School Absences Among Fourth Grade Students and Their Correlates with Maslow's Hierarchy of Needs

BETI LAMEVA[1], ZHANETA CHONTEVA[2]
[1]National Examinations Centre
University American College Skopje
Blvd. Treta Makedonska Brigada no. 60
REPUBLIC OF NORTH MACEDONIA

[2]Department of Psychology
University American College Skopje
Blvd. Treta Makedonska Brigada no. 60
REPUBLIC OF NORTH MACEDONIA

Abstract: - Students from the Republic of North Macedonia consistently perform below the international average in mathematics and science, as evidenced by the 2023 *Trends in International Mathematics and Science Study* (TIMSS), which assessed 4,633 fourth graders. Notably, 24% of these students reported being absent from school once a week, nearly double the international average of 13%. Consistent with prior research, frequent absenteeism was associated with lower academic achievement. This study examined the relationships between student absenteeism and unmet needs based on Maslow's hierarchy of needs, focusing on physiological, safety, belongingness, and esteem needs. Spearman rank-order correlations indicated that higher absenteeism was significantly associated with increased reports of hunger (r = .08), tiredness (r = .17), bullying exposure (r = .20), lower sense of school belonging (r = –.11), and reduced confidence and interest in mathematics and science (r ranging from –.10 to –.20), all at $p < .001$. An ordinal logistic regression model revealed that tiredness (e.g., daily tiredness: $B = –0.40$, $p < .001$), bullying frequency (weekly bullying: $B = 0.51$, $p < .001$), lower sense of school belonging (some belonging vs. little: $B = –0.36$, $p < .001$), and lower confidence in mathematics and science significantly predicted higher absenteeism, while hunger and attitudes toward the subjects were not significant predictors. These findings highlight the importance of addressing students' holistic needs through a whole-school approach involving family, peers, and broader social contexts. The results have been shared with education policymakers to inform ongoing reforms in primary education curricula and student support systems.

Key-Words: - school absenteeism, hierarchy of needs, TIMSS 2023, ordinal logistic regression, whole-school approach

Received: June 9, 2024. Revised: March 19, 2025. Accepted: April 21, 2025. Published: August 4, 2025.

1 Introduction

The Republic of North Macedonia ranks among the countries with the highest rates of weekly school absences in the 2023 Trends in International Mathematics and Science Study (TIMSS) for fourth-grade students. Specifically, 24% of students in North Macedonia reported being absent from school at least once a week—nearly double the international average of 13%. Other countries with comparably high or higher rates of weekly absence include Armenia, Georgia, Jordan, Kuwait, Oman, Saudi Arabia, and Uzbekistan [1]. A similar pattern was observed in TIMSS 2019, when 20% of fourth-grade students in North Macedonia reported weekly absences, compared to the international average of 11% [2]. Frequent absenteeism among young learners has been increasingly linked to lower academic achievement, diminished school engagement, and greater risk of long-term educational disengagement [3], [4], [5].

Consistent school attendance provides critical opportunities for instructional time, peer interaction, and participation in structured learning environments, all of which contribute significantly to academic success [6]. TIMSS 2023 data reinforce this connection: students who reported being absent at least once a week scored significantly lower in both mathematics and science compared to peers with fewer absences [1]. In North Macedonia, frequently absent students had an average mathematics achievement score of 449, slightly below the international average of 451, while their average science score was substantially lower at 408, compared to the international average of 442.

