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# Relationship between Mental Health Problems and Resilience Among Students. The Moderating Role of Motivation for Mathematics Learning

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**Abstract**: The paper presents the results of a study testing the moderating role of the motivation for mathematics learning between mental health problem and resilience in children. The sample consisted in 707 Romanian children, (average age 13 years old). The students filled in the questionaries for strengths and difficulties (SDQ), the CYRM for Resilience (Ungar& Theron, 2019) and a questionnaire for mathematics attitudes. The results indicate a significant moderating effect of the mathematic motivation for the relationship between mental health problems (difficulties such as emotional problem, behavioral problems, hyperactivity and peer relations problem) and resilience. So, the mathematic motivation learning reduces the negative effect of mental health problems on resilience, contributing as a protective factor in front of difficulties. There are implications for learning design in educational settings, so the teachers could pay more attention to enhance the student's motivation for learning mathematics as a possible intervention to enhance resilience.

**Keywords:** *mathematics motivation, resilience, mental health problems, learning motivation*

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## Introduction

### *Mental Health and Resilience*

In the past years we noticed an increasing rate of mental health problems among the children and adolescent and a decreasing the age of mental health issues manifestations both in USA and in Europe (Olfson et al., 2015). Later studies identified a high prevalence of mental health problems in children and adolescents, especially in girls (Ma et al., 2021). Mental health is conceptualized according to WHO as a state of wellbeing, the individual realizes his/her potential, he/she copes with stress of daily life and contributes efficiently to the community. It is well known that mental health problems in childhood could have lasting effects on the adolescence, young adult and adulthood, and could affect entire development of a child (Murphy &Fonagy, 2012) That is why it is very important to tackle this issue at school level, in order to assure healthy premises for safe and healthy development. Also, there is a common perception nowadays that the children and adolescents are more prone to experience emotional problems, bad behaviours, different troubles that the older generations. Statistics in Europe have shown that one of five children has a mental health issue, and the mental health problems arise at early ages, than before. Mental health problems correlate with poorness, parents' mental problems,

Mental health problems in children and youngsters could cause distress and can have widespread impact, negative effects on educational attainment and social relationships, as well as wellbeing and physical health. Mental health problems increase the risk of school maladjustment, dropping out, school failure (Schulte-Körne, 2016), so the preventive programs developed by school could be a good solution. In a systematic review conducted by Franziska Reiss (Reiss, 2013) the socioeconomic disadvantage is a risk for developing mental health problems, and the decreasing pf socioeconomic status was associated with increasing mental health problems.

Resilience is considered the capacity to positive adapt in the face of adversity and it is a required personal dimension nowadays due to the many challenges within the world. Resilience is strongly associated with mental health in children and adolescents (Mesman et al., 2021).

Ungar and Theron (Ungar& Theron, 2020) in a brief review of the science of resilience demonstrated that the concept is understood "as the process of multiple biological, psychological, social, and ecological systems interacting in ways that help individuals to regain, sustain, or improve their

mental wellbeing when challenged by one or more risk factors". The authors have shown that the research is more interested in the factors that provoke stress and difficulties than the protective or positive factors that prevent stress and trouble. The actual definition of the resilience considers two factors: the presence of the adversity (stress or threat) and the positive result (in terms of wellbeing or health). Also, resilience is developing at the interaction of multisystemic dynamic process which conduct to the positive adaptation in face of the threat or adversity (Mesman et al., 2021).

Ann Masten(2021) proposes ten factors responsible for resilience promoting: sensitive caregiving, close relationships, social support; Sense of belonging, cohesion; Self-regulation, family management, group or organization leadership; Agency, beliefs in system efficacy, active coping; Problem-solving and planning; Hope, optimism, confidence in a better future; Mastery motivation, motivation to adapt; Purpose and a sense of meaning; Positive views of self, family, or group; Positive habits, routines, rituals, traditions, celebrations (Masten et al., 2021). Resilience is an important psychological result, it is dynamic and it needs to be constantly developed through educational activities. There are studies showing the relationships between resilience and health, higher resilience is related with lower negative health results and has an inverse relation with adverse childhood experiences (Hall et al., 2021), increased resilience is associated with lower mental health problems and physical problems (Crouch et al., 2018) at the school level resilience is associated with higher academic performance, self-efficacy, positive attitudes towards school, engagement (Nearchou et al., 2014; Xenofontos&Mouroutsou, 2022).

