

## Short Communication

# Relationships between Self-Downing Beliefs and Math Performance in Greek Adolescent Students: A Predictive Study Based on Rational-Emotive Behavior Education (REBE) as Theoretical Perspective

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**Abstract**

There is ample evidence from both educational practice and research that math performance is often associated with increased levels of test anxiety, stress and discomfort and that students' cognitions account for this performance. Rational-Emotive Behavior Education (REBE), derived from Ellis's Rational-Emotive Behavior Theory (REBT), supports that it is mainly students' cognitions in the form of core (ir) rational beliefs that determine their performance and overall school achievement. However, given the binary nature of the REBT model, it is less empirically known what is the type of relationship (linear or non-linear) between cognitions, such as core (ir) rational beliefs, and specific aspects of school performance such as mathematics. Hence, this study investigates the type of relationships between students' self-downing beliefs (a type of students' core irrational beliefs according to REBT) and academic math performance in students of secondary education. Greek adolescent students (N=116) from all grades of middle school and high school completed a self-downing subscale taken from the Child and Adolescent Scale of Irrationality; students' scores from mathematical tests were collected directly from school records. A weak, though significant linear correlation was found between self-downing beliefs and academic math performance ( $r=-.21$ ;  $p<.05$ ), indicating 4.4% of common variance. Polynomial regression analysis revealed, however, that students' self-downing beliefs significantly predicted academic math performance by means of a curvilinear relationship ( $R^2=.10$ ): the quadratic and cubic trend gave rise to 10% of the variance explained in math performance. Overall, these results are in line with the binary model of REBE according to which not only students' lower self-downing beliefs, but also higher self-acceptance beliefs, may have a substantial impact on their math performance. The importance of the non-linear relationship found is discussed on the crucial importance of REBE as a form of social-emotional learning method that promotes better math performance through modification of problematic self-referent cognitions.

**INTRODUCTION**

Rational Emotive Behavior Theory (REBT) [1] has been extensively applied in educational settings through Rational-Emotive Behavior Education (REBE) [2]. REBE focuses on the impact of students' core (ir) rational beliefs on their academic performance and school achievement (besides students' behavior and well-being). One of the main tenets of REBE is that students' academic performance is indirectly determined by teachers and other school factors through core (ir) rational beliefs that students actively endorse about different aspects of their performance, instruction and school environment [2-4].

According to REBE, core irrational beliefs about school performance include, a) rigid demandingness beliefs (e.g., "I want

to perform well in math, therefore, I should always perform well in math"), b) extreme catastrophizing beliefs (e.g., "It is bad to not perform well in math, therefore, it is awful to not perform well in math"), c) extreme discomfort intolerance beliefs (e.g., "It is difficult for me to not always perform well in math, therefore, I cannot stand it at all") and extreme depreciation beliefs about self, others and school (e.g., "It is bad to not perform well in math and this makes me a totally bad student in math") [3].

Respectively, students may be trained to endorse rational beliefs about school performance which are, a) flexible preference beliefs (e.g., "I want to perform well in math but there is no reason why I should always perform well in math"), b) non-extreme badness beliefs (e.g., "It is bad to not perform well in math but there is no reason why it is awful to not perform well in math"),

c) non-extreme discomfort tolerance beliefs (e.g., "It is difficult for me to not always perform well in math but there is no reason why I cannot stand it at all") and non-extreme, unconditional acceptance beliefs about self, others and school (e.g., "It is bad to not perform well in math but this does not make me a totally bad student in math") [5].

The underlying premise is that students who endorse rational, instead of irrational, beliefs have better school performance and achievement [6]. Also, the binary model of REBE supports the idea of qualitative, besides quantitative, changes in the student output (e.g., emotions, behaviors, performance, etc.) [7]. For example, students with low math performance who endorse rational beliefs about themselves (or their math performance) may experience healthy negative emotions (e.g., sadness instead of depression) that incline them to take action and correct their math performance. Instead, students with low math performance who endorse irrational beliefs about themselves (or their math performance) may experience unhealthy negative emotions (e.g., depression instead of sadness) that demotivate them take action and correct their math performance.