Although student absenteeism is often associated with socioeconomic disadvantage, school climate, and home environment [5], [7], it may also reflect the extent to which students' psychological and emotional needs are unmet. To better understand the underlying drivers of frequent school absences, this study uses Maslow's hierarchy of needs [8], [9] as a guiding framework. Maslow theorized that human behavior is driven by a universal set of needs, which he initially organized into five levels: physiological, safety, love/belonging, esteem, and self-actualization. He later expanded the model to include cognitive and aesthetic needs, and eventually a sixth stage—self-transcendence—defined as the desire to connect to something beyond the self, such as meaning, purpose, or altruism [10], [11]. In Maslow's original model, needs are arranged hierarchically, meaning that lower-level needs must be at least partially satisfied before higher-level motivation becomes dominant. For example, physiological needs—such as hunger, sleep, and rest—must be met before individuals can focus on higher needs like learning or social connection [8]. In the context of TIMSS 2023, these needs are assessed through student reports of feeling tired or hungry upon arriving at school. Prior research shows that inadequate sleep and food insecurity impair cognitive functioning and concentration, which can negatively impact school performance [12], [13]. The second tier in Maslow's hierarchy consists of safety needs, including personal and emotional security. In the school context, students' perceptions of safety are often linked to experiences with bullying or harassment. Students who feel unsafe at school are more likely to exhibit anxiety, withdraw socially, and avoid attendance altogether [14], [15]. The present study uses data on the frequency of bullying to assess this domain. The third tier—love and belongingness—reflects students' desire for social connection, friendship, and inclusion. A strong sense of school belonging has been shown to enhance academic motivation, protect against emotional distress, and reduce the likelihood of absenteeism [16], [17]. TIMSS captures this through its Sense of School Belonging scale, which measures students' perceived connection to peers and adults at school. Esteem needs occupy the fourth level and refer to the individual's need for competence, confidence, respect, and recognition. In educational settings, this is often reflected in students' self-efficacy and academic self-concept—especially in core domains like mathematics and science. Students with low academic self-beliefs may feel less capable, resulting in avoidance behaviors such as disengagement or absenteeism [18], [19]. At the top of Maslow's hierarchy is self-actualization, described as the desire to realize one's full potential, pursue creativity, and find personal meaning in learning [9]. In the context of TIMSS 2023, this is represented through students' interest in mathematics and science. Research shows that when students perceive schoolwork as meaningful and aligned with their interests, they are more likely to be intrinsically

motivated and consistently attend school [20]. It is also worth noting that Maslow viewed the hierarchy not as rigidly linear but as fluid and responsive to individual circumstances. Students may strive for belonging or esteem even when basic needs are only partially met [9], [21]. This dynamic view of motivation suggests that interventions should be comprehensive and adaptable to students' varied and evolving needs.

Since fourth-grade students are at a pivotal stage of development—when they begin to form a sense of identity, apply logic to real-world experiences, and internalize feedback from adults and peers [22], [23]—supporting their holistic needs is essential. By applying Maslow's framework, this study seeks to better understand how unmet needs relate to absenteeism, and how schools might respond in ways that promote student well-being, academic engagement, and equitable learning outcomes.

2 Problem Formulation

Sample

The sample consists of 4,633 fourth grade students (International Standard Classification of Education Level 1) with the mean age of 9.5 years. The schools in North Macedonia were stratified by cross classifying the following characteristics: language of instruction (Macedonian, Albanian and mix) and school location (town, village and mix). 150 schools were eligible in the original sample and within-school student participation (weighted percentage) is 93%.

Instruments

For the purposes of this study, several items and scales from the TIMSS 2023 Student Questionnaire [24] were used:

Frequency of Student Absences: Students reported how often they were absent from school, selecting from the following options: "never or almost never," "once every two months," "once a month," "once every two weeks," or "once a week."

Sense of School Belonging Scale: This scale assessed students' feelings about school and their relationships with others at school. Based on their responses, students were classified as having a "high," "some," or "little" sense of belonging.

Student Bullying Scale: Students reported how frequently they experienced various types of bullying during the past school year. Based on their answers, students were categorized as being bullied "never or almost never," "about monthly," or "about weekly."

Students Confident in Mathematics Scale: This scale measured students' perceptions of their mathematical abilities. Students were classified as "very confident," "somewhat confident," or "not confident" in mathematics.

Students Confident in Science Scale: Similar to the mathematics scale, this assessed students' confidence in science, categorizing them as "very confident," "somewhat confident," or "not confident."

Students Like Learning Mathematics Scale: Students indicated their agreement with seven items about their attitudes toward studying mathematics. Based on their responses, they were categorized as "very much like," "somewhat like," or "do not like" learning mathematics.

