

# The Hidden Mathematical Difficulties among Academically High-Achieving Students: A Mixed-Methods (Quantitative–Qualitative) Study in Secondary Schools in the City of Oran

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## Abstract

**Purpose:** This study aims to examine hidden mathematical difficulties among academically high-achieving secondary-school students in Oran, Algeria — that is, performance-related and affective difficulties (mathematical reasoning, procedural problem-solving, mathematics anxiety, and performance under time pressure) that may remain masked by high overall academic averages.

**Design:** The study adopts a convergent mixed-methods design integrating quantitative and qualitative strands. The planned sample comprises 300 academically high-achieving students (stratified random sampling), alongside a purposive sample of 80 mathematics teachers and 20 school and vocational guidance counsellors. Data collection instruments include a researcher-developed questionnaire informed by the literature and the Abbreviated Math Anxiety Scale, a companion questionnaire for educators and guidance counsellors, and semi-structured interviews with subsamples of students and teachers. Quantitative data are to be analyzed using descriptive statistics, group comparisons, Pearson correlations, regression analysis, and internal-consistency estimates; qualitative interviews are to be analyzed through reflexive thematic analysis.

**Findings:** As a study protocol, no empirical findings — quantitative or qualitative — are reported. Interview data were not collected and cannot be generated through simulation; a full report will require actual thematic analysis integrated with quantitative results. The manuscript's numerical examples are simulated for illustrative purposes only: they show, for instance, how mathematics anxiety and time-pressure performance might be reported as elevated relative to procedural problem-solving, and how group comparisons or regression estimates would be

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presented. These simulated patterns are not empirical results and must not be interpreted as such.

**Research implications:** The proposed framework offers a methodological approach for identifying difficulties that standard achievement measures may conceal, with potential relevance for research on giftedness, mathematics anxiety, and the reasoning-versus-performance gap in high-achieving populations.

**Practical implications:** Findings, once collected, are expected to inform early-identification practices for teachers and guidance counsellors, supporting differentiated pedagogical and counselling responses for students whose difficulties are otherwise obscured by strong averages.

**Originality/value:** The study addresses an underexplored population — high achievers rather than low performers — and proposes a convergent mixed-methods protocol combining validated psychometric tools (AMAS) with context-specific instruments tailored to the Algerian secondary-education setting.

**Keywords:** hidden mathematical difficulties; high academic achievement; mathematics anxiety; mathematical reasoning; mixed methods; secondary education

### **Introduction:**

High academic achievement in mathematics is often treated as an indicator of a sound educational trajectory. Yet strong overall achievement can coexist with subtle, domain-specific difficulties that remain invisible in aggregate grades — difficulties in abstract mathematical reasoning, in grasping a problem's underlying structure, in applying knowledge to unfamiliar contexts, or in sustaining performance under evaluative pressure. This study uses "hidden mathematical difficulties" as an operational descriptor, not a diagnostic category: performance-related and affective difficulties that may be masked by strong overall academic attainment. The issue is especially salient in Algerian secondary education, where cumulative assessment and high-stakes examinations emphasize overall averages, potentially obscuring narrower areas of difficulty — particularly when students are reluctant to disclose mathematics-related anxiety given the expectations attached to being seen as high-achieving. While mathematics learning difficulties among low-achieving students are well studied, comparatively little is known about students who sustain high overall achievement while experiencing specific mathematical difficulties. The related international literature on twice-exceptionality — where giftedness co-occurs with a recognized disability or learning difficulty (Al-Hroub & Whitebread, 2008; Assouline et al., 2010; Baum et al., 2017) — offers a useful conceptual lens, though the present study does not equate academic high achievement with giftedness nor diagnose twice-exceptionality. Against this background, the study investigates hidden mathematical difficulties among academically high-achieving secondary students in Oran through a convergent mixed-methods design, guided by the overarching question: *What are the manifestations of hidden mathematical difficulties among academically high-achieving students in secondary schools in Oran, and what factors are associated with these difficulties from the perspectives of students and their teachers?*

### **Objectives of the Study:**

- Identify the manifestations and levels of hidden mathematical difficulties — in reasoning, procedural problem-solving, mathematics anxiety, and performance under time pressure — among academically high-achieving secondary school students in Oran.
- Examine differences in these difficulties by gender, academic stream (Experimental Sciences or Mathematics), and grade level.
- Estimate the association between mathematics anxiety and the non-anxiety dimensions of hidden mathematical difficulty.
- Understand mathematics teachers' perceptions of the phenomenon and the strategies they use to identify and address it.
- Develop pedagogical and counselling recommendations to support earlier identification and more appropriate support within the Algerian school context.

