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REVIEW ARTICLE

A META-ANALYTIC REVIEW OF THE RELATIONSHIP BETWEEN GENERALIZED ANXIETY DISORDER AND EMOTIONAL DYSREGULATION

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This meta-analytic study was conducted with the aim of quantitative integrating the findings obtained in individual studies that were concerned with determining the relationship between generalized anxiety disorder (GAD) and emotional dysregulation in studies conducted on non-clinical sample and adult population.
The studies included in the meta-analysis are quantitative correlational studies in English, published in scientific journals in the last twenty years and whose methodological features correspond to the context of this analysis. The average weighted correlation, expressed by the Pearson correlation coefficient, is .497 and can be characterized as moderate.
The obtained results are in line with the expectations and results of other researchers. The obtained results indicate a high heterogeneity and the study is discussed with suggestions for researchers in this field in the direction of continuing research on the relationship between the variables that are the subject of research.
Empirical evidence testifies to the fact that problems of emotional regulation occur not only in persons with GAD, but also in panic disorder, social phobia and depression, which opens the door to the investigation of potential mediating relationships or covariates that influence the development of psychopathological symptomatology.

Keywords: emotional regulation, generalized anxiety disorder, meta-analysis

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INTRODUCTION

Generalized anxiety disorder (GAD) is characterized by intense anxiety and worry about a number of events or activities. The main symptom reported with this disorder is worry, which is difficult to control. This concern is associated with physical symptoms such as muscle tension, fatigue, irritability, sleep problems, and restlessness, which are associated with a significant reduction in function-ality in daily life, and they last for at least six months (1). When compared to other anxiety disorders, it is interesting that GAD differs from others in that there is no clearly defined stimulus or situation that causes not characterized by expressed avoidance behaviors (2). Research that studied the content of care in people with this diagnosis found that GAD individuals usually do not have a specific issue they worry about, although these topics are often not in the focus of the observer, i.e., the person seems to worry for no particular reason. A large number of people suffering from this problem predict the catastrophic outcomes of some future events that certainly have a low probability of happening (2).

As there are certain disagreements in understanding the etiology and differentiating GAD from others in this group, various theories are present with the aim of making a more subtle distinc-tion and enabling a better understanding. Mennin (3) is the first representative of a group of theories in the field of emotional regulation, which, as its starting point, takes the idea that worry is a cognitive strategy to avoid emotions and other unpleasant content. Menin assumes that the key to understanding that problem should be sought in emotional regulation, and he finds the starting point for this idea in the explanation that, at its core, the problem involves the need to avoid, where one also avoids one's own emotions. Emotional regulation was defined by this author as a set of abilities that concern the way a person expresses and reacts to one's own emotions (3).

Empirical research has largely supported this conceptualization. In particular, Menin and colleagues found that individuals meeting the criteria for this disorder tend to experience emotions more intensely and face greater difficulties in identifying and describing their own emotions, which are often evaluated negatively (4). In one experimental study, it was established that these deficits in persons diagnosed with GAD do not only relate to the regulation of emotions such as fear and anxiety but also involve the emotion of sadness, suggesting the existence of a general emotional-regulatory deficit (5). It was also found that, regardless of their current emotional state, individuals diagnosed with GAD demonstrated reduced awareness of emotions and the ability to accept them compared to a control group (5). These data and research are mostly recent, but there is a base of results that do not support this theory. For example, during the daily monitoring of emotions in people with GAD, it was confirmed that they indeed experience more intense emotions, but that they do not have a reduced ability to recognize them or that they rely only on a narrow range of strategies to modulate their emotional experience (6). Such data already question previous results and point to the need for further research. This is not an isolated case of conflicting findings.

For example, in a study that used independent assessors and not subjective evaluation of emotions, it was not found that people with the diagnosis of GAD lag behind the control group in understanding and identifying emotions (7). Roemer and Orsilova (8) also made a relevant and similar observation in their research. They suggest that a central problem in individuals diagnosed with GAD is a tendency to negatively judge their own intrapsychic experiences. This includes emotions, which is why they try to avoid them, either behaviorally or cognitively. Therefore, a negative assessment of one's own emotional experiences leads to the inability of a person to experience an emotion, accept it, or understand the current feelings. One of the first studies was conducted by Roemer and his associates, the author of the theory. In a study he conducted both on the student and clinical sample (9), he obtained data that did not support the theory. While in the student sample a positive connection was established between the tendency to avoid experience, negative evaluation of emotions (e.g., the presence of fear of emotions), and the degree of expression of GAD symptoms, in the clinical sample, no expected connections were found.