Students Like Learning Science Scale: This scale measured students' attitudes toward studying science through seven items. Students were classified as "very much like," "somewhat like," or "do not like" learning science.

Students Arrive at School Hungry Item: Students reported the frequency of feeling hungry upon arrival at school, choosing from "every day," "almost every day," "sometimes," or "never."

Students Arrive at School Tired Item: Similarly, students reported how often they

felt tired upon arrival at school with the same response options as the hunger item.

Statistical techniques

TIMSS 2023 Questionnaire Scales were created using the Rasch partial credit model [25], [26] on data gained with the TIMSS 2023 Context Questionnaire Scales included in the TIMSS 2023 International Database. The Partial credit model (PCM) [26] like the Rasch model, considers only one parameter but unlike the Rasch model, which uses dichotomous data, it is suitable for analyzing polytomous items [26]. The PCM model describes the probability that a person will provide a certain type of response to a polytomous item, taking into account the person's trait level and the item's affectivity (or difficulty). The PCM model allows to estimate a set of thresholds, each of which represents the position on the continuum of latent traits where adjacent response categories are equally probable (e.g. on a Likert scale, adjacent response categories could be "very" and "very much", or "never" and "hardly ever"). It is assumed that there are as many thresholds as there are response categories minus 1 (k – 1). Each threshold represents the trait level that is necessary to choose a specific response category instead of the previous one. These thresholds are necessary to connect the person's trait level with the response category that this person should choose. In particular, the higher the person's trait level, the higher the probability that this person should choose a high response category [27].

Spearman's rank-order correlation coefficient (r□) was computed to assess relationships between student absenteeism and variables related to Maslow's Hierarchy of Needs, including the Sense of School Belonging scale, Student Bullying scale, Students Confident in Mathematics scale, Students Confident in Science scale, Students Like Learning Mathematics scale, Students Like Learning Science scale, as well as items measuring frequency of arriving at school hungry and tired. Spearman's correlation was chosen because many variables were measured on ordinal scales, rendering Pearson's r inappropriate.

To further explore predictors of absenteeism while controlling for other factors, an ordinal logistic regression analysis was conducted. Absenteeism frequency, measured on an ordinal scale, was the dependent variable. Predictor variables included tiredness, bullying frequency, sense of school belonging, confidence in mathematics and science, hunger, and attitudes toward learning these subjects. The regression model allowed examination of the unique contribution of each predictor to the likelihood of increased absenteeism.

3 Problem Solution

Results from the Correlational Analyses

Spearman rank-order correlations indicated that students who were more frequently absent from school tended to report coming to school hungry, $r_{\square}(3967) = .08$, $p < .001$, and tired, $r_{\square}(4317) = .17$, $p < .001$. Absenteeism was also positively associated with being bullied in person, via messaging, or on social media by other students during the school year, $r_{\square}(4120) = .20$, $p < .001$. Regarding the need for belonging, students who were more frequently absent tended to report a lower sense of school belonging, $r_{\square}(4142) = –.11$, $p < .001$. At the level of esteem and self-actualization needs, absenteeism was associated with lower confidence in mathematics, $r_{\square}(3967) = –.20$, $p < .001$, and science, $r_{\square}(3921) = –.20$, $p < .001$, as well as with lower interest in mathematics, $r_{\square}(4114) = –.10$, $p < .001$, and science, $r_{\square}(4003) = –.10$, $p < .001$.

Results from the Ordinal Logistic Regression

An ordinal logistic regression using the logit link function was conducted to examine the

effects of tiredness, hunger, school belonging, bullying, attitudes toward mathematics and science, and confidence in mathematics and science on students' self-reported school absenteeism. The model was statistically significant compared to the intercept-only model, $\chi^2(18) = 935.11$, $p < .001$, indicating that the predictors reliably distinguished between levels of absenteeism. However, the model explained a modest proportion of variance, as indicated by the pseudo R^2 values (Nagelkerke $R^2 = .080$, Cox & Snell $R^2 = .075$, McFadden $R^2 = .028$). Table 1 presents the results of the ordinal logistic regression analysis.

