



The Impact of the Student's Relationship with the School, Family, Professors, and the Community on One's Subjective Perception of the School

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Abstract

The present study aimed to investigate the impacts of external variables of school trajectories on the students' subjective perceptions of interpersonal relationships and sense of belonging in school, in addition to the expectations regarding education. To this end, we used the IAFREE-A questionnaire, which is based on the perspective of five related dimensions of school dropout risk [1]: students' relationship with the school (SSc), family (SF), school professionals (SP), community (SC), and students' relationship with themselves (SSt). Thus, a Structural Equation Modeling was used to investigate the influence of SSC, SF, SP, and SC on SSt variables, using a synthetic dataset generated through the Gaussian Copula technique, using a real dataset of 3,678 students from four states in Brazil. This data generation method estimates new responses based on the association between variables in the real dataset, reproducing its factorial structure, and was used in this study due to the General Law of Data Protection (LGPD), ensuring ethical compliance through the use of anonymized data. Nationwide data collection using real-world data is currently being conducted in Brazil. The explanatory model showed excellent results [$\chi^2(898) = 11459.827$; CFI = 0.983; TLI = 0.980; SRMR = 0.038; RMSEA = 0.034 (0.034–0.035)], with regression coefficients indicating a substantial contribution of the perception of school as a safe place to students' levels of interpersonal relationships ($B=0.82$, $p<.001$) and expectations regarding education ($B=0.59$, $p<.001$), indicating that the higher the perception of school as a safe place, the higher the levels of expectations regarding education and interpersonal relationships. Moreover, School management/organization was the strongest predictor of sense of belonging ($B = 0.91$, $p<.001$), indicating that an increase in School management and organization leads to an increase in the perception of belonging.

Keywords: School trajectories, Educational psychology, Risk of school dropout.

1. Introduction

School dropout and abandonment constitute a multifaceted phenomenon that transcends the mere interruption of formal educational trajectories, resulting from the intertwining of socioeconomic, cultural, and institutional variables that extend beyond purely individual and family circumstances. In most cases, dropout and abandonment represent the outcome of situations in which existing educational structures and support systems prove inadequate to meet the specific needs of students [2].

Defined by the non-renewal of enrollment in the subsequent educational stage, this phenomenon surpasses the strictly pedagogical domain, also constituting a serious public health issue with substantial economic impact [3],[4],[5],[6],[7]. The lack of formal qualifications, frequently resulting from dropout, predisposes individuals to unemployment, intensifying social inequalities and perpetuating cycles of vulnerability. Consequently, this scenario may contribute to rising rates of functional illiteracy and, in extreme cases, correlate with increased crime rates, as well as mental health problems such as elevated stress levels [5],[6],[7],[8],[9].

In response to this multidimensional challenge, it is worth highlighting the existence of the Relational Factors for the Risk of School Dropout Scale (*Instrumento de Avaliação dos Fatores Relacionais do risco de Evasão Escolar* — IAFREE), developed by Vasconcelos et al. [1] and adapted for the context of protecting school trajectories by Freires et al. [10]. The IAFREE is grounded in the theory of relational factors of school dropout risk, which together function as predictors of school dropout.



Among these relational factors, the instrument encompasses the relationships between students and the school, school staff, family, community, and among students themselves or their peers.

The Student–Student (SSt) relational dimension reveals that aspects related to students' educational expectations, their interpersonal relationships, and their sense of belonging to the school environment are equally important for protecting school trajectories. In this context, studies such as that of Martinelli, Muelle-Zuniga, and Alves [11] investigated students' perceptions of the learning environment, focusing on harmony, cooperation, participation, engagement, and teacher support. The findings indicate that students with higher academic performance held more positive perceptions of these aspects, suggesting a correlation with motivation and interest in learning.

In this regard, the factor "Interpersonal relationships and social skills" (SSt1) underscores that the interpersonal relationships established within the school environment are fundamental to the construction of positive educational experiences, fostering a climate of trust, self-acceptance, and cooperation that enhances motivation and interest in learning [12]. Conversely, the absence or fragility of these interpersonal bonds may significantly compromise students' attachment to the institution, negatively affecting motivation, socioemotional development, and educational continuity [13].