This study examines the relationship between emotional dysregulation and generalized anxiety disorder in a non-clinical population and synthesizes the available empirical data in this area. Everything shown above indicates that the study results do not indicate the existence of agreement among researchers when it comes to the connection between emotional regulation and generalized anxiety disorder, and these are also the conclusions of individual researchers in this field (10). The importance of this research question lies in the fact that, by reviewing the above studies, although the results imply that emotional regulation

and generalized anxiety disorder are negatively related, it is not possible to unequivocally make conclusion about the intensity of this relationship. The review of the literature revealed particular differences depending on which population of respondents was included; therefore, it was decided to focus on a non-clinical population. The results of this meta-analytic study are aimed at providing answers on the basis of which certain implications could be given both for further psychological practice and for further research in this area. Considering that the field is relatively in its infancy and that, despite the large number of works, little is still known, we believe that the theoretical goal of the research has been brought into focus for a reason.

METHODS

Operationalization of variables

Emotional dysregulation is operationalized through the score on the questionnaire that measures the ability of emotional regulation; that is, in this case, dysregulation was measured, which indicates a low-developed ability. Therefore, higher scores indicate low emotional regulation, while low scores indicate the absence of behaviors typical of people with regulation problems but do not necessarily indicate a high capacity for regulation. Only those measures that are in accordance with the theory of emotional regulation, whose questionnaires have shown good psychometric characteristics and are often used, are considered valid.

Generalized anxiety disorder: this variable was operationalized through a variable that indicates the overall experience of anxiety and feeling of worry, where higher scores indicate a more pronounced feeling of anxiety and lower scores indicate the absence of that unpleasant feeling. When choosing the measures, both the variables identified by the authors as adequate for assessing generalized anxiety disorder and other scales with satisfactory psychometric properties that directly relate to the investigated phenomenon were considered appropriate for use.

Sample

In this meta-analytic study, we included studies that were conducted on a non-clinical population. The study also included those where it was possible to clearly separate a subsample of respondents from the clinical and non-clinical population. The criteria that the mentioned additional studies should have fulfilled were the following:

1. The research had to be published in a scientific journal with an impact factor;
2. The journal in which the research was published was in English;
3. The study was published after 2000;
4. Variables were operationalized in a clear way in the study;
5. There were significant correlation coefficients between variables.

Literature search

The literature search was conducted through available internet sources for accessing scientific publications that do not require special permissions and are used in the scientific community: Google Scholar, ResearchGate, and ScienceDirect, during November and December 2020. The criteria entered for the search were: generalized anxiety disorder, anxiety disorders, anxiety, emotional regulation, emotional dysregulation, and dysregulation. The search was narrowed only to papers published after 2000, and papers that did not have the full text available were not included (Figure 1).

The effect size included in the analysis is the Pearson's correlation coefficient, so there was no need to convert the measures additionally. A sample size was used to weight the effect size. The meta-analysis procedure includes studies whose subjects probably do not come from the same population, primarily because the subjects in the study differ in terms of country of origin, age, education, and potentially other covariates. Therefore, it is assumed that there is not one but a distribution of true effects, which indicates that a random effects model would be appropriate for computing the overall effect size measure. However, the random effects model tends to overestimate the error variance (11), and bearing in mind that the random effects model can be reduced to a fixed model if the variance between studies approaches zero (12), both types of overall effect size analysis will be compared, as the number of studies we include in the final analysis is not that large. For the purposes of this analysis, the program comprehensive meta-analysis was used to calculate metastatistics and deviation measures.

