0.318$; $p = 0.582$), which contributes negatively and insignificantly to the variance in results ($\beta = -0.149$; $p = 0.582$). **Table 8** below illustrates these results.

Table 8. Sibling anxiety and academic performance among deaf girls.

Academic performances	Deaf girls anxious about their brothers or sisters		R^2
	β	p	
In Mathematics	-0.246	0.358	0.061
In French	-0.149	0.582	0.022

Source. Survey data (2024).

The effect of deaf girls' anxiety caused by their siblings on their academic performance is negative and insignificant in mathematics ($\beta = -0.246$; $p = 0.358$) and French ($\beta = -0.149$; $p = 0.582$).

- Anxiety among hearing girls attributable to their siblings and academic performance

Table 9. Sibling anxiety and academic performance in hearing girls.

Academic performance	Hearing girls distressed by their brothers or sisters		R^2
	β	p	
In Mathematics	-0.299	0.162	0.083
In French	-0.158	0.448	0.025

Source. Survey data (2024).

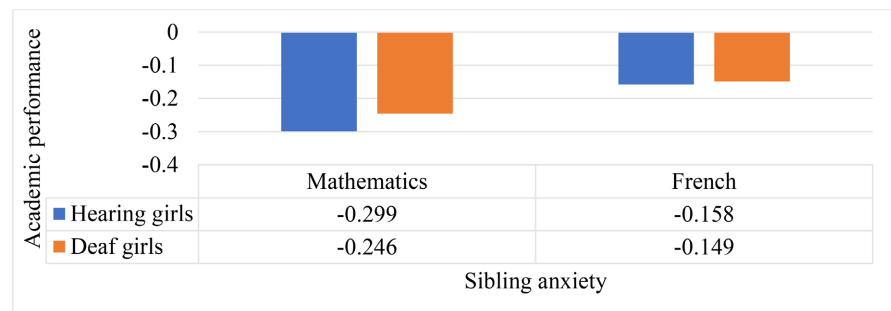
In mathematics, this variable explains 8.3% of the variability in the academic performance of hearing girls ($F = 2.090$; $p = 0.162$), with a negative and insignificant contribution ($\beta = -0.299$; $p = 0.162$). In French, the effect is even weaker:

only 2.5% of the variance in results is attributable to this form of anxiety ($F = 0.596$; $p = 0.448$), which contributes negatively but not statistically significantly to academic performance in this subject ($\beta = -0.158$; $p = 0.448$). **Table 9** below highlights the effect indicators of the relationship between sibling anxiety and academic performance.

The anxiety felt by hearing girls toward their brothers or sisters appears to be statistically insignificant. It does not significantly predict their academic performance in mathematics ($\beta = -0.299$; $p = 0.162$) or French ($\beta = -0.158$; $p = 0.448$).

- Comparative performance of deaf and hearing girls who feel anxious about their siblings

The following **Figure 3** illustrates the comparative academic performance of deaf and hearing girls based on the effect of the anxiety felt by learners caused by their brothers or sisters.



Source. Survey data (2024)

Figure 3. Academic performance of deaf and hearing girls who feel anxious about their siblings.

Anxiety caused by brothers or sisters is not a significant predictor of academic performance in either deaf or hearing girls. Among deaf girls, it has no significant effect on results in mathematics ($\beta = -0.246$; $p = 0.358$) or French ($\beta = -0.149$; $p = 0.582$). Similarly, among hearing girls, this form of anxiety does not significantly predict academic performance in mathematics ($\beta = -0.299$; $p = 0.162$) or French ($\beta = -0.158$; $p = 0.448$). Furthermore, hearing girls had higher regression coefficients in mathematics ($\beta = -0.299$; $p = 0.162$) and French ($\beta = -0.158$; $p = 0.448$) than deaf girls in mathematics ($\beta = -0.246$; $p = 0.358$) and French ($\beta = -0.149$; $p = 0.582$), suggesting a more pronounced disciplinary sensitivity among hearing girls, although not significant.

4. Discussion of Results

The study explored the link between sibling anxiety and academic performance.

4.1. Sibling Anxiety and Academic Performance: A Bioecological Perspective

The research results reveal a relative vulnerability of deaf students to sibling anx-

ity in both mathematics and French. While the effect of sibling anxiety is negative, it does not reach the conventional statistical significance threshold of 5%. However, a marginal significance trend is observed in French ($p = 0.067$ for deaf students and $p = 0.082$ for the overall sample).

In light of Bronfenbrenner's bioecological model (2000), the sibling relationship constitutes a central element of the child's *microsystem*. When this microsystem is characterized by anxiety or conflict, it disrupts the balance of proximal interactions necessary for development. This emotional instability within the immediate family circle appears to weigh more heavily on linguistic achievement, where communication is the primary vehicle for learning. Deaf children, due to their specific mode of communication, are particularly exposed: the lack of sign language proficiency among siblings (Lavigne, 2016) creates a rupture in the *mesosystem* (the family-school link), hindering the fluidity of exchanges that normally support schooling.