Furthermore, it is important to note that educational trajectories are shaped by how students perceive the expectations associated with their academic journey. The factor "Educational expectations and educational development" (SSt2) emphasizes that students form expectations regarding the outcomes of their own performance and the value they attribute to academic success. Accordingly, for schooling to be integrated as a meaningful part of students' life projects, it is essential that they believe in their own competencies to achieve positive outcomes [14]. Likewise, the way in which students perceive their academic future directly influences the formation of their expectations regarding their educational trajectory [15]. Thus, the greater the degree of confidence students place in their personal capacities, the greater the tendency to maintain high and consistent educational expectations, which in turn increases the likelihood of completing secondary education and pursuing higher education [16]. This indicates that each student's perception of their own expectations directly shapes the academic choices they make and the level of engagement they sustain with their studies.

Similarly, the factor "Belonging and identification" (SSt3) points to the notion that feeling integrated, recognized, and valued as part of a group constitutes an essential element in the construction of educational trajectories [13]. When students identify with, and are accepted and respected by, their peer group, affective and social bonds are strengthened, thereby fostering continuous engagement in school activities and contributing to the development of subjective well-being throughout the school career. This sense of belonging extends beyond its immediate effects on academic performance, playing a structuring role in the psychosocial dynamics that underpin the entire academic journey [17].

2. Methods

2.1 Participants

The sample was composed of 10,000 synthetic data, generated through a real sample of 3,678 students from four out of five regions of Brazil (except for the South region). The synthetic data was generated based on the resemblance to the real one, so the prevalence of groups listed in Table 1 reflects the real group concentration of the original data. Based on this, the majority of the sample was composed of women (50.82%), self-identified as brown (54.88%), from the center-west region of Brazil (44.35%), and from the middle point of the socioeconomic index (21.66%), that is, neither poor nor rich.

Table 1. Profile of the sample.

Sex	n	%	Race/Color	n	%
Male	4898	48.98	White	2168	21.68
Female	5082	50.82	Black	2062	20.62
Not informed	20	0.20	Brown	5488	54.88
			Other	282	2.82
Regions of Brazil	n	%	Socioeconomic index	n	%
Center-West	4435	44.35	I	196	1.96
Northeast	1368	13.68	II	1101	11.01
North	1625	16.25	III	1525	15.25



Southeast	2572	25.72	IV	2042	20.42
			V	2166	21.66
			VI	1592	15.92
			VII	1222	12.22
			VIII	156	1.56

2.2 Procedures

Data collection was aligned with the ethical statements for research with human beings, based on the Resolutions No. 466/2012 and No. 510/2026 of the National Health Council of Brazil, and the project was approved by the Research Ethics Committee with Human Beings from the Federal University of Alagoas in the process number 5,407,594. The scope of data collection reached four out of five regions of Brazil, being: North, Northeast, Center-West, and Southeast (except for the South region). During questionnaire administration, the Informed Consent Form (ICF) was available on the platform of data collection, and the Informed Assent Form (IAF) was shared with parents days before administration. Moreover, it is important to highlight that the data derived from the administration was used to generate the synthetic dataset of 10,000 samples used in this study.

2.3 Instruments

The final version of the Relational Factors for the Risk of School Dropout Scale - Alternative version (IAFREE-A) was used [10]. The IAFREE-A is an adaptation of the original scale, developed by Vasconcelos et al. [1], that was based on the evaluation of the risk of school dropout using students' relational factors, being: Student-School (SSc), Student-School professionals (SP), Student-Family (SF), Student-Community (SC), and Student-Student (SSt). The alternative version is aligned and oriented towards the concept of School Trajectory Protection. The original version of the instrument was based on two respondents: the students and the professors of the school, but in the revised version of the instrument, the target audience has changed to students only [18]. In addition, the alternative version maintains this characteristic, being administered with students only. Another important change relies on the scale length. While the original and revised versions had only 36 items, the alternative version is composed of 46 items.