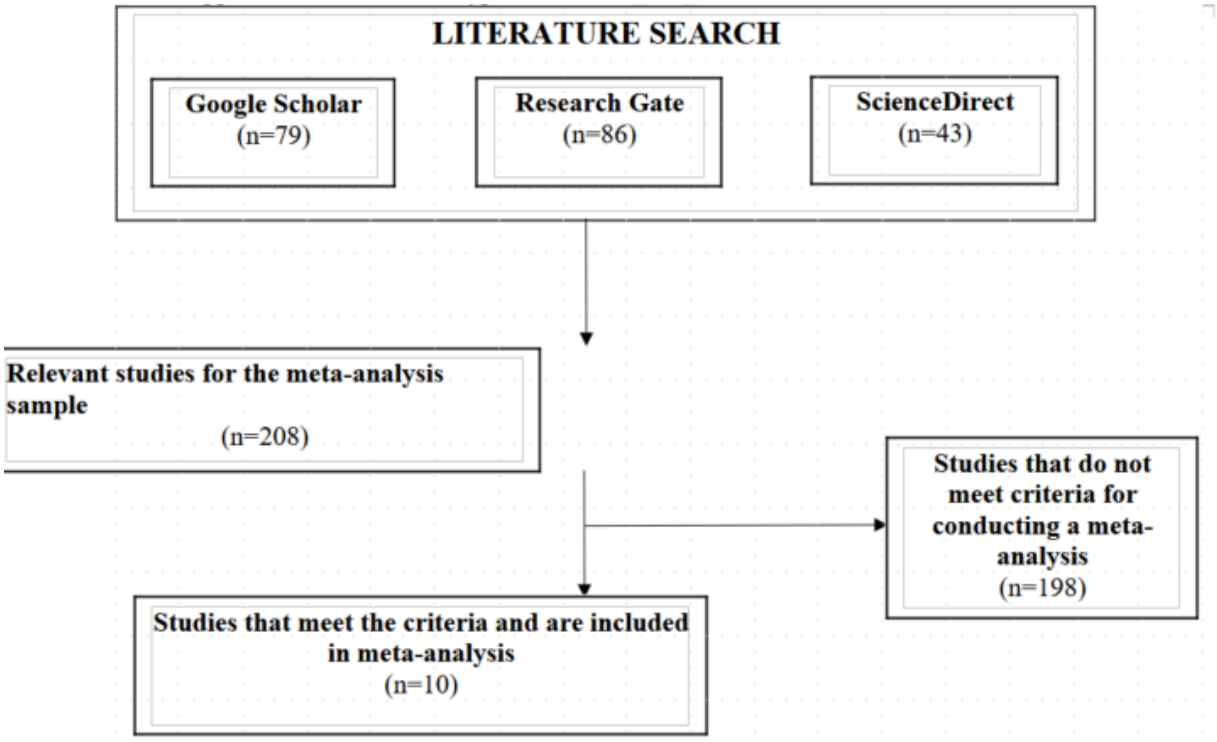

Figure 1. *Presentation of the flow of the search and selection of literature for the analysis*

An overview of the 10 studies included in the final analysis is provided in Table 1. As mentioned earlier, Pearson's correlation coefficient was used as a measure of effect size, and only one measure from each study was included.

We see that there are certain differences in the studies when it comes to the operationalization of the constructs but in the case of the variable related to generalized anxiety. However, for the measure to be accepted, the authors had to offer an explanation as to why it was considered equivalent. Considering the rigorous selection criteria of the journals that will be included in the study, this procedure is justified, in the author's opinion.

Table 2 shows the results of the conducted meta-analysis for the fixed and variable effect models, together with the average weighted correlation.

The obtained metastatistics, that is, the average weighted correlation coefficient, points to the existence of a connection between low emotional dysregulation and generalized anxiety disorder. We can interpret the obtained statistic as a correlation of medium intensity.

The evaluation of heterogeneity in this meta-analysis was performed by determining the significance indicator of heterogeneity (via the Q statistic) and the percentage of total variability that can be attributed to heterogeneity (via the I2 statistic). Based on the value of the Q statistic and its statistical significance, we can reject the hypothesis that there is a fixed effect. Furthermore, we can see that more than 90% of the total variance can be attributed to heterogeneity, i.e., variances between individual studies (I2 = 90,450), which can be interpreted as very high heterogeneity (13).