4.2. Vulnerability of Deaf Boys: Between Attachment and Scaffolding

As suggested by Kushalnagar et al. (2011), deaf boys are more vulnerable to emotional disorders related to family dynamics. Our data support this thesis through a statistical trend observed in both mathematics ($p = 0.092$) and French ($p = 0.093$) among deaf boys.

This result can be interpreted through Bowlby's attachment theory (1969): an anxious sibling relationship can weaken the child's "secure base," monopolizing cognitive resources at the expense of academic exploration. On a cognitive level, this aligns with Vygotsky's interactionist theory (1978). In a serene climate, siblings play the role of "tutors" or play partners who facilitate scaffolding (*étayage*). However, for the deaf boys in our study, sibling anxiety seems to act as a barrier to the co-construction of knowledge. Unlike hearing boys, who more easily mobilize regulatory resources, deaf boys face linguistic barriers that limit their ability to transform sibling conflict into a social learning experience, thereby slowing their progression within the Zone of Proximal Development (ZPD).

4.3. Resilience of Girls and Emotional Regulation

Anxiety caused by siblings is not a significant predictor of academic performance among girls ($p > 0.15$), whether deaf or hearing. This finding suggests a gender-specific form of resilience. In agreement with Kushalnagar et al. (2011), deaf girls appear to better utilize the emotional regulation levers provided by an inclusive environment.

From a Vygotskian perspective, girls may develop earlier compensatory strategies through language or social mediation, mitigating the impact of family microsystem disruptions on their performance. Their academic trajectory thus seems better protected from the emotional vagaries of sibling relationships, illustrating a dynamic of educational resilience (Vanistendael & Lecomte, 2002) where social

support and self-regulation neutralize the negative effects of anxiety.

5. Limitations of the Study

The primary limitation of this research lies in the restricted statistical power of our quantitative analyses. Although the overall sample consists of 111 participants, the correlation and comparison analyses focused specifically on the learner subgroup ($n = 77$). The segmentation of this group into four distinct subcategories—deaf boys, deaf girls, hearing boys, and hearing girls—mechanically reduced the size of each unit of analysis, leading to two major consequences:

- Risk of Type II Error (False Negatives): A reduced sample size decreases the probability of detecting a real effect. It is therefore possible that the influence of sibling anxiety on academic performance is indeed present in the parent population, but that our study lacked the necessary power to reach the conventional statistical significance threshold ($p < 0.05$).
- Limited Scope of Inferences: The generalizability of the quantitative results is constrained by this lack of power. Consequently, the observed trends should be interpreted as exploratory leads rather than definitive conclusions.

Furthermore, an important confounding variable must be noted: the socio-economic status of the families. As the participants come from “disadvantaged or modest” backgrounds, this factor may exert a bidirectional influence. On one hand, economic precariousness can exacerbate tensions within the sibling group (reactive anxiety); on the other hand, it often limits access to pedagogical support resources, directly impacting academic results regardless of sibling dynamics. While this socio-economic homogeneity reflects the field’s reality, it calls for caution when isolating the causes of academic performance.

These methodological constraints necessitate caution when extrapolating our data. Nevertheless, they pave the way for future research perspectives that would benefit from a larger and more geographically diverse sample across Burkina Faso. Such an expansion would allow for the confirmation of these initial observations regarding the intersectional dynamics between deafness, gender, and the family environment.

6. Conclusion

Sibling dynamics have been little explored by research, despite raising significant concerns (McHale, Updegraff, & Whiteman, 2012). Their impact on academic performance motivated our study, the objective of which was to examine the link between sibling anxiety and academic success in French and mathematics—two fundamental subjects in elementary school.

The study, conducted with 111 participants, indicates that sibling anxiety exerts a negative effect on academic performance. While this effect remains statistically non-significant at the conventional 5% threshold, the analysis of regression coefficients and probabilities reveals marginal significance trends (ranging between 0.05 and 0.10) that warrant particular attention. This is notably the case for deaf

boys in French ($p = 0.067$) and hearing boys in the same subject ($p = 0.098$). These results suggest that, although the effect is not generalized, a specific vulnerability emerges in linguistic learning when the sibling climate is anxiogenic.

The impact of sibling anxiety is more pronounced among deaf boys in mathematics (beta = -0.358 ; $p = 0.174$) and French (beta = -0.468 ; $p = 0.067$) than among their hearing peers (mathematics: beta = -0.220 , $p = 0.351$; French: beta = -0.381 , $p = 0.098$). Conversely, deaf girls appear better protected, benefiting from compensatory family support and superior emotional regulation capacity (Kushalnagar et al., 2011), which neutralizes the influence of sibling anxiety on their academic results ($p > 0.15$; e.g., in French: beta = -0.149 , $p = 0.582$).