### *Mathematics motivation*

Learning mathematics could be a challenge for most of the students, not only in Romania, but also in different European countries. According to a recent Euridice Report (European Education and Culture Executive Agency, 2022) Romania is one of the country with the highest percentage of low achievers in mathematics and sciences (above 40%), and this fact underline the necessity of a systematic intervention for strengthen the students' motivation for mathematics learning. Mathematics motivation could be protective factor for math anxiety, being demonstrated a negative correlation between math anxiety and math motivation, with intrinsic motivation assuring mathematics performance and perceived competence (Morano et al., 2021; Rodríguez et al., 2021; Wang et al., 2015)

## Methodology

### *Participants*

The sample consists in 707 children, 282 boys and 425 girls, 285 from urban area and 422 from rural area. The average age is 13,6 years old (SD = 2,43). The data were collected by teachers who pursued the master study within education science field at Suceava University. An online link was used to administer the questionnaires, including the informed consent, so the students could do this task at school or at home, having the parents' agreement. The students were guided related to the way of filling in the questionnaires by their teachers and were made aware of the possibility of withdrawing any time they consider without any consequences.

### *Measures*

We measured mathematics motivation using *Toward Mathematics Inventory(*Tapia, 1996) which is a 40-items scale, consisting of 4 subscales (Self-confidence, Value, Enjoyment, Motivation), students need to rate using a Likert scale, from Strongly Disagree to Strongly Agree. Examples of items for motivation subscale: I plan to take as much mathematics as I can during my education. The challenge of math appeals to me. The instrument has a good reliability, Alpha Cronbach is 0.93 for self-confidence, 0.95 for value, 0,93 for Enjoyment and 0,85 for Motivation.

Resilience was measured using *Child and Youth resilience Measure CYRM-R*(Jefferies et al., 2019), revised form, with 17 items, consisting in 2 subscales: Personal Resilience and relational Resilience. We used the total score for Resilience, and the Alpha Cronbach is 0,94.

Mental Health problems were measured using *The Strengths and Difficulties Questionnaire (SDQ)* which is a brief behavioural screening questionnaire (Goodman et al., n.d.; Goodman et al., 1998), The questionnaires for self-completion by children and adolescents ask about 25 traits, having 25 items. The questionnaire has five subscales (emotional problems, peer symptoms, conduct problems, hyperactivity symptoms and prosocial behaviour) We used the total score consisting in the four subscales measuring problems and the alpha Cronbach is 0,81.

### *Hypothesis*

The present study investigates the following hypothesis:

- There is a positive association between mathematics motivation and resilience.

- There is a negative association between mental health problems, resilience and mathematics motivation
- There are differences at the level of mental health problems, resilience and mathematics motivation in terms of age.
- Mathematics motivation moderates the relationships between mental health problems and resilience

## Results

In order to test the first and the second hypothesis we used the Pearson correlation analysis. As in the Table1 all the correlations are significant at 0,01 level.

**Table1.** Correlations between mental health problems, mathematics motivation and resilience (correlation is significant for $p<0.01$, 2-tailed)

| | M | SD | 1 | 2 | 3 |
|---|---|---|---|---|---|
| 1 Mental health problems | 33,54 | 7,74 | 1 | | |
| 2Math_motivation | 15,91 | 5,13 | -,220** | 1 | |
| 3 Resilience | 25,67 | 4,72 | -,355** | ,222** | 1 |

Source: Author's own conception

We could notice the negative correlation between mental health problems and mathematics motivation, the negative correlation between mental health problems and resilience, and the positive correlation between resilience and mathematics motivation.

To test the third hypothesis, we used t-test for independent samples, using as dependent variables resilience, mental health problems and mathematics motivation and as independent variable the age, with two dimensions (the age above 14, and the age under 14 years old, using the Median value for splitting the sample in the two groups, Median = 14 for the variable *age*) (Table 2)

**Table 2.** The means difference of resilience, mental health and mathematics motivation in terms of students' age

| | age | N | Mean | Std. Deviation | t test |
|---|---|---|---|---|---|
| **Resilience** | >= 14 | 376 | 67,9149 | 12,82137 | t(705)= -3,86 |
| | < 14 | 331 | 71,6375 | 12,72489 | p=0.000 |
| **Mental health problems** | >= 14 | 376 | 34,5266 | 7,49929 | t(705)= 3,47 |
| | < 14 | 331 | 32,5136 | 7,89374 | p=0/000 |
| **Mathematic motivation** | >= 14 | 376 | 14,8324 | 5,04974 | t(705)=-6.13 |
| | < 14 | 331 | 17,1480 | 4,96709 | p=0.000 |

Source: Author's own conception

Results showed significant differences in terms of age, students over 14 years old have lower levels of resilience and mathematics motivation and higher level of mental health problems than the students under age of 14. So, it appears that younger children are more resilient and less prone to mental health problems that the older ones.