Further, mathematics is a main and demanding school subject taught and examined in most schools of the world. There is ample evidence from both educational practice and research that math performance is often associated with increased levels of test anxiety, stress and frustration for some students in secondary education, but also with pleasure and pride for others [8]. In any case, students' cognitions in the form of core beliefs seem to account for their school performance in most school subjects [3-5]. However, appropriate data targeting at the impact of specific cognitions on specific school subjects (e.g., reading, math) is, however, lacking. Therefore, this study investigated the predictive relationship between students' self-downing beliefs (a form of core irrational beliefs according to REBT theory [1]) and academic math performance among adolescent students. We selected to focus on self-downing beliefs only because they are usually associated with signs of depression, withdrawal and learned helplessness [5], which are associated with demanding school subjects such as mathematics.

The research questions of this study are, a) do self-downing beliefs significantly predict math performance and b) what is the type of relationship between self-downing beliefs and math performance (linear or non-linear, e.g., curvilinear)? Our main hypothesis is that there will be a non-linear relationship between self-downing beliefs and math performance according to the binary REBE (and REBT theory) model according to which high school performance is not only a matter of the quantity of self-downing beliefs endorsed by students (here, lower self-downing beliefs) but also a matter of the quality of beliefs endorsed by them (here, endorsement of self-acceptance beliefs besides lower self-downing beliefs) [7,9].

## MATERIALS AND METHODS

Data were collected from Greek adolescent students. The method of selection used was the method of convenience sampling and the data involved were collected from three secondary schools of Athens, Attica. The number of participants was 116 with an age range from 12 to 17 years old ( $M=14.5$  and

$SD=1.4$ ) consisting of 51% of girls and 49% of boys. Students' self-downing beliefs were assessed using the Children and Adolescent Scale of Irrationality (CASI) [10]. Nowadays, self-downing beliefs are - within the context of REBT - more commonly referred to as self-depreciation beliefs<sup>1</sup> [11]. Besides, students' math grades were gathered from their most recent mathematical tests, after the consent of their teachers, as a measure of academic math performance.

## RESULTS AND DISCUSSION

Correlational and polynomial regression analyses have been used for the purpose of this study. A weak, though significant linear correlation was found between self-downing beliefs and academic math performance ( $r=-.21$ ;  $p<.05$ ), indicating 4.4% of common variance. Polynomial regression analysis revealed, however, that students' self-downing beliefs significantly predicted academic math performance by means of a curvilinear relationship ( $R^2=.10$ ): the significant quadratic and cubic term gave rise to 10% of the variance explained in math performance. So, describing the relationship between self-downing beliefs and math performance, we found a steep downwards trend first, then a turning point slightly upwards, and another turning point further downwards. All in all, the larger the amount of self-downing beliefs students report, the lower their academic math performance.

The curvilinear relationship found in this sample not only shows that students with higher self-downing beliefs have lower math performance than students with lower self-downing beliefs; it also implies that students of this sample with lower self-downing beliefs may also endorse [higher] self-acceptance beliefs and, thus, be more motivated to compensate for their lower math performance. A future study of this kind should measure rational beliefs (such as students' self-acceptance beliefs) and other constructs (e.g., functional coping strategies, healthy negative emotions, etc.) that may act as mediators and/or moderators and explain the curvilinear relationship found between self-downing and math performance in this study; for example, students who endorse lower self-downing beliefs may involve more rational beliefs and more functional coping strategies to compensate for their low math performance than students with higher self-downing beliefs. However, it is important to note that irrational and rational beliefs are two distinct constructs meaning that low irrational beliefs do not necessarily mean high rational beliefs and low rational beliefs do not necessarily associate with high irrational beliefs [7].