Moreover, the IAFREE-A is based on a hierarchical factor structure, with five relational dimensions and two or three factors each, being: Infrastructure (SSc1); School as a safe space (SSc2); Discrimination (SSc3); School management and organization (SP1); Pedagogical quality (SP2); Teacher expectations (SP3); Parenting (SF1); Home support structure (SF2); Family interaction (SF3); Network interaction (SC1); Community relations (SC2); Interpersonal relationships and social skills (SSt1); Expectations regarding education/educational development (SSt2); Belonging/Identification (SSt3). Response categories vary from 1 to 4 in two settings: frequency (1 = "Never", 2 = "Sometimes", 3 = "Frequently" and 4 = "Always") and agreement (1 = "Strongly disagree", 2 = "Disagree", 3 = "Agree" and 4 = "Strongly agree"), and both are administered with pictorial scales, in addition to the number and label. The items of IAFREE-A have positive descriptions, and by that, they are reverse-scored after the data collection, with the exception of items Q5 and Q36, which already have negative descriptions. Due to the reversion, higher scores reflect higher vulnerability of the student in the relational factors or dimensions.

2.4 Data analysis

Initially, the synthetic data generation technique was used through the Gaussian Copula Machine Learning technique [19]. This is a synthetic data generation technique that represents real data by transforming each original variable into a uniform scale (through ranks or empirical distribution functions), then projecting these uniform variables into a latent space with a multivariate normal distribution. From the Gaussian correlation matrix, new normal latent vectors are simulated, which are transformed to the aforementioned uniform scale, and finally, are converted back to the marginal distributions of each variable, as originally. Moreover, the resemblance of the synthetic data was investigated through the analysis of the Hellinger distance, which ranges from 0 to 1 and indicates how close the two distributions are, with values closer to 0 indicating similarity, while values closer to 1 indicate substantial differences between the real and synthetic data [20]. For the study, values up to 0.20 were used as the cutoff point for the Hellinger distance.



In addition, further investigation was conducted to evaluate the resemblance of the synthetic and real data, considering psychometric analyses, due to the nature of the data. Based on this, Confirmatory Factor Analysis (CFA) models were used for the IAFREE factors, in order to evaluate the factorial invariance of the two samples. The Weighted Least Squares Mean and Variance Adjusted (WLSMV) estimator was used, due to the ordinal nature of the items [21]. Thus, to assess the fit of the CFA model, the following fit indicators were used: a) χ^2 : with significant results indicating perfect fit of the model; c) Comparative Fit Index (CFI) and Tucker Lewis Index (TLI): with results ≥ 0.90 indicating satisfactory model fit, and ≥ 0.95 indicating excellent model fit; Root Mean Square Error of Approximation (RMSEA): which presents adequate results when ≤ 0.08 , with the upper limit of the indicator not exceeding values of 0.10 [22]. Factor loadings were considered adequate when $\geq |0.40|$.

In addition, Multigroup Confirmatory Factor Analysis (MCFA) was also used to investigate the invariance of the instruments between real and synthetic data, that is, whether the factorial structure of the instruments in the real data is also reproduced with the synthetic data. The hypothesis tested is that, since the synthetic data generation technique used in this study is based on the correlation between variables (as are clustering techniques such as factor analysis), the factor structure of the instrument is expected not to change between the real and synthetic data. To analyze this hypothesis, the following models were used: a) configural invariance: which investigates whether the factor structure remains the same for the real and synthetic data (number of latent factors, items explained by each latent factor, etc.); b) metric invariance: which aims to investigate the equivalence of factor loadings between groups, that is, it assesses whether the magnitude of the relationships between the items and their respective latent factors is statistically similar in the real and synthetic data; c) scalar invariance: which investigates whether the scores are related to the level of latent trait in the real and synthetic data [23],[24]. For the assessment of factorial invariance in these models, the criteria used were $\Delta CFI < 0.01$ and $\Delta RMSEA < 0.015$ [25]. Finally, a Structural Equation Model was tested to estimate the impact of the factors of Student-School (SSc), Student-School professionals (SP), Student-Family (SF), and Student-Community (SC) on the Student-Student (SSt) factors. For this purpose, the same estimator and fit indices were used.