**Importance of the Study:** Theoretically, the study addresses a relatively under-examined question in the Arab and Algerian literature: whether strong overall achievement can coexist with narrower mathematical and affective difficulties. It draws on the twice-exceptionality literature without equating its population with that construct, since twice-exceptionality ordinarily requires both giftedness and a documented disability, whereas high achievement here is operationalized through school grades; Baum et al.'s (2017) strength-based framework is used instead as a complementary lens for examining how strengths and support needs can coexist. Practically, the study aims to offer school counsellors and teachers an initial screening framework for identifying subtle mathematical difficulties among high-achieving students, and to generate context-specific evidence to inform pedagogical interventions for students whose strong averages may conceal genuine support needs.

**Methodology:** The study adopts a convergent mixed-methods design combining quantitative and qualitative strands, conducted among secondary schools in Oran, Algeria, targeting academically high-achieving students in the second and third years of secondary education (Experimental Sciences and Mathematics streams) during the 2025–2026 academic year. The quantitative strand draws on a stratified random sample of 300 high-achieving students and is designed to estimate levels of hidden mathematical difficulty and mathematics anxiety, test for group differences by gender, stream, and grade level, and examine the association between mathematics anxiety and the non-anxiety dimensions of difficulty. The qualitative strand draws on purposive samples of 80 mathematics teachers and 20 school and vocational guidance counsellors, together with semi-structured interviews with subsamples of students and teachers, to examine how students experience these difficulties and how teachers perceive and respond to them. The study is delimited to difficulties in reasoning, procedural problem-solving, mathematics anxiety, and performance under time pressure; clinically diagnosed specific learning disorders such as dyscalculia fall outside its scope.

## First: Operational Definitions

### *1Hidden Mathematical Difficulties*

For this study, hidden mathematical difficulties are operationally defined as performance-related and affective manifestations that interfere with optimal performance on selected mathematical tasks such as abstract reasoning, non-routine problem-solving, and performance under time pressure despite high overall academic achievement. They are operationalized through scores on the researcher-developed Hidden Mathematical Difficulties Questionnaire. The term is descriptive and does not constitute a clinical or educational diagnosis.

### *2Academic High Achievement*

Academic high achievement is operationally defined in this study as an overall term or annual average of at least 14/20. This cut-off is a study-specific inclusion criterion and should not be interpreted as a universal definition of giftedness or academic excellence.

### *3Mathematics Anxiety*

Mathematics anxiety is defined as an affective response characterized by tension, worry, fear, or avoidance in situations that require engagement with mathematics. In this study, it is assessed through the mathematics-anxiety dimension of the questionnaire, informed by the Abbreviated Math Anxiety Scale (Hopko et al., 2003).

## Second: Theoretical Framework and Literature Review

### 1 Mathematics Learning Difficulties

Al-Zayat (1998) conceptualized mathematics learning difficulties as disturbances affecting one or more domains, including arithmetic comprehension, numerical and mathematical reasoning, the understanding and use of mathematical concepts and facts, and the performance of arithmetic and mathematical operations. Hafez (2000) similarly discussed learning difficulties in relation to basic academic processes and remedial teaching, including the consequences of persistent weaknesses in foundational arithmetic skills.

Ibrahim (2008) described difficulties that may arise in mathematical learning and instruction, including problems in understanding mathematical symbols, carrying out procedures accurately, organizing solution steps, and solving word problems. Contemporary descriptions likewise emphasize that mathematical difficulties can be heterogeneous: students may show weaknesses in some domains while performing adequately or strongly in others (EBSCO Research Starters, n.d.).

Traditional discussions of mathematics learning difficulties have often focused on low achievement. This focus may make less visible the experiences of students who compensate successfully in aggregate grades yet still encounter specific difficulties with reasoning, procedures, or affect. The present study addresses this narrower problem without equating hidden mathematical difficulty with a formal learning disorder.

### 2 Related Literature on Twice-Exceptionality

The term twice-exceptional (2e) generally refers to students who show giftedness or high ability while also meeting criteria for a disability or specific learning difficulty (Assouline et al., 2010; Baum et al., 2017). The concept is relevant to the present study because it demonstrates how strengths and difficulties can mask one another. However, the present sample is defined by school achievement rather than by formal identification of giftedness, and participants are not required to have a diagnosed learning disability. Hence, twice-exceptionality is treated as a related framework rather than as a diagnostic label for the study population.