Tiredness

Tiredness was a significant predictor of absenteeism. Compared to students who reported never being tired (reference group):

- Students who reported being tired every day had significantly greater odds of absenteeism ($B = –0.40$, $SE = 0.06$, Wald = 42.58, $p < .001$, 95% CI [–0.52, –0.28]).
- Students who were tired almost every day also had greater odds of absenteeism ($B = –0.26$, $SE = 0.07$, $p < .001$, 95% CI [–0.39, –0.12]).
- Students who were sometimes tired had slightly higher odds ($B = –0.17$, $SE = 0.05$, $p = .001$, 95% CI [–0.27, –0.08]).

Hunger

Hunger did not significantly predict absenteeism. None of the hunger levels were statistically different from the reference category (all *ps* > .76).

Sense of School Belonging

Students with some sense of school belonging (vs. little) were significantly less likely to report frequent absenteeism ($B = –0.36$, $SE = 0.10$, Wald = 12.30, $p < .001$, 95% CI [–0.56, –0.16]). Students with a high sense of belonging (vs. little) did not differ significantly ($B = –0.10$, $SE = 0.10$, $p = .293$, 95% CI [–0.30, 0.09]).

Bullying

Experiencing bullying significantly predicted absenteeism. Compared to students who were never or almost never bullied:

- Students bullied about monthly had increased odds of absenteeism ($B = 0.23$, $SE = 0.05$, $p < .001$, 95% CI [0.13, 0.34]).
- Students bullied about weekly had even greater odds ($B = 0.51$, $SE = 0.05$, $p < .001$, 95% CI [0.42, 0.61]).

Attitudes Toward Mathematics

Liking mathematics was not significantly associated with absenteeism. Students who somewhat liked ($B = –0.01$, $SE = 0.07$, $p = .877$) or did not like mathematics ($B = –0.01$, $SE = 0.07$, $p = .840$) were not significantly different from those who liked it very much.

Confidence in Mathematics

Confidence in mathematics was a significant predictor of absenteeism. Compared to students who were very confident:

- Those who were somewhat confident had higher odds of absenteeism ($B = 0.14$, $SE = 0.04$, $p = .001$, 95% CI [0.06, 0.23]).
- Those who were not confident had substantially greater odds ($B = 0.54$, $SE = 0.05$, $p < .001$, 95% CI [0.44, 0.65]).

Attitudes Toward Science

Students who somewhat liked science were slightly less likely to be absent compared to those who liked it very much ($B = –0.14$, $SE = 0.07$, $p = .043$, 95% CI [–0.27, –0.004]). No significant difference was found for those who did not like science ($B = –0.01$, $SE = 0.07$, $p = .894$).

Confidence in Science

Confidence in science was also a significant predictor. Compared to students who were very confident:

- Those who were somewhat confident had greater odds of absenteeism ($B = 0.15$, $SE = 0.04$, $p = .001$, 95% CI [0.06, 0.23]).
- Those who were not confident had even higher odds ($B = 0.42$, $SE = 0.05$, $p < .001$, 95% CI [0.32, 0.51]).