3. Results

Initially, the differences between real and synthetic data, generated using the Gaussian Copula technique, were investigated using Hellinger distance indicators. The results showed that the data presented adequate similarity, with a mean Hellinger distance of 0.060 (SD = 0.008), indicating that the synthetic data adequately represent the real data. Furthermore, MCFA was used to investigate the factorial invariance of the measure, considering both real and synthetic data. The results of the multi-group factorial models indicated that there was no factorial invariance when comparing the real and synthetic datasets, indicating that the factorial structure of the instrument did not vary according to the generation of the synthetic data (Table 2).

Table 2. Fit indices for factorial invariance and predictive model.

	$\chi^2(df)$	CFI	ΔCFI	TLI	RMSEA	$\Delta RMSEA$	SRMR
Configural	42972.685 (1930)	.962		.960	.056		.060
Metric	43574.949 (1971)	.962	.000	.960	.056	.000	.060
Scalar	43409.864 (2017)	.962	.000	.961	.055	-.001	.060
Predictive	3968.681 (898)	.985		.983	.031		.036

Furthermore, the analysis of the predictors of the student-to-student dimension factors indicated that, for the interpersonal relationships factor, the impact of the variables of discrimination, perception of the school as a safe space ($\beta = .82, p < .001$) and discrimination ($\beta = .14, p < .001$), stemming from the student's relational dimension with the school, was observed, in addition to the impact of support at home ($\beta = .24, p = .035$), stemming from the student's relational dimension with the family. Furthermore, the impact of teachers' expectations ($\beta = -.26, p < .001$) and school organization ($\beta = .57, p = .012$) on students' interpersonal relationships was also observed, both derived from the student's relational dimension with school professionals. The results indicate that the greater the perception of the school as a safe space, school organization, and support at home, the better the student's interpersonal



relationships will be. Furthermore, it can also be observed that the increase in experiences of discrimination can subtly increase interpersonal relationships, while teachers' expectations tend to negatively impact interpersonal relationships. The strongest predictor of the interpersonal relationships variable was the perception of the school as a safe space, and the model explained 81.5% of the variance of this variable.

As for the belonging factor, the impact of infrastructure ($\beta = -.17, p = .033$), family involvement ($\beta = -.34, p = .012$), associations with the school system ($\beta = .57, p = .003$), pedagogical quality ($\beta = -.40, p = .037$), and school organization and management ($\beta = .91, p = .004$) was observed. It was observed that increased engagement with the network and school organization and management impact the increase in students' sense of belonging, while increased family involvement, pedagogical quality, and a better perception of infrastructure were associated with a decrease in the sense of belonging, with the latter relationship being the weakest. The most important predictor of the sense of belonging was school management and organization, and the model explained 49.0% of the variance in the belonging variable.

Finally, for the factor of expectations regarding education, it was observed that the impact of the perception of the school as a safe space ($\beta = .59, p < .001$), school infrastructure ($\beta = -.25, p < .001$), family involvement ($\beta = .26, p < .001$), teachers' expectations ($\beta = -.20, p < .001$), and school management and organization ($\beta = .64, p = .005$) was significant. Therefore, it is possible to infer that the increased perception of the school as a safe space, family involvement, and school organization impact the increase in expectations regarding education. On the other hand, it was also observed that the higher the teacher expectations and school infrastructure, the lower the expectations regarding education. The most important predictor of expectations regarding education was school management and organization, and the model explained 72.2% of the variance in the expectations regarding education variable.