Al-Hroub and Whitebread (2008) reported variability in teachers' ability to nominate mathematically gifted pupils with specific learning difficulties in Jordan, highlighting the risk that visible strengths may interfere with recognition of support needs. Al-Hroub (2010a) further examined perceptual skills and Arabic literacy patterns among mathematically gifted pupils with specific learning difficulties, while Al-Hroub (2010b) reported on programming that combined multisensory and enrichment approaches for mathematically gifted pupils with learning difficulties.

Budínová (2024) presented two qualitative case studies illustrating the risks of identifying mathematically gifted pupils, including a pupil with dyslexia and another with an extremely high intelligence quotient. The study highlighted instances in which school support was insufficient and emphasized the importance of teacher preparation to recognize diverse profiles of mathematical giftedness and need.

### 3 Mathematics Anxiety and Performance Among High-Achieving Students

Mathematics anxiety refers to negative affective responses that may include tension, worry, fear, and avoidance in mathematical contexts. Such anxiety can occur even among students with strong mathematical ability or high academic achievement. The original Abbreviated Math Anxiety Scale, developed by Hopko et al. (2003), consists of 9 items and was designed to provide a brief, psychometrically supported measure of mathematics anxiety.

Zhou et al. (2026) investigated mathematical learning knowledge structures among mathematically gifted Grade 9 students in Nanning, China, and reported significant associations between aspects of mathematical learning knowledge and mathematics achievement. Their

findings highlight the importance of how students organize and regulate learning, not only the amount of mathematical knowledge they possess.

Related evidence from a high-achieving educational context also points to the role of academic stress. Helsper et al. (2025), in a qualitative study of gifted students in a high-achieving residential school, described stressors associated with demanding academic and social environments, as well as the coping strategies students used. Although that study did not focus specifically on mathematics anxiety, it supports the broader proposition that high achievement does not eliminate vulnerability to performance-related stress.

#### 4Mathematical Difficulties in the Algerian Context

Within the Algerian context, Ben Brika (2023) examined mathematics learning difficulties at the middle-school level and reported that many pupils perceived mathematics as difficult and experienced difficulties with problem-solving and the application of mathematical concepts. The study also emphasized instructional and motivational factors that may contribute to students' difficulties. These findings support the importance of examining mathematics difficulties locally, although they do not in themselves establish the existence of hidden difficulties among high-achieving secondary-school students.

The distinction is important for the present study: evidence that mathematics difficulties can occur across heterogeneous student profiles justifies investigating high-achieving students directly rather than inferring their experiences from research conducted with low-achieving or clinically identified groups.

#### 5Research Gap

The reviewed literature reveals three gaps relevant to the present study. First, much of the mathematics-specific twice-exceptionality research cited here was conducted in primary school settings in Jordan (Al-Hroub, 2010a, 2010b; Al-Hroub & Whitebread, 2008), which limits direct transferability to Algerian secondary education. Second, recent international studies have examined giftedness, stress, or mathematical learning processes in contexts that differ substantially from Algerian secondary schools (Budínová, 2024; Helsper et al., 2025; Zhou et al., 2026). Third, available Algerian research has generally examined mathematics learning difficulties without specifically focusing on students who maintain high overall academic averages (Ben Brika, 2023).

The present study is therefore designed to examine academically high-achieving secondary-school students in Oran through a convergent mixed-methods framework that combines quantitative assessment of mathematical difficulties and mathematics anxiety with qualitative exploration of students' experiences and teachers' perceptions.

#### Third: Method

##### 1Research Design

The planned study adopts a convergent mixed-methods design, also historically described as concurrent triangulation. Quantitative and qualitative data are intended to be collected during approximately the same phase, analysed separately, and then integrated during interpretation to examine convergence, complementarity, and divergence across the two strands (Creswell & Plano Clark, 2018). This design is appropriate because the study seeks both to estimate the distribution and correlates of hidden mathematical difficulties and to understand how those difficulties are experienced and interpreted in context.

The numerical results reported later in this manuscript are based on simulated data and are included solely to illustrate the proposed quantitative analysis plan. They do not constitute field evidence. No qualitative findings are presented because no empirical interview dataset was supplied for the present manuscript.

## 2Population and Planned Sample

### Study Population

The target population comprises academically high-achieving students, defined for this study as those with an overall average of at least 14/20, enrolled in the second or third year of secondary education in the Experimental Sciences or Mathematics stream in Oran during the 2025–2026 academic year. The educator population comprises mathematics teachers and school and vocational guidance counsellors working in the participating schools.