Table 1
Ordinal Logistic Regression Predicting Absenteeism

Predictor	B	SE	Wald	df	*p*	95% CI
Tiredness						
Level 1 vs 4 (Never tired)	-0.40	0.06	42.58	1	< .001	[-0.52, -0.28]
Level 2 vs 4	-0.26	0.07	14.02	1	< .001	[-0.39, -0.12]
Level 3 vs 4	-0.17	0.05	12.08	1	.001	[-0.27, -0.08]
Hunger						
Level 1 vs 4	-0.01	0.06	0.03	1	.865	[-0.12, 0.10]
Level 2 vs 4	-0.02	0.06	0.09	1	.767	[-0.14, 0.10]
Level 3 vs 4	0.00	0.05	0.01	1	.934	[-0.09, 0.10]
Sense of School Belonging						
Some vs Little sense	-0.36	0.10	12.30	1	< .001	[-0.56, -0.16]
High vs Little sense	-0.10	0.10	1.11	1	.293	[-0.30, 0.09]
Bullying						
About monthly vs Never	0.23	0.05	19.92	1	< .001	[0.13, 0.34]
About weekly vs Never	0.51	0.05	110.84	1	< .001	[0.42, 0.61]
Liking Mathematics						
Somewhat vs Very Much	-0.01	0.07	0.02	1	.877	[-0.14, 0.12]
Do not like vs Very Much	-0.01	0.07	0.04	1	.840	[-0.15, 0.12]
Confidence in Mathematics						
Somewhat confident vs Very	0.14	0.04	10.66	1	.001	[0.06, 0.23]
Not confident vs Very	0.54	0.05	105.38	1	< .001	[0.44, 0.65]
Liking Science						
Somewhat vs Very Much	-0.14	0.07	4.10	1	.043	[-0.27, -0.004]
Do not like vs Very Much	-0.01	0.07	0.02	1	.894	[-0.14, 0.12]
Confidence in Science						
Somewhat confident vs Very	0.15	0.04	11.40	1	.001	[0.06, 0.23]
Not confident vs Very	0.42	0.05	73.26	1	< .001	[0.32, 0.51]

Note. B = unstandardized regression coefficient; SE = standard error; CI = confidence interval. The reference categories for all predictors are the highest levels (e.g., "Never tired," "Very Much Like," "Very Confident"). Confidence intervals are presented in brackets. p values less than .001 are reported as "< .001." The model used a logit link function.

Discussion

This study highlights several important psychosocial and academic predictors of student absenteeism, consistent with Maslow's hierarchy of needs. Factors related to physiological, safety, belongingness, and esteem needs were all relevant in understanding fourth graders' self-reported attendance patterns.

Tiredness emerged as one of the strongest predictors of absenteeism. Students who reported feeling tired more frequently were significantly more likely to be absent from school, underscoring the critical role of physical well-being in regular attendance. Although hunger showed a modest correlation with absenteeism, it was not a significant predictor in the multivariate model. This suggests that hunger may co-occur with other challenges but does not independently explain absenteeism when other factors are accounted for.

Experiences of bullying—both monthly and weekly—were associated with increased absenteeism, supporting prior research that peer victimization and perceived safety are key deterrents to school attendance (e.g., [28]). A lower sense of school belonging was also linked to higher absenteeism, indicating that students who feel disconnected from their school community are less motivated to attend regularly. Interestingly, the difference in absenteeism between students with "some" versus "little" belonging was significant, while the difference between "high" and "little" belonging was not, possibly reflecting ceiling effects or complex social dynamics among students with high belonging.

Academic confidence, particularly in mathematics and science, was another strong predictor. Students with lower confidence in these subjects were more likely to miss school, aligning with prior findings that self-efficacy influences engagement and persistence [18], [19]. In contrast, liking mathematics was not a significant predictor, and liking science had only a small effect, suggesting that cognitive appraisals of competence may have a greater impact on attendance than affective attitudes toward subjects.

Self-report bias is a potential limitation, as discrepancies can occur between reported and actual behaviors due to social desirability, cognitive factors, or survey conditions [29]. However, the TIMSS questionnaire is internationally validated by the IEA (International Association for the Evaluation of Educational Achievement), mitigating this concern [1].

These results should be interpreted within a whole-school approach that considers all aspects of a child's microsystem—family, peers, school, and broader contexts [30]. In North Macedonia, persistent low student achievement in international assessments [31], [32] contrasts sharply with high summative grades, reflecting a focus on end-of-year assessments rather than meaningful learning. This disconnect can alienate students, making school attendance feel like an imposed obligation rather than a personally relevant experience. Additionally, irregular attendance is often normalized, supported by parents, teachers, and peers, especially during adolescence. Schools generally lack open discussions and critical reflection on these issues, with unclear goals for improving learning outcomes and limited support for student development. Therefore, schools must be recognized as vital social resources to address absenteeism by connecting it to students' developmental needs for socialization, belonging, and engagement—with increased student participation.