Beyond disciplinary performance, this study invites a rethinking of academic support systems by integrating family dynamics. To translate these findings into action, we propose the following recommendations:

- Implementation of “Inclusive School Life Councils”: These discussion spaces, facilitated by school psychologists or specialized teachers, would allow for sibling conflicts to be explicitly addressed. For instance, a deaf student could express frustrations related to communication barriers with their siblings, enabling the school to act as a mediator and provide emotional support to reduce their cognitive load before learning tasks.
- Creation of “Inclusive Sibling” Resources: Schools could produce and distribute practical guides or workshops for parents. These resources would aim to promote supportive relationships—for example, by introducing hearing siblings to the basics of sign language or by sensitizing parents to the need for differentiated scaffolding (*étayage*), ensuring that the deaf child does not feel isolated or stigmatized within their own family niche (*microsystem*).

By paving the way for inclusive pedagogical approaches attentive to emotional realities, the educational system can better support the resilience of deaf students—particularly boys—in the face of pressures from their family environment.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

- Ainsworth, M. D. S. (1989). L'attachement mère-enfant. *Enfance*, 36, 7-18.
<https://doi.org/10.3406/enfan.1983.2798>
- Bourguignon, O. (2003). *Questions éthiques en psychologie*. Mardaga.
- Bowlby, J. (1969). *Attachment and Loss: Attachment (1ère et 2è édition respectivement)*. Basic Books.
- Bronfenbrenner, U. (2000). *Ecological Systems Theory*. American Psychological Association.
- Camdessus, B. (1998). *La fratrie méconnue: Liens du sang, liens du cœur*. ESF.
- Corman, L. (1964). *Le test du dessin de famille dans la pratique médico-pédagogique*. Presses Universitaires de France.
- Corroller, J. M. L. (2003). *Quand l'enfant de six ans dessine sa famille*. Mardaga.

- Furman, W., & Buhrmester, D. (1985). Children's Perceptions of the Personal Relationships in Their Social Networks. *Developmental Psychology, 21*, 1016-1024. <https://doi.org/10.1037/0012-1649.21.6.1016>
- Granier, A. L. (2020). La situation sociale des sourds au Burkina Faso: Pratiques sexuelles à risque et réseaux de mendicité. *Études africaines, 46*, 585-605.
- Guralnick, M. J. (2002). Family Patterns of Interaction, Intersubjectivity, and the Social Development of Young Children with Disabilities. *Journal of Early Intervention, 25*, 5-18.
- Kramer, L., & Conger, K. J. (2009). What We Learn from Our Sisters and Brothers: For Better or for Worse. *New Directions for Child and Adolescent Development, 2009*, 1-12. <https://doi.org/10.1002/cd.253>
- Kushalnagar, P., Topolski, T. D., Schick, B., Edwards, T. C., Skalicky, A. M., & Patrick, D. L. (2011). Mode of Communication, Perceived Level of Understanding, and Perceived Quality of Life in Youth Who Are Deaf or Hard of Hearing. *Journal of Deaf Studies and Deaf Education, 16*, 512-523. <https://doi.org/10.1093/deafed/enr015>
- Laurin, J. C., Dupont, M. A., & Gagné, F. (2012). L'inclusion scolaire des élèves sourds et malentendants: Défis et conditions de réussite. *Revue canadienne de l'éducation, 35*, 45-68.
- Lavigne, C. (2016). Les parents entendants d'enfants sourds, les sourds, la langue des signes: Rencontre ou choc des cultures ? *La nouvelle revue de l'adaptation et de la scolarisation, 75*, 215-242. <https://doi.org/10.3917/nras.075.0215>
- McHale, S. M., Updegraff, K. A., & Whiteman, S. D. (2012). Sibling Relationships and Influences in Childhood and Adolescence. *Journal of Marriage and Family, 74*, 913-930. <https://doi.org/10.1111/j.1741-3737.2012.01011.x>
- Sarrazin-Auriol, C. (2010). *La scolarisation des élèves sourds en France: État des lieux et perspectives*. Ministère de l'Éducation nationale, Inspection générale de l'administration de l'éducation nationale et de la recherche (IGAENR).
- Troupel, O. (2017). Comment fonctionnent les relations fraternelles? *Spirale, 81*, 45-54. <https://doi.org/10.3917/spi.081.0045>
- Tshimbadi, K., Tshiswaka, M. J., Matanda, N. R. (2011). Prévalence des troubles de l'audition en milieu scolaire de Kinshasa. *Annales Africaines de Médecine, 4*, 697-701.
- Vanistendael, S., & Lecomte, J. (2002). *Le bonheur est toujours possible: Construire la résilience*. Bayard Éditions.
- Vygotsky, L. S. (1978). *Mind in Society: The Development of Higher Psychological Processes (Vol. 86)*. Harvard University Press.
- Weil-Barais, A. (2004). *Les apprentissages scolaires*. Bréal.
- Widlöcher, D. (1965). *Le dessin dans les maladies mentales*. Presses Universitaires de France.