### Planned Student Sample

The planned student sample comprises 300 students selected through stratified random sampling, with stratification intended to ensure representation by gender, academic stream, and grade level. The sampling frame covers six secondary schools located in different areas of Oran city centre, Es Sénia, Bir El Djir, Medina Jdida, Hai Es-Sabah, and Sidi Chahmi to provide a degree of social and geographical diversity. The allocation shown in Table 1 is illustrative and should be replaced by the realised field sample after data collection.

Table (1) Illustrative Planned Distribution of the Student Sample

| <i>Variable</i>        | <i>Category</i>                    | <i>n</i> | <i>%</i> |
|------------------------|------------------------------------|----------|----------|
| <b>Gender</b>          | Male                               | 138      | 46.0     |
| <b>Gender</b>          | Female                             | 162      | 54.0     |
| <b>Grade level</b>     | Second year of secondary education | 162      | 54.0     |
| <b>Grade level</b>     | Third year of secondary education  | 138      | 46.0     |
| <b>Academic stream</b> | Experimental Sciences              | 171      | 57.0     |
| <b>Academic stream</b> | Mathematics                        | 129      | 43.0     |

**Note.** N = 300. These values are illustrative planning figures and are not empirical participant counts.

### Planned Educator and Guidance Counsellor Sample

A purposive sample of 100 education professionals is planned, comprising 80 mathematics teachers and 20 school and vocational guidance counsellors with at least 3 years of professional experience in secondary education. The experience criterion is intended to increase the likelihood that participants can provide informed accounts of the phenomenon under investigation.

## 3Data Collection Instruments

### Hidden Mathematical Difficulties Questionnaire

The researcher-developed student questionnaire comprises 40 items organized into four 10-item dimensions: (a) mathematical reasoning and non-routine problems, (b) procedural problem-solving and attention to detail, (c) mathematics anxiety, and (d) performance under time and examination pressure. Instrument development was informed by the literature on mathematics learning difficulties (Al-Zayat, 1998; Al-Hroub & Whitebread, 2008) and by the conceptual content of the Abbreviated Math Anxiety Scale (AMAS; Hopko et al., 2003). Because the original

AMAS contains 9 items, the 10-item mathematics-anxiety dimension in the present instrument should be treated as an adapted, researcher-developed subscale rather than the AMAS itself.

Items are scored on a five-point Likert-type scale ranging from 1 (never applies) to 5 (always applies), yielding total scores from 40 to 200. The provisional interpretive bands used in the simulation are low (40–93), moderate (94–146), and high (147–200). These cut-offs are heuristic and require empirical validation before they are used for substantive classification in field research.

#### Educator and Guidance Counsellor Perceptions Questionnaire

The available appendix contains 10 closed-ended items addressing recognition of hidden difficulties, response strategies, and institutional barriers, as well as two open-ended questions. The instrument is therefore described in the present manuscript as a 10-item closed-ended questionnaire plus two open-ended items. Any longer version intended for field use should be supplied in full, and its item count should be reported consistently across the manuscript and supplementary materials.

#### Semi-Structured Interview Guides

Two semi-structured interview guides were developed, one for students and one for mathematics teachers. The guides address experiences of difficulty, situations in which difficulties become salient, coping strategies, help-seeking, mathematics-test experiences, and perceived effects on academic self-image. The planned qualitative subsample comprises 20 students and 15 teachers, purposively selected to maximise variation in questionnaire profiles, including both relatively high and low mathematics-anxiety scores.

#### 4Validity and Reliability

For face and content validity, the questionnaire was reviewed by five university academics specialising in educational psychology and mathematics education, and revisions were made to the wording of selected items. Before substantive field interpretation, construct validity should be evaluated empirically. Exploratory factor analysis is an appropriate initial step, with factorability checks, extraction and rotation procedures, and factor-retention decisions reported transparently. Where feasible, subsequent confirmatory testing in an independent sample would strengthen the evidence for the proposed four-dimensional structure.

Internal consistency is planned to be evaluated for each subscale and the overall instrument. The simulated coefficients in Table 2 were computed solely to illustrate the calculation procedure and are not evidence of the reliability of the field instrument. For empirical reporting, internal-consistency estimates should be accompanied by appropriate uncertainty information and interpreted alongside evidence of dimensionality; Cronbach's alpha should not be treated as a stand-alone indicator of scale quality.