The results of this study showed that self-downing beliefs seem to be a good predictor of math performance in a curvilinear way; a finding that implies the binary model of REBE according to which students' performance is not only a matter of quantity of core cognitions (high vs. low self-downing beliefs) but, mainly, a matter of quality of core cognitions (endorsement of [higher] self-acceptance beliefs in addition, or instead, of lower self-downing beliefs). Thus, our main hypothesis that self-downing beliefs significantly predict math performance in a non-linear (curvilinear) way was supported from these preliminary data in this sample of Greek adolescent students, thus, confirming the binary nature of REBE model.

<sup>1</sup> For reasons of conceptual consistency with the CASI as measurement instrument, the term self-downing beliefs will be used throughout this article.

## CONCLUSION

In general, findings of this preliminary study are in line with REBE that students' irrational beliefs are significantly associated with unhealthy behaviors in terms of school performance (low math academic performance, here) [3,4,8]. The finding of a curvilinear relationship between self-downing beliefs and math performance is also in favor of a more complex relationship between core beliefs and math performance implying the binary model of REBE and the possible mediation and/or moderation from other variables (e.g., self-acceptance beliefs, healthy negative emotions, functional coping strategies, personality factors, etc.) [5,7]. While irrational beliefs are known to emerge during stressful life events and unhealthy community situations (at school, home, work), this finding has important implications for the quality of students' school life because they can be systematically guided, through REBE, to modify their higher self-downing beliefs to lower ones and, simultaneously, empower their self-acceptance beliefs for better school performance.

Thus, further research in bigger and more diverse samples including measures of other (ir) rational beliefs and other variables implied from this curvilinear relationship is needed for possible replication and generalization of these findings. Despite these limitations, self-downing beliefs seem to be an important determinant of math performance (although it may not be the only one), while students, teachers, parents, school leaders and important other school agents should effectively address them, thus, helping students enhance their math performance. Social-emotional programs that draw from REBT theory (and other Cognitive Behavioral approaches) should consider self-downing beliefs as a non-linear regulator of math performance and promote its modification (along with the empowerment of self-acceptance beliefs) for the betterment of students' math performance at school.

## REFERENCES

1. Ellis A. Reason and emotion in psychotherapy (Rev. updated ed.). New York: Birch Lane. 1994.
2. Knaus WJ. Rational Emotive Education. 2001.
3. Vernon A, Bernard ME. Applications of REBT in schools: Prevention, promotion, intervention. In A. Ellis & M. E. Bernard (Eds.), Rational Emotive Behavioral approaches to childhood disorders. New York: Springer. 2006; 415-460.
4. Trip S, Vernon A, McMahon J. Effectiveness of Rational-Emotive Education: A quantitative meta-analytical study. *Journal of Cognitive and Behavioral Psychotherapies*. 2007; 7: 81-93.
5. David D, Lynn, S, Ellis A. Rational and irrational beliefs. Implications for research, theory, and practice. New York, NY: Oxford University Press. 2010.
6. Bernard M, Walton K. The effect of you can do it! Education in six schools on student perceptions of well-being, teaching, learning and relationships. *Journal of Student Wellbeing*. 2011; 5: 22-37.
7. David D, Szentagotai A, Kallay E, Macavei B. A synopsis of Rational-Emotive Behaviour Therapy (REBT): Fundamental and applied research. *Journal of Rational-Emotive and Cognitive-Behavior Therapy*. 2005; 23: 175-221.
8. Pekrun R., Lichtenfeld S, Marsh HW, Murayama K, Goetz T. Achievement emotions and academic performance: Longitudinal models of reciprocal effects. *Child Dev*. 2017; 88: 1653-1670.
9. Keeley J, Zayac R, Correia CJ. Curvilinear relationships between statistics anxiety and performance among undergraduate students: evidence for optimal anxiety. *Statistics Education Research Journal*. 2008; 7: 4-15.
10. Bernard ME, Cronan F. The child and adolescent scale of irrationality: Validation data and mental health correlates. *Journal of Cognitive Psychotherapy*. 1999; 13: 121-132.
11. Dryden W. Rational-Emotive Behaviour Therapy: Distinctive features (2nd ed.). London: Routledge. 2015.

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