For the last hypothesis we used Model 1 for moderation of Hayes process macro for SPSS (Hayes, 2013) and tested the moderation effect of mathematics motivation upon the relationship between mental health problems and resilience. The results indicate that 16% of the variance of resilience is due to mental health problems and mathematics motivation: $F(3, 703)=45,6688$, $p<0.01$, $R\text{-sq}=0.16$

**Fig.1** Moderation model: mathematics motivation as moderator between mental health problems and resilience

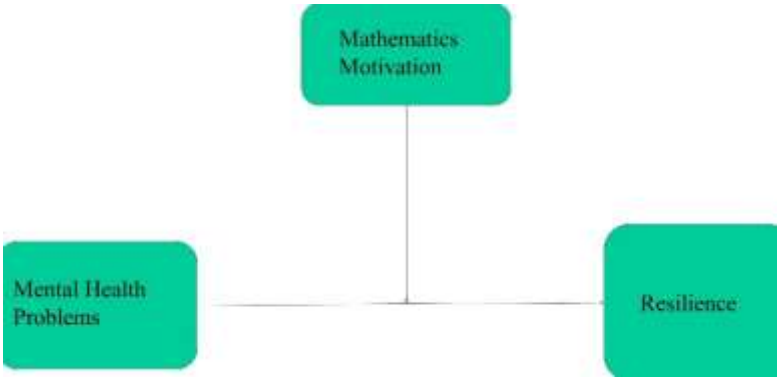


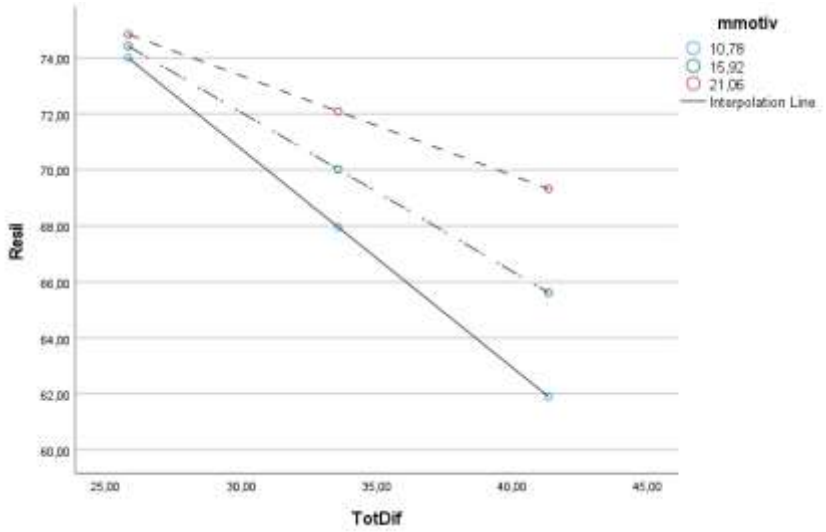

**Table 3.** The t test result for predictors of resilience

| **Predictors** | **b** | **t test** | **p** |
|---|---|---|---|
| **Mental health Problems** | -1.22 | t(703)= -6,08 | P<0.01 |
| **Mathematics motivation** | -0.98 | t(703)=-2.51 | P=0,01 |
| **Int (MHP x math motivation)** | 0.04 | t(703)= 3.57 | P<0.01 |

Source: Author's own conception

The interaction effect is significant showing that the high level of mathematics motivation alleviates the impact of mental health problems upon resilience. All predictors are significant, as well.

In Figure 2 we could see the moderation effect of the mathematics motivation upon the relationship between mental health problems and resilience among students in Romania.