Table (2) Illustrative Internal-Consistency Coefficients From Simulated Data

| Dimension                  | Items | Cronbach's $\alpha$ |
|----------------------------|-------|---------------------|
| Mathematical reasoning     | 10    | .897                |
| Procedural problem-solving | 10    | .904                |
| Mathematics anxiety        | 10    | .932                |
| Performance under pressure | 10    | .927                |
| Overall instrument         | 40    | .896                |

**Note. N = 300 simulated cases. These coefficients are illustrative and must be recalculated using empirical field data.**

#### 5 Ethical and Data Collection Procedures

Before empirical data collection, approval should be obtained from the relevant institutional research ethics body, the Directorate of Education of Oran, and the participating schools. Students should provide informed assent or consent as appropriate, and parental or guardian consent should be obtained for minors in accordance with applicable ethical requirements. Participation should be voluntary, confidentiality should be protected, and data should be used only for the stated research purposes.

The student questionnaire is planned for group administration in classrooms, with the researcher available to clarify instructions without influencing responses. Semi-structured interviews are planned as individual sessions in a quiet setting within the school. Audio recording should occur only with explicit participant consent, followed by verbatim transcription and secure handling of recordings and transcripts.

#### Quantitative Analysis Plan

The planned quantitative analyses include frequencies and percentages for sample characteristics; means and standard deviations for each questionnaire dimension; independent-samples t tests for two-group comparisons; one-way analysis of variance (ANOVA) where a predictor contains more than two categories; Pearson's correlation coefficient to estimate the association between mathematics anxiety and a composite of the three non-anxiety dimensions; simple linear regression to examine the extent to which mathematics anxiety predicts that non-anxiety composite; and internal-consistency estimates for the instrument. Statistical assumptions, missing-data handling, outliers, confidence intervals, and effect sizes should be reported with the empirical analyses.

To avoid part-whole inflation, mathematics anxiety should not be correlated with an overall difficulty score that already contains the mathematics-anxiety items. The simulated analyses therefore use the mean of the three non-anxiety dimensions, mathematical reasoning, procedural problem-solving, and performance under pressure, as the outcome composite for correlation and regression.

#### Fourth: Qualitative Analysis Plan

Interview data are planned to be analysed using reflexive thematic analysis following Braun and Clarke's (2006) six-phase process: familiarisation with the data, initial coding, theme development, theme review, theme definition and naming, and production of the analytic account. Qualitative software such as NVivo may support data management, but interpretive decisions remain the researcher's responsibility. In the final mixed-methods interpretation, qualitative themes should be integrated explicitly with quantitative patterns rather than presented as a separate, unrelated strand.

#### 1 Illustrative Results from Simulated Data

The results in this section are based entirely on simulated data and are presented to demonstrate the planned statistical analyses. They are not empirical findings and cannot support substantive conclusions about students or teachers in Oran.

#### Simulated Student Sample

Table (3) Distribution of the Simulated Student Sample

| Variable        | Category                           | n   | %    |
|-----------------|------------------------------------|-----|------|
| Gender          | Male                               | 143 | 47.7 |
| Gender          | Female                             | 157 | 52.3 |
| Grade level     | Second year of secondary education | 159 | 53.0 |
| Grade level     | Third year of secondary education  | 141 | 47.0 |
| Academic stream | Experimental Sciences              | 170 | 56.7 |
| Academic stream | Mathematics                        | 130 | 43.3 |

**Note.** N = 300 simulated cases.

## 2Level of Hidden Mathematical Difficulties

Table 4 presents the simulated means and standard deviations for the four questionnaire dimensions and the overall mean score on the 1–5 response scale.

Table (4) *Descriptive Statistics for Hidden Mathematical Difficulty Dimensions in the Simulated Data*

| Dimension                       | M    | SD   | Illustrative level |
|---------------------------------|------|------|--------------------|
| Mathematical reasoning          | 3.28 | 0.60 | Moderate           |
| Procedural problem-solving      | 2.98 | 0.63 | Moderate           |
| Mathematics anxiety             | 3.41 | 0.75 | Moderate to high   |
| Performance under time pressure | 3.46 | 0.72 | Moderate to high   |
| Overall mean score              | 3.28 | 0.40 | Moderate           |

**Note.** N = 300 simulated cases. The qualitative labels are heuristic and are used only for illustration.

Within the simulation, performance under time pressure had the highest mean, followed by mathematics anxiety, whereas procedural problem-solving had the lowest mean. If a comparable pattern were observed in empirical field data, it would warrant examining whether affective and performance-pressure processes contribute to difficulties obscured by high overall academic achievement. Such an interpretation would nevertheless require confirmation from real data and from the qualitative strand.

### 3Gender Differences

A Welch independent-samples t-test was used in the simulation to compare overall hidden-difficulty scores between male and female students. The simulated female group had a higher mean ( $M = 3.36$ ,  $SD = 0.38$ ) than the simulated male group ( $M = 3.19$ ,  $SD = 0.40$ ),  $t \approx 3.74$ ,  $p < .001$ . Based on the rounded summary statistics, the standardized mean difference is approximately  $g = 0.44$ . This difference was deliberately introduced into the data-generation process and therefore has no empirical evidential value.