Table 1. *Studies included in the final analysis*

No.	Study	Sample	Sample size	GAP	Emotional disregulation	r
1	Roemer L, Lee JK, Salters-Pedneault K, Erisman SM, Orsillo SM, Mennin DS. Behav Ther.	General population	411	The Generalized Anxiety Disorder Questionnaire-IV (GAD-Q-IV; Newman et al., 2002)	The Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004)	.55
2	Tull MT, Stipelman BA, Salters-Pedneault K, Gratz KL. J Anxiety Disord.	Students	410	The Generalized Anxiety Disorder Questionnaire-IV (GAD-Q-IV; Newman et al., 2002)	The Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004)	.41
3	Ouellet C, Langlois F, Provencher MD, Gosselin P. Eur Rev Appl Psychol.	General population	204	The Generalized Anxiety Disorder Questionnaire-IV (GAD-Q-IV; Newman et al., 2002)	The Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004)	.61
4	Marganska A, Gallagher M, Miranda R. Am J Orthopsychiatry.	Students	284	The Generalized Anxiety Disorder Questionnaire-IV (GAD-Q-IV; Newman et al., 2002)	The Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004)	.41
5	Gratz KL, Roemer L. J Psychopathol Behav Assess.	Adolescents	210	The Screen for Child Anxiety Related Emotional Disorders (Birmaher et al., 1997)	The Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004)	.42
6	Soenke M, Hahn KS, Tull MT, Gratz KL. Cogn Ther Res.	Students	396	The Generalized Anxiety Disorder Questionnaire-IV (GAD-Q-IV; Newman et al., 2002)	The Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004)	.47
7	Suveg C, Morelen D, Brewer GA, Thomassin K. J Anxiety Disord.	Students	676	Symptom Checklist-90-Revised (SCL-90R; Derogatis, 1994)	The Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004)	.53
8	Mennin DS, Holaway RM, Fresco DM, Moore MT, Heimberg RG. Behav Ther.	Students	869	The Generalized Anxiety Disorder Questionnaire-IV (GAD-Q-IV; Newman et al., 2002)	The Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004)	.27
9	Nielsen SKK, Lønfeldt N, Wolitzky-Taylor KB, Hageman I, Vangkilde S, Daniel SIF. J Affect Disord.	General population	147	Beck Anxiety Inventory (BAI; Beck et al., 1988)	The Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004)	.73
10	Salters-Pedneault K, Roemer L, Tull MT, Rucker L, Mennin DS. Cogn Ther Res.	Students	325	Penn State Worry Questionnaire (PSWQ; Meyer et al., 1990)	The Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004)	.51

Table 2. *Weighted average correlation between generalized anxiety and emotional dysregulation*

Model	Effect size				Test of null		Heterogeneity			
	N	*r̂*	UL	LL	*Z*	*p*	*Q*	*df*	*p*	I^2
Fixed	10	.460	.435	.484	31.049	.000	94.238	9	.000	90.450
Random	10	.497	.414	.571	10.229	.000				

N – number of studies included in the analysis; r̂ – weighted average coefficient; UL – upper limit; LL – lower limit; I^2 – percentage of total variability that can be attributed to heterogeneity

Drawer effect

The drawer effect refers to the bias in studies that are included in a meta-analysis relative to studies that are not included. It is hypothesized that this could have an impact on the size of the effect obtained, and additional analysis will be conducted to examine such possibilities.

As can be seen in Figure 2, the studies included in the meta-analysis are shown as circles. They are expected to be evenly distributed around the vertical axis. As can be seen from the attached graph, the studies are evenly distributed around the vertical axis, so there can be no doubt that there is a bias in the selection of studies for analysis.