Source: Author's own conception

There is a moderating effect of the mathematics motivation upon the relationship between mental health problems and resilience. (for higher levels of mental problems, higher levels of mathematics motivation alleviate the impact of mental health problems upon resilience)

## Discussion

The present study tested the relationships between mental health problems and resilience among students and the moderator role of mathematics motivation. The relationship between mental health problems, mathematics motivation and resilience were less explored as we did through the moderation model. Anyway, there are studies showing the same positive association between motivation and resilience, motivation being considered as one of protective factors in the face of mathematics anxiety (Trigueros et al., 2020). We assumed that there is a positive association between mathematics motivation and resilience and a negative association between mental health problems and resilience. These hypotheses were confirmed by our study.

We assumed that there are differences in terms of age for the variables studied and we got an important information describing significant differences between children under 14 years old and the others over 14. Growing up is coming with less resilience and mathematics motivation and more mental health problems. This could affect the adolescence development of the students and there are some implications for future

interventions at these ages. School and family need to take care of the particular development of the adolescence, in order to prevent their negative psychological results.

We assumed that mathematics motivation could moderate the relationship between mental health problems and resilience, and the results indicated that higher levels of motivation for mathematics could minimize the negative effect of the mental health problems upon resilience. This result could have implication at the school level related to the learning design in order to promote and maintain the motivation for learning mathematics. This specific kind of motivation could act as a protective factor in the relationship between mental health problems and resilience. So, enhancing motivation for learning mathematic could be another way to promote resilience through education.

## Limits

Our study presents some limits due to the difficulty in generalising the results internationally since the sample is made up from Romanian children only; in the same time one of the factors analysed such as resilience is environmentally sensitive so, it is possible that the results differ from other population. As future research we propose to extend the sample for population from other countries. Another limit is due to the type of present study, a transversal study, and for robust conclusions it will be useful to have a longitudinal approach.

## Conclusions

The present study provides evidence for the moderator role of the mathematics learning motivation of the relationship between mental health problems and resilience among students in Romania. The results have implication on the teaching and learning in schools considering enhancing mathematics motivation as a way to enhance the resilience of students and to alleviate the impact of the mental health problems on the students' resilience. Moreover, the study confirms the positive association of resilience with mathematics motivation and the negative association of resilience with mental health problems. Another useful result indicates the fact that the students over 14 years old are more vulnerable to mental health problems, less resilient and having a lower level of mathematics motivation than the younger students. This fact could have implications at school policies level, pointing out the need to better address the adolescents in their schooling period, so their psychological results could be optimized.

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## References

Crouch, E., Radcliff, E., Strompolis, M., &Srivastav, A. (2018). Safe, Stable, and Nurtured: Protective Factors against Poor Physical and Mental Health Outcomes Following Exposure to Adverse Childhood Experiences (ACEs). *Journal of Child & Adolescent Trauma, 12*(2), 165–173. https://doi.org/10.1007/s40653-018-0217-9

European Education and Culture Executive Agency. (2022). *Increasing achievement and motivation in mathematics and science learning in schools*. Publications Office. https://data.europa.eu/doi/10.2797/031821

Goodman, R., Ord, T. F., Simmons, H., Ward, R. G., & Meltzer, H. (n.d.). Using the Strengths and Difficulties Questionnaire (SDQ) to screen for child psychiatric disorders in a community sample. *British Journal of Psychiatry, 177*, 534-539. https://doi.org/10.1192/bjp.177.6.534

Goodman, R. M., Speers, M. A., McLeroy, K., Fawcett, S., Kegler, M., Parker, E., Smith, S. R., Sterling, T. D., & Wallerstein, N. (1998). Identifying and defining the dimensions of community capacity to provide a basis for measurement. *Health Education & Behavior, 25*(3), 258-278. https://doi.org/10.1177/109019819802500303

Hall, A., Perez, A., West, X., Brown, M., Kim, E., Salih, Z., & Aronoff, S. (2021). The Association of Adverse Childhood Experiences and Resilience with Health Outcomes in Adolescents: An Observational Study. *Global Pediatric Health, 8*, 2333794X20982433.https://doi.org/10.1177/2333794X20982433

Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach* (pp. xvii, 507). Guilford Press.