Table (5) *Illustrative Gender Comparison in the Simulated Data*

| Group  | N   | M    | SD   | T    | p      |
|--------|-----|------|------|------|--------|
| Male   | 143 | 3.19 | 0.40 |      |        |
| Female | 157 | 3.36 | 0.38 | 3.74 | < .001 |

**Note.** Welch's t test. Values are based on simulated data; the group difference was intentionally introduced for demonstration.

### 4Grade-Level and Academic-Stream Differences

In the simulated data, the overall score did not differ significantly between second-year students ( $M = 3.25$ ) and third-year students ( $M = 3.32$ ),  $F(1, 298) = 2.09$ ,  $p = .150$ . The difference between the Experimental Sciences stream ( $M = 3.32$ ) and the Mathematics stream ( $M = 3.24$ ) was also not statistically significant,  $F(1, 298) = 3.03$ ,  $p = .083$ . These simulated non-significant results illustrate the methodological importance of testing hypotheses rather than presuming that predicted group differences will be observed.

### 5Association Between Mathematics Anxiety and the Non-Anxiety Difficulty Composite

In the simulated data, mathematics anxiety was positively associated with the mean of the three non-anxiety dimensions: mathematical reasoning, procedural problem-solving, and performance under pressure ( $r = .343$ ,  $p < .001$ ). A simple linear regression using the same non-anxiety composite as the outcome yielded  $R^2 = .118$  and  $B = .178$ , indicating that mathematics anxiety accounted for approximately 11.8% of the simulated variance in that composite. Because these values come from simulated data, they illustrate the proposed analysis only and should not be interpreted as estimates of the corresponding relationship in the target population.

### 6Educator Questionnaire: Selected Simulated Responses

Table (6) *Illustrative Agreement Rates for Selected Educator Questionnaire Items*

| Statement                                                                                                            | Agree/Strongly agree (%) |
|----------------------------------------------------------------------------------------------------------------------|--------------------------|
| I have previously observed high-achieving students experiencing an unrecognized difficulty in mathematics.           | 71.0                     |
| I find it difficult to distinguish between insufficient effort and a genuine difficulty in a high-achieving student. | 54.0                     |
| I employ individualized or targeted strategies for this group.                                                       | 20.0                     |

|                                                                              |      |
|------------------------------------------------------------------------------|------|
| I believe that the current assessment system can conceal these difficulties. | 77.0 |
|------------------------------------------------------------------------------|------|

**Note.** N = 100 simulated cases. Agreement was defined as a response of 4 or 5 on a five-point scale.

The simulated pattern shows a lower proportion of respondents reporting the use of individualized strategies than reporting recognition of the phenomenon. If empirically reproduced, such a discrepancy could indicate a gap between awareness and the practical capacity to intervene. This interpretation cannot be made from the simulation alone.

#### Fifth: Qualitative Findings

No empirical qualitative findings are reported in this manuscript because interview data were not supplied and cannot be generated through statistical simulation. A complete mixed-methods report will require actual interviews, transparent thematic analysis, presentation of themes supported by participant data, and explicit integration of those findings with the quantitative results.

#### Sixth: Discussion

The simulated analyses illustrate how the planned quantitative component could be reported, but they do not establish substantive findings. In the simulation, mathematics anxiety and performance under time pressure were relatively elevated compared with procedural problem-solving. If a similar pattern emerged in empirical data, it would support closer examination of affective and performance-related processes among high-achieving students rather than assuming that all mathematical difficulty reflects weak procedural knowledge. Such an interpretation would be compatible with the literature showing that high ability and high achievement can coexist with stress, uneven performance profiles, or under-identified support needs (Al-Hroub & Whitebread, 2008; Baum et al., 2017; Helsper et al., 2025).

The simulated correlation between mathematics anxiety and the non-anxiety difficulty composite was moderate, and the corresponding regression accounted for approximately 12% of simulated variance. If replicated empirically, such a result would indicate that mathematics anxiety is relevant but insufficient as a single explanatory factor. Other candidate variables such as self-regulated learning, metacognitive knowledge, instructional support, and family expectations would warrant investigation. Zhou et al. (2026), for example, underscore the relevance of students' mathematical learning knowledge structures to achievement among mathematically gifted students.