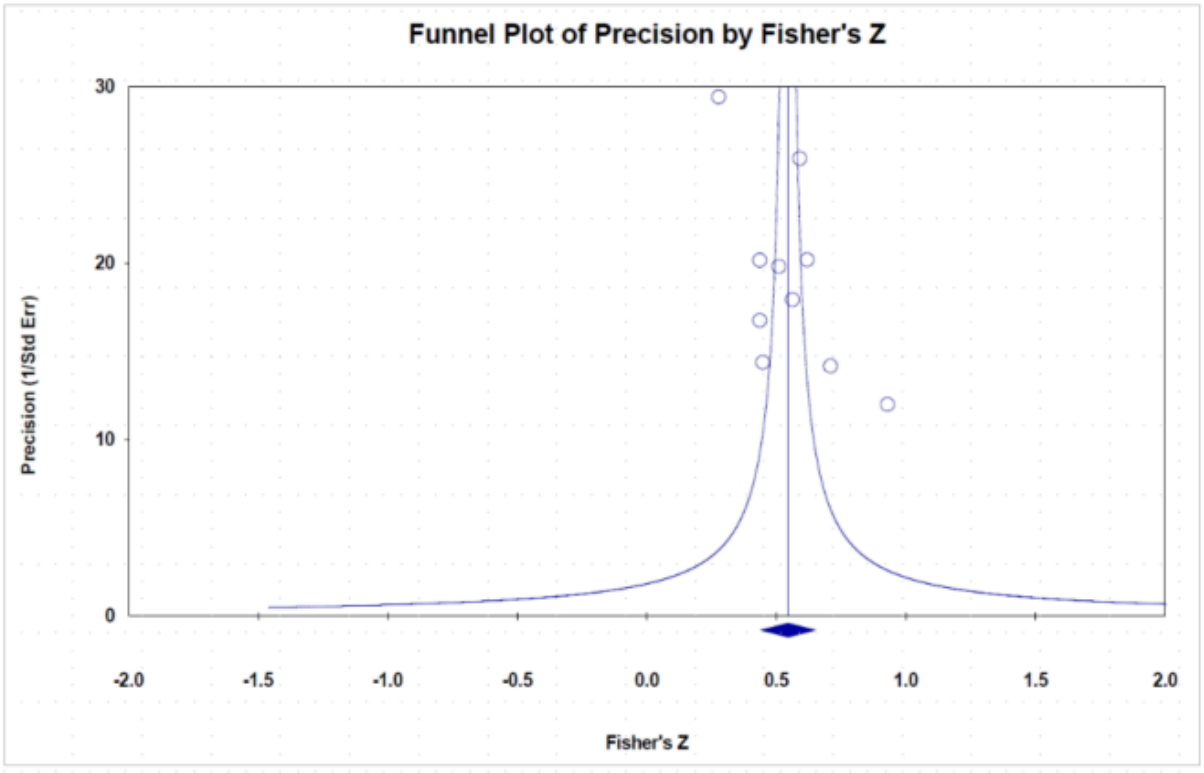

Figure 2. *Display of the drawer effect for the random effects model*

DISCUSSION

The main goal of the study was to integrate the data obtained in earlier studies in order to determine whether there is a connection between generalized anxiety disorder and poor ability to regulate emotions, presented here as emotional dysregulation.

The research idea came from an extensive review of the literature that is available to researchers, especially in the past ten years since this topic has really been in the focus of researchers. On the other hand, the very broad material failed to cover all important topics and approach the problem in depth. Primarily, we come across data indicating that the results of studies do not indicate the existence of agreement among researchers when it comes to the connection between emotional regulation and generalized anxiety disorder, according to Mihić (10). Some of the reasons are related to the specificity of the population in which the research is conducted. Another specificity of the subject of the study is the sample and population of adults that are in focus, given that it was assumed that emotional regulation does not have to play the same role in this segment of the population as it does in earlier developmental stages related to early adolescence or childhood, and also differs from its role in later stages, including older adulthood and old age (14–17).

The results of this study confirmed the expectations set by this research and the findings of previous studies (14, 18–22). The obtained metastatistics, i.e., the average weighted Pearson's correlation coefficient, point to the connection between low emotional dysregulation and generalized anxiety disorder. The obtained correlation of .497 indicates a medium intensity of connection, which is also just a confirmation of what other studies have found. Namely, in the research included in the analysis, the range went from low to approximately high, which is why the information obtained in this study is not surprising.

The analyses showed that about 90% of the total variance can be attributed to heterogeneity, i.e., variances between individual studies. This result not only confirms the justification of using random or variable effects' models but also gives us important methodological guidelines. Namely, Sanchez-Meca et al. (13) state that in a situation where the I2 statistic is of moderate or high intensity, there is a meaningful basis for additional examination of the relationship between the constructs, i.e., examination of the influence of moderator variables, which can explain heterogeneity. In our case, the heterogeneity is very high, and it unequivocally indicates the existence of space for further research. It is believed that other parameters should be included in this relationship to begin with, especially those concerning the methodological value of the conducted study.

The instruments used to operationalize the constructs, especially the one used to approach the concept of emotional regulation, justify the obtained conclusions. It is very important that, when operationalizing the construct, the same measure was used in each study, especially considering the excellent psychometric characteristics of the scale. When it comes to generalized anxiety disorder, the deviation in measures is justified in the methodological part of the study, and in addition to the subjective assessment of the adequacy of the authors of this paper, we also relied on the reputation of the journal. Thus, only studies whose quality met the expected standards of this paper were included in the analysis. The methodological value of this study is further enhanced by the fact that the selection bias analysis carried out showed that there is no drawer effect. One of the basic qualities for evaluating a study is the way in which papers are chosen and the criteria according to which they are selected. In addition, in order to have a better insight, the impact factor of the journal in which it was published is listed for each paper, which should additionally testify to the quality of the study itself in addition to the confirmed effect.

This study has a greater value when considering the context in which it was created and the implications it offers. Those implications are primarily of a theoretical nature, and the importance of the research is greater in this regard. There is no doubt that practitioners in the field of mental health and clinical psychology have been dealing with this topic for a long time and that they see emotional regulation as an ability essential for understanding the etiology of psychopathological manifestations. However, it is important to comment on the specificity of the connection between emotional regulation difficulties and the diagnosis of GAD. A decent body of empirical evidence testifies to the fact that problems of emotional regulation (difficulties in describing and understanding emotions, as well as the appearance of fear of intense emotions) do not occur only in these persons, but there are reports of similar problems in panic patients as well.

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Competing Interest

The authors declare no relevant conflicts of interest.

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