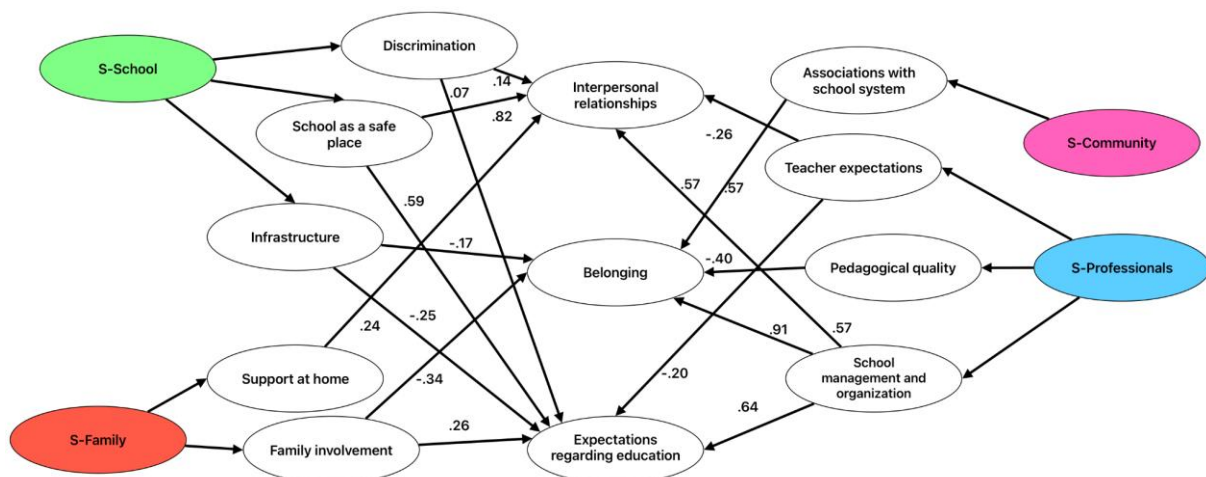


Fig. 1. Structural model for the predictors of Student-Student dimension.

4. Discussion

The aim of this study was to investigate the predictors of the subjective factor among the relational factors of school dropout risk, from the perspective of protecting school trajectories, considering as potential predictors the relational factors between the student and the school, school staff, family, and community. To this end, a synthetic database was employed, generated from a sample of 3,678 students across four regions of Brazil. Initial results indicated that there was no factorial structure invariance when comparing the real and synthetic datasets. In addition, Hellinger distance indicators yielded low values, suggesting that the synthetic data faithfully represented the real data, a result consistent with findings from recent studies supporting the utility of synthetic data in health-related settings as well as in capturing intricate behavioral dynamics [26],[27].

Regarding the predictive analyses, the structural model explained 81.5% of the variance in the interpersonal relationships variable, with the perception of school as a safe space being the strongest predictor. A modest positive impact of discrimination on interpersonal relationships was also observed. The hypothesized mechanism underlying the predictive impact of discrimination was the formation of



groups through homophily, in which individuals tend to interact more frequently with others from the same group, as suggested by Kogachi and Graham [28], who found that adolescents from racial minority groups showed stronger friendships with members of the same group. Accordingly, this hypothesis may be extended to the findings of the present study through the interpretation that groups of students who experience discrimination at school tend to develop stronger relational bonds among themselves, which would explain the small yet positive impact observed in the structural model analysis.

With respect to the sense of school belonging factor, the model explained 49% of the outcome variance, and the strongest predictor was school management and organization. Conversely, higher levels of family involvement were associated with lower sense of school belonging, which may be accounted for by the helicopter parenting hypothesis, in which parents display intrusive, controlling behaviors toward their children [29], thereby reducing peer attachment [29] and increasing negative affect [30].

Furthermore, for the educational expectations variable, the structural model explained 72.2% of the outcome variance, with school management and organization again emerging as the strongest predictor. The study by Johnson, Pas and Bradshaw [31] found a positive association between emotional and service support, rules and consequences, and adolescents' future orientations in a sample of 27,698 students across 12 countries. This finding supports the view that clear communication of rules and administrative support are directly associated with students' expectations regarding their own educational trajectories.

Based on these findings, it was possible to observe that the relational factors of school dropout risk are not only potentially associated, as the underlying theory proposes [1], but may also act as predictors of one another. The results revealed substantial predictive impacts, particularly for interpersonal relationships (81.5%) and educational expectations (72.2%), indicating an important relationship among the variables examined in this manuscript. Among the study's limitations, the absence of longitudinal analyses or analyses distinguishing different stages of school development is noteworthy, as these would allow for the investigation of relationships among variables over time and across students' educational trajectories. Furthermore, it should be noted that the sample used as the basis for generating the synthetic data was not representative of the Brazilian population, which limits the generalizability of the findings. Finally, it is considered that the findings of this study may contribute to the interpretation of how various school contextual variables can impact students' subjective experiences, as well as their peer relationships within the school environment.

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