The simulated group comparisons also illustrate an important reporting principle. A gender difference was intentionally built into the simulation, whereas grade-level and academic-stream differences were not statistically significant. In an empirical study, both statistically significant and non-significant results should be reported transparently, together with effect sizes and confidence intervals, rather than selectively interpreting only results that support hypotheses.

Finally, the simulated educator responses suggest how a potential gap between recognition and intervention could be examined. If field data showed that teachers often recognize hidden difficulties but rarely use differentiated strategies, this would have implications for professional development. Such an inference would require confirmation from questionnaire data and qualitative accounts from teachers and students.

### Conclusion and Recommendations

#### Key Findings:

- This study draws attention to an often-overlooked educational group: high-achieving students who conceal genuine mathematical difficulties behind a strong academic average, and who

deserve recognition and support precisely because their difficulties do not "cry out" for attention — apparent excellence should prompt greater educational vigilance, not less.

- As a research protocol, the numerical results presented are simulated rather than empirical; no descriptive statistic, inferential test, psychometric estimate, effect size, or confidence interval in the Results section can be generalized to actual students, teachers, guidance counsellors, schools, or regions until the field study is completed and the analyses recalculated from real data.
- The qualitative strand has not yet been implemented, so the mixed-methods claim remains provisional pending completion and integration of both strands; the operational constructs used — "academically high-achieving" (grade-based, not equivalent to formal giftedness or twice-exceptionality) and "hidden mathematical difficulties" (a study-specific construct requiring psychometric validation) — are likewise provisional pending empirical work.

### **Recommendations**

#### *Pedagogical:*

- Train mathematics teachers in early-identification practices that look beyond overall averages to specific indicators of reasoning, procedural skill, affect, and performance under time pressure.
- Diversify assessment formats — open-ended problems, projects, formative assessment — so performance is not inferred solely from time-limited exams.
- Include enrichment and non-routine reasoning activities in support provision for high-achieving students, adapted to individual profiles rather than assumed uniform strengths.

#### *Guidance and Psychological:*

- Strengthen school guidance counsellors' role in monitoring the psychological well-being of high-achieving students, including mathematics-related anxiety.
- Provide evidence-informed support for examination anxiety and adaptive coping strategies where student need is established.

#### *Institutional:*

- Complement cumulative averages with more specific indicators of mathematical reasoning, procedural accuracy, transfer to unfamiliar tasks, and performance under time pressure.
- Encourage further empirical research on under-identified mathematical difficulties among high-achieving students across Algerian and broader Maghreb educational contexts.

#### *Directions for Future Research:*

- Conduct longitudinal research tracking the development of hidden mathematical difficulties across the three years of secondary education.
- Extend the study to multiple Algerian provinces (e.g., Oran, Algiers, Constantine) to examine regional variation.
- Develop and experimentally evaluate a strength-based intervention for students whose hidden mathematical difficulties are confirmed through validated assessment.
- Validate the proposed questionnaire using appropriate exploratory and confirmatory psychometric methods and independent samples where feasible.

### **Declarations**

*Ethics Approval:* Not applicable to the present manuscript, which is based exclusively on previously published literature, simulated data, and instrument design, and did not involve human participants or animals. The planned field study — administration of the questionnaires and interviews to the actual student, teacher, and guidance-counsellor samples — will require separate ethics approval and informed consent procedures prior to data collection.

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## Appendix A

### **Hidden Mathematical Difficulties Questionnaire for Students**

Dear Student,

As part of a scientific study on hidden mathematical difficulties among academically high-achieving students, you are kindly requested to respond honestly to the following items. The information you provide will remain confidential and will be used solely for research purposes. Mark the response that best applies to you, where 1 = never applies, 2 = rarely, 3 = sometimes, 4 = often, and 5 = always.

Personal information: Gender: Male / Female - Grade level: \_\_\_\_\_ - Academic stream: \_\_\_\_\_ - Overall average for the most recent term: \_\_\_\_\_

#### **Dimension 1: Mathematical Reasoning and Non-Routine Problems**

1. I find it difficult to solve problems when I have not previously practised a similar type.
2. I feel confused when a problem requires me to connect more than one mathematical idea.
3. I need more time than my classmates to understand the formulation of a problem before beginning to solve it.
4. I prefer memorizing ready-made solution methods rather than attempting to derive a new method.
5. I have difficulty justifying the steps I followed in reaching a solution.
6. I feel lost when faced with geometry problems that require spatial visualisation.
7. I find it difficult to translate a word problem into a mathematical equation.
8. I hesitate considerably before choosing an appropriate method for solving a complex problem.
9. I feel that I understand the lesson but am unable to apply it to new problems.
10. I need additional help to understand the logical connections between the steps of a proof.