Jefferies, P., McGarrigle, L., &Ungar, M. (2019). The CYRM-R: A Rasch-Validated Revision of the Child and Youth Resilience Measure. *Journal of Evidence-Based Social Work, 16*(1), 70–92. https://doi.org/10.1080/23761407.2018.1548403

Ma, L., Mazidi, M., Li, K., Li, Y., Chen, S., Kirwan, R., Zhou, H., Yan, N., Rahman, A., & Wang, W. (2021). Prevalence of mental health problems among children and adolescents during the COVID-19 pandemic: A systematic review and meta-analysis. *Journal of Affective Disorders, 293*, 78–89. https://doi.org/10.1016/j.jad.2021.06.021

Masten, A. S. (2021). Resilience of children in disasters: A multisystem perspective. *International Journal of Psychology, 56*(1), 1–11. https://doi.org/10.1002/ijop.12737

Masten, A. S., Lucke, C. M., Nelson, K. M. & Stallworthy, I. C. (2021). Resilience in Development and Psychopathology: Multisystem Perspectives. *Annual Review of Clinical Psychology, 17*(1), 521–549. https://doi.org/10.1146/annurev-clinpsy-081219-120307

Mesman, E., Vreeker, A., & Hillegers, M. (2021). Resilience and mental health in children and adolescents: An update of the recent literature and future directions. *Current Opinion in Psychiatry, 34*(6), 586–592. https://doi.org/10.1097/YCO.0000000000000741

Morano, S., Markelz, A. M., Randolph, K. M., Myers, A. M., & Church, N. (2021). Motivation Matters: Three Strategies to Support Motivation and Engagement in Mathematics. *Intervention in School and Clinic, 57*(1), 15–22. https://doi.org/10.1177/1053451221994803

Murphy, M., & Fonagy, P. (2012). Mental health problems in children and young people. *Annual Report of the Chief Medical Officer 2012, Our Children Deserve Better: Prevention Pays*, (pp. 1–13). Chief Medical Officer. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/252660/33571_2901304_CMO_Chapter_10.pdf

Nearchou, F. A., Stogiannidou, A., & Kiosseoglou, G. (2014).Adaptation and Psychometric Evaluation of a Resilience Measure in Greek Elementary School Students. *Psychology in the Schools, 51*(1), 58–71. https://doi.org/10.1002/pits.21732

Olfson, M., Druss, B. G., & Marcus, S. C. (2015). Trends in mental health care among children and adolescents. *New England Journal of Medicine, 372*(21), 2029–2038. https://doi.org/10.1056/NEJMsa1413512

Reiss, F. (2013). Socioeconomic inequalities and mental health problems in children and adolescents: A systematic review. *Social Science & Medicine, 90*, 24–31. https://doi.org/10.1016/j.socscimed.2013.04.026

Rodríguez, S., Estévez, I., Piñeiro, I., Valle, A., Vieites, T., & Regueiro, B. (2021). Perceived Competence and Intrinsic Motivation in Mathematics: Exploring Latent Profiles. *Sustainability, 13*(16),16. https://doi.org/10.3390/su13168707

Schulte-Körne, G. (2016). Mental health problems in a school setting in children and adolescents. *Deutsches Ärzteblatt International, 113*(11), 183.https://doi.org/10.3238/arztebl.2016.0183

Tapia, M. (1996). *The Attitudes toward Mathematics Instrument*. Reports – Research. https://eric.ed.gov/?id=ED404165

Trigueros, R., Aguilar-Parra, J. M., Mercader, I., Fernández-Campoy, J. M., & Carrión, J. (2020). Set the Controls for the Heart of the Maths. The Protective Factor of Resilience in the Face of Mathematical Anxiety. *Mathematics, 8*(10), Article 10. https://doi.org/10.3390/math8101660

Ungar, M., & Theron, L. (2020). Resilience and mental health: How multisystemic processes contribute to positive outcomes. *The Lancet Psychiatry, 7*(5), 441–448. https://doi.org/10.1016/S2215-0366(19)30434-1

Wang, Z., Lukowski, S. L., Hart, S. A., Lyons, I. M., Thompson, L. A., Kovas, Y., Mazzocco, M. M. M., Plomin, R., &Petrill, S. A. (2015). Is Math Anxiety Always Bad for Math Learning? The Role of Math Motivation. *Psychological Science, 26*(12), 1863–1876. https://doi.org/10.1177/0956797615602471

Xenofontos, C., & Mouroutsou, S. (2022). Resilience in mathematics education research: A systematic review of empirical studies. *Scandinavian Journal of Educational Research*. https://doi.org/10.1080/00313831.2022.2115132