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Predicting High School Dropout Risk from Academic Engagement, Attendance, Self-Efficacy, and Family Support Using TabNet

Daniel. Farrugia¹, Camille. Brossard^{2*}, Rodrigo. Villagra³

¹ Department of Psychology, University of Malta, Msida, Malta

² Department of Cognitive Psychology, Sorbonne University, Paris, France

³ Department of Psychology, National University of Asunción, San Lorenzo, Paraguay

* Corresponding author email address: camille.brossard@sorbonne-universite.fr

E d i t o r	R e v i e w e r s
Ahmad Amani [✉] Associate Professor, Counseling Department, University of Kurdistan, Sanandaj, Iran a.amani@uok.ac.ir	Reviewer 1: Mohammad Salehi [✉] Associate Professor, Department of Educational Management, Sari Branch, Islamic Azad University, Sari, Iran. Email: drsalehi@iausari.ac.ir Reviewer 2: Kamdin Parsakia [✉] Department of Psychology and Counseling, KMAN Research Institute, Richmond Hill, Ontario, Canada. Email: kamdinarsakia@kmanresce.ca

1. Round 1

1.1. Reviewer 1

Reviewer:

The Study Design and Participants section describes the investigation as a “prospective longitudinal predictive design,” but the temporal structure requires greater precision. The authors should specify the exact baseline assessment dates, the beginning and end of the attendance-recording window, the date on which predictor extraction was frozen, and the final date used to determine dropout status. It is essential to demonstrate that every predictor preceded the outcome and that no attendance information recorded after a student’s effective withdrawal entered the model. Without a clearly defined prediction index date and observation horizon, temporal leakage cannot be excluded.

The participant recruitment paragraph reports that “a total of 1,326 students were invited,” 1,279 consented, and 1,248 were included. The manuscript should provide a complete participant-flow account explaining the status of all excluded students. In particular, the reasons for nonparticipation, unmatched records, and excessive missingness should be disaggregated, and the authors should compare included and excluded students on available demographic or administrative characteristics. Such an analysis is necessary to evaluate selection bias, especially because students at the greatest risk of dropout may also be less likely to consent, complete questionnaires, or possess complete administrative records.

The sampling description states that 12 public lycées were selected from four French regions “to provide variation in geographical location, urbanization, socioeconomic conditions, and school characteristics.” The procedure appears purposive rather than probability-based, but this is not explicitly acknowledged. The authors should describe how schools were approached, how many declined participation, the criteria used to select participating institutions, and whether schools differed in size, pathway composition, deprivation level, or dropout prevalence. The limits that nonrandom school recruitment places on national generalizability should also be stated clearly.

The operational definition of dropout requires further justification. The manuscript classifies a student as having dropped out when the student “discontinued attendance before completing the expected qualification and was not enrolled in another recognized general, technological, vocational, or apprenticeship program by the follow-up date.” The authors should explain how temporary interruption, prolonged medically justified absence, delayed transfer, emigration, homeschooling, institutional exclusion, and administrative loss to follow-up were handled. A sensitivity analysis using alternative dropout definitions would strengthen confidence that the findings are not dependent on one administrative classification rule.

The Data Collection Tools section refers to “a French-language 18-item School Engagement Scale,” but the original instrument, adaptation procedure, and psychometric basis are not identified. The authors should provide the scale’s full name, original developers, evidence supporting its three-factor structure, translation and back-translation procedures if applicable, and prior validation in French adolescents. Reporting Cronbach’s alpha alone is insufficient. Confirmatory factor analysis, composite reliability, and evidence of measurement invariance across gender, grade level, and educational pathway should be considered because these groups are compared and evaluated in subgroup analyses.

The model-development procedure reports that Bayesian optimization was conducted using the training and validation datasets, but the search design is insufficiently reproducible. The authors should specify the optimization library, acquisition function, number of trials, parameter distributions, optimization objective, random seed, and whether repeated runs were conducted. It should also be clarified whether the validation set was repeatedly queried during hyperparameter tuning and threshold selection. Extensive tuning on a single validation set can produce optimistic performance, and nested grouped cross-validation would better separate model selection from performance estimation.

Authors uploaded the revised manuscript.

1.2. Reviewer 2

Reviewer:

The manuscript reports an overall academic engagement score together with behavioral, emotional, and cognitive subscale scores, and all four were entered into the TabNet model. This creates substantial predictor redundancy because the overall score is mathematically derived from the same items as the subscale scores. The authors should quantify multicollinearity and explain why both aggregate and component scores were retained. A sensitivity analysis comparing models that use only the three subscales, only the overall score, and both representations would determine whether the reported performance or feature-importance rankings are artificially influenced by duplicated information.

In the attendance-measurement paragraph, overall attendance rate, excused absence rate, and unexcused absence rate appear to be mathematically interdependent. If attendance equals one minus total absence, including all three indicators may encode nearly duplicate information and may distort importance estimates. The authors should present the exact formulas used, confirm whether partial-day absence was included, explain how overlapping categories were avoided, and report correlations among attendance variables. A reduced-feature sensitivity model should be estimated to assess whether TabNet performance remains stable after removing deterministic or near-deterministic redundancy.

The description of academic self-efficacy states that a “French-language 10-item Academic Self-Efficacy Scale” was used, but the source instrument and its construct boundaries are unclear. The authors should distinguish academic self-efficacy from general self-efficacy, academic competence, self-regulated learning efficacy, and academic self-concept. The scale’s scoring, factor structure, criterion validity, and previous use among secondary-school students should be reported. Because self-efficacy

is a central predictor, stronger psychometric documentation is necessary to support the interpretation of its importance within the model.

The manuscript uses the family subscale of the Multidimensional Scale of Perceived Social Support and interprets it as “family support” relevant to dropout prevention. The authors should acknowledge that this instrument primarily assesses perceived emotional and general support and may not capture school-specific parental involvement, educational monitoring, communication with teachers, financial support, or homework assistance. The construct should therefore be labeled consistently as perceived family support rather than broad family support, and the Discussion should avoid implying that the measure represents all family processes relevant to school completion.

The missing-data procedure requires more rigorous reporting. The manuscript states that continuous variables were median-imputed and missingness indicators were created, but it does not report missingness separately by variable, outcome group, school, or dataset partition. The authors should test whether missingness was associated with dropout and describe whether questionnaire scale scores were calculated before or after dataset-level imputation. Multiple imputation or a model-based missing-data sensitivity analysis should be considered, because simple median imputation may attenuate variance and alter nonlinear associations, particularly in a relatively small minority-outcome sample.

The school-level partition is an important strength, but the allocation of nine schools to development and three schools to testing requires additional explanation. The manuscript should state whether schools were randomly assigned, manually balanced, or selected according to region, pathway composition, school size, or dropout prevalence. It should also report the number of students and dropout cases in each school. With only three test schools and 28 dropout events, the reported test performance may be sensitive to the particular institutions selected. Repeated grouped cross-validation or leave-one-school-out validation would provide a more stable estimate of between-school generalizability.

Authors uploaded the revised manuscript.

2. Revised

Editor’s decision after revisions: Accepted.

Editor in Chief’s decision: Accepted.