#### **Dimension 2: Procedural Problem-Solving and Attention to Detail**

11. I make simple calculation errors despite understanding the correct method.
12. I forget some of the solution steps when completing a lengthy exercise.
13. I sometimes confuse similar mathematical symbols or rules.
14. I need to review my answer several times to ensure that it is free from errors.
15. I find it difficult to organise the steps of my solution clearly on paper.
16. I sometimes rush through a solution and make errors that could have been avoided.
17. I have difficulty dealing with large numbers or complex fractions.
18. I sometimes misread the given information even when it is clear.
19. I find it difficult to verify the correctness of my final answer.
20. Completing routine exercises takes me longer than I expect.

#### **Dimension 3: Mathematics Anxiety**

21. I feel tense when I hear the words “mathematics test”.
22. My heart beats faster when I face a difficult mathematics problem in front of the teacher.
23. I avoid asking questions during mathematics lessons because I am afraid of being judged.
24. I feel anxious even when I am well prepared for a test.
25. I think a great deal about the possibility of failure before a mathematics test begins.
26. I feel that my performance in mathematics does not reflect my true abilities because of anxiety.
27. I avoid talking about my difficulties in mathematics even with people I trust.
28. I feel embarrassed if I make a mistake while solving a problem in front of my classmates.
29. My anxiety increases as the date of a mathematics examination approaches.
30. I sometimes experience a “mental blank” when faced with a difficult mathematics question even though I know the answer.

#### **Dimension 4: Performance Under Time and Examination Pressure**

31. I find it difficult to complete all examination questions within the allotted time.
32. I perform better on homework assignments than on time-limited tests.
33. I feel that time pressure prevents me from thinking clearly.

34. I need additional time to review my answers during examinations.
35. I feel panicked when I see that time is running out and I have not finished solving the questions.
36. My performance declines noticeably in unannounced tests.
37. I prefer problems that can be solved quickly to lengthy problems.
38. I feel that the speed at which my classmates solve problems increases my anxiety.
39. I avoid beginning with a difficult question because I am afraid of wasting time.
40. I feel that my examination result does not reflect my actual level of understanding of the subject.

## Appendix B

### **Educator and Guidance Counsellor Perceptions Questionnaire**

Personal information: Position: Mathematics teacher / Guidance counsellor - Years of experience: \_\_\_\_\_ - Secondary school: \_\_\_\_\_

1. I have previously observed academically high-achieving students who experience an unrecognised difficulty in mathematics.
2. I find it difficult to distinguish between insufficient effort and a genuine difficulty in a high-achieving student.
3. I believe that a high overall academic average may conceal specific difficulties in particular mathematical skills.
4. I employ individualised or targeted support strategies for high-achieving students who experience difficulties.
5. I believe that the current cumulative assessment system can conceal these difficulties rather than identify them.
6. I have received adequate training on twice-exceptionality (high ability/giftedness plus a learning difficulty or disability).
7. I encourage my high-achieving students to ask questions without fear of being judged.
8. I observe differences in the performance of some high-achieving students between homework exercises and time-limited tests.
9. I communicate with the guidance counsellor when I observe signs of high anxiety in a high-achieving student.
10. I believe that Algeria needs further research and professional development concerning this group of students.

### **Open-Ended Questions**

11. Describe a specific situation in which you observed a hidden difficulty in mathematics in an academically high-achieving student.
12. What measures do you consider necessary to improve the early identification of these difficulties in Algerian schools?

## Appendix C

### **Semi-Structured Interview Guide for Students**

- Tell me about your relationship with mathematics in general since the beginning of your educational journey.
- Have you ever encountered a situation in which you felt that your performance in mathematics did not reflect your overall academic level? Describe that situation.
- How do you respond when you encounter a difficult mathematics problem in front of your classmates or teacher?
- Have you ever hesitated to ask for help in mathematics despite needing it? Why?
- How would you describe your feelings before and during a mathematics test?

- What differences do you notice between your performance on homework assignments and on time-limited tests?
- If you could change one aspect of the way mathematics is taught or assessed, what would it be?

## **Appendix D**

### **Semi-Structured Interview Guide for Teachers**

- Based on your experience, have you encountered high-achieving students who experience a hidden difficulty in mathematics? Describe an example.
- How do you distinguish between a high-achieving student who is experiencing a genuine difficulty and one who simply needs to make greater effort?
- What strategies do you use to address such cases in the classroom?
- What institutional barriers (curriculum, assessment, class size, etc.) hinder the early identification of these difficulties?

What measures do you propose to improve support for this group of students in Algerian schools?