The findings suggest several actionable areas for educational policy in North Macedonia. Since tiredness strongly predicts absenteeism, schools should implement well-being programs such as healthy breakfast initiatives and promote healthy sleep habits among students and families. Given the

significant role of bullying, schools must establish clear anti-bullying policies, enforce reporting mechanisms, and provide staff training to prevent and respond to bullying. Creating safe, inclusive environments through peer support and counseling is essential. To enhance school belonging, policies should encourage student participation in extracurricular activities and decision-making processes. Teachers need support to build positive, trusting relationships with students. Academic confidence's link to attendance highlights the need for academic support programs focused on building self-efficacy, such as tutoring, growth mindset interventions, and professional development for educators on student-centered teaching. Engaging families and communities is also critical. Outreach programs can raise awareness about attendance importance and foster supportive home environments. Partnerships with local health and social services can address external factors influencing absenteeism. Finally, developing early warning systems that monitor attendance alongside indicators like tiredness, hunger, bullying, and academic confidence can enable timely, coordinated interventions among teachers, professional staff teams, and families.

4 Conclusion

The TIMSS 2023 data reveal that fourth-grade students in the Republic of North Macedonia exhibit higher rates of weekly school absenteeism compared to the international average, alongside persistently low achievement in mathematics and science. Understanding the factors contributing to absenteeism is crucial for improving student outcomes.

Grounded in Maslow's Hierarchy of Needs, the findings highlight the close connection between students' physical, emotional, and social needs and their school attendance and academic engagement. Students with higher absenteeism are more likely to feel tired and hungry, experience bullying, and report a lower sense of school belonging. These students also tend to have lower confidence and interest in mathematics and science.

These results underscore the importance of educational reforms that address not only academic skills but also students' holistic well-being and motivation. Schools should implement strategies to monitor and support students' basic needs, foster safe and inclusive environments, and build academic self-confidence. Such comprehensive efforts can help reduce absenteeism and improve learning outcomes.

In summary, promoting regular attendance and student success in North Macedonia requires a holistic approach integrating physical, emotional, social, and academic support. These findings should inform ongoing primary education reforms by emphasizing motivation and well-being through curriculum enhancements and complementary school activities in the annual work program of schools.

References:

[1] von Davier, M., Fishbein, B., & Kennedy, A. (Eds.), *TIMSS 2023 Technical Report (Methods and Procedures)*, Boston College, TIMSS & PIRLS International Study Center, 2024.

[2] Mullis, I. V. S., Martin, M. O., Foy, P., & Hooper, M., *TIMSS 2019 international results in mathematics and science*, TIMSS & PIRLS International Study Center, 2020.

[3] Balfanz, R., & Byrnes, V., The importance of being in school: A report on absenteeism in the nation's public schools, Johns Hopkins University, 2012.

[4] Gottfried, M. A., Chronic absenteeism and its effects on students' academic and socioemotional outcomes, *Journal of Education for Students Placed at Risk*, Vol. 19, No. 2, 2014, pp. 53-75.

[5] Kearney, C. A., School absenteeism and school refusal behavior in youth: A

contemporary review, *Clinical Psychology Review*, Vol. 28, No. 3, 2008, pp. 451-471.
[6] Berliner, D. C., Poverty and potential: Out-of-school factors and school success, Education Policy Research Unit, Arizona State University, 2009.
[7] Chang, H. N., & Romero, M., Present, engaged, and accounted for: The critical importance of addressing chronic absence in the early grades, National Center for Children in Poverty, 2008.
[8] Maslow, A. H., A theory of human motivation, *Psychological Review*, Vol. 50, No. 4, 1943, pp. 370-396.
[9] Maslow, A. H., *Motivation and personality*, Harper & Row, 1970.
[10] Maslow, A. H., *The farther reaches of human nature*, Viking Press, 1971.
[11] Koltko-Rivera, M. E., Rediscovering the later version of Maslow's hierarchy of needs: Self-transcendence and opportunities for theory, research, and unification, *Review of General Psychology*, Vol. 10, No. 4, 2006, pp. 302-317.
[12] Basch, C. E., Breakfast and the achievement gap among urban minority youth, *Journal of School Health*, Vol. 81, No. 10, 2011, pp. 635-640.
[13] Florence, M. D., Asbridge, M., & Veugelers, P. J., Diet quality and academic performance, *Journal of School Health*, Vol. 78, No. 4, 2008, pp. 209-215.
[14] Espelage, D. L., Hong, J. S., Rao, M. A., & Low, S., Understanding and preventing violence directed against teachers, *American Psychologist*, Vol. 68, No. 2, 2013, pp. 75-87.
[15] Juvonen, J., Wang, Y., & Espinoza, G., Bullying experiences and compromised academic performance across middle school grades, *Journal of Early Adolescence*, Vol. 31, No. 1, 2011, pp. 152-173.
[16] Goodenow, C., Classroom belonging among early adolescent students: Relationships to motivation and achievement, *The Journal of Early Adolescence*, Vol. 13, No. 1, 1993, pp. 21-43.
[17] Osterman, K. F., Students' need for belonging in the school community, *Review of Educational Research*, Vol. 70, No. 3, 2000, pp. 323-367.
[18] Bandura, A., *Self-efficacy: The exercise of control*, W.H. Freeman, 1997.
[19] Pajares, F., Motivational role of self-efficacy beliefs in self-regulated learning, in D. H. Schunk & B. J. Zimmerman (Eds.), *Motivation and Self-Regulated Learning*, Lawrence Erlbaum, 2007, pp. 111-139.
[20] Deci, E. L., & Ryan, R. M., The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior, *Psychological Inquiry*, Vol. 11, No. 4, 2000, pp. 227-268.
[21] Kenrick, D. T., Griskevicius, V., Neuberg, S. L., & Schaller, M., Renovating the pyramid of needs: Contemporary extensions built upon ancient foundations, *Perspectives on Psychological Science*, Vol. 5, No. 3, 2010, pp. 292-314.
[22] Eccles, J. S., The development of children ages 6 to 14, *The Future of Children*, Vol. 9, No. 2, 1999, pp. 30-44.
[23] Piaget, J., *The psychology of the child*, Basic Books, 1972.
[24] Reynolds, K. A., Mullis, I. V., & Martin, M. O., TIMSS 2023 context questionnaire framework, *TIMSS 2023 Assessment Frameworks*, No. 46, 2021.
[25] Masters, G. N., & Wright, B. D., The partial credit model, in W. J. van der Linden & R. K. Hambleton (Eds.), *Handbook of Modern Item Response Theory*, Springer, 1997, pp. 101-121.
[26] Masters, G. N., A Rasch model for partial credit scoring, *Psychometrika*, Vol. 47, No. 2, 1982, pp. 149-174.
[27] Andrich, D., A rating formulation for ordered response categories, *Psychometrika*, Vol. 43, 1978, pp. 561-567.
[28] Gastic, B., School truancy and the disciplinary problems of bullying victims, *Educational Review*, Vol. 60, No. 4, 2008, pp. 391-404.
[29] Bound, J., Brown, C., & Mathiowetz, N., Measurement error in survey data, in J. J. Heckman & E. Leamer (Eds.), *Handbook of Econometrics*, Vol. 5, Elsevier, 2001, pp. 3705-3843.
[30] Parkes, J., Heslop, J., Ross, F. J., Westerveld, R., & Unterhalter, E., *A rigorous review of global research evidence*

on policy and practice on school-related gender-based violence, UNICEF, 2016.

[31] Mullis, I. V. S., von Davier, M., Foy, P., Fishbein, B., Reynolds, K. A., & Wry, E., *PIRLS 2021 International Results in Reading*, Boston College, TIMSS & PIRLS International Study Center, 2023.

[32] OECD, *PISA 2022 Results (Volume I): The State of Learning and Equity in Education*, OECD Publishing, Paris, 2023.