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Ph.D. THESIS EXTENDED SUMMARY

AN EMPIRICAL ASSESMENT OF E-PRIME THEORY AND MECHANISMS OF CHANGE IN A COGNITIVE BEHAVIOR FRAMEWORK

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CHAPTER I. THEORETICAL BACKGROUND

1.1. Introduction and Research Problem

1.1.1. General Framework

The general aim of this thesis was to investigate the assumptions of E-Prime theory and its relationship with rational and irrational beliefs, using a cognitive-behavioral framework. The present thesis has assumed three major objectives. The first one is to scientifically test the assumptions of E-Prime theory which propose the elimination of the verb *to be* from speech in order to improve human functioning. The second objective was to investigate the relationship between rational beliefs and psychological distress in order to contribute to the building of a solid empirical foundation for the theory behind the Rational-Emotive Behavior Therapy (REBT). The third objective was to test if REBT theory and practice could be enhanced by incorporating E-Prime concepts/strategies, in order to achieve a significant improvement for research and clinical field. This thesis aimed to be a pioneer by bringing a philosophical and linguistic movement, E-Prime, in the scientific field and investigating its possible benefits. Moreover, we have proposed to provide added value to the REBT field, especially regarding fundamental research.

The thesis is divided in four chapters. First, we summarized the theoretical knowledge relevant for the thesis, and we emphasized the limitations of the research in the targeted fields, which afterwards fed the development of our research objectives. In the second chapter we presented the main goals of the thesis and described the methodological toolbox that we used. In the third chapter we presented the original research output and the results that we have obtained. In the last chapter we described the general conclusions of the research carried out, as well as their theoretical and practical implications, alongside with the inherent limits of the studies and future research suggestions.

1.1.2 Theoretical Foundations and Research Problem

Rational Emotive Behavior Therapy (Ellis, 1962) was among the pioneers of cognitive-behavior therapies (CBT; Beck, 1976; Ellis, 1962). The distinctive element of REBT is its emphasis on the rationality/irrationality of ones beliefs as important factors in the development and maintenance of psychological health or psychological problems/disorders (Ellis, 1962). The REBT model of psychopathology considers that irrational beliefs are the main etiopathogenic factor, as well as the proximal cause of dysfunctional feelings and maladaptive behavior (David et al., 2009). The model received strong empirical support, in different populations and using various types of designs, such as cross-sectional, longitudinal and experimental (for a review see David, 2015). Moreover, a recent meta-analysis (Vîslă, Flückiger, Grosse Holtforth, & David, 2016) has investigated the specific relationship between irrational beliefs and psychological distress and revealed an overall medium effect size of r =0.38.

On the other hand, REBT model of psychological health considers that rational beliefs cause functional emotions and adaptive behavior, thus protecting us from distress (David & Cramer, 2009). Unlike the REBT model of psychopathology, the REBT model of psychological health was less empirically tested (David, 2015; Hyland, Maguire, Shevlin, & Boduszek, 2014; Hyland, Shevlin, Adamson, & Boduszek, 2014), so the presumed role of rational beliefs as protective factor against psychological distress/disorders is still in debate. There is some incipient evidence (Hyland, Maguire, et al., 2014) showing that preference beliefs represents the primary appraisal mechanism/rational belief, while realistic evaluation

of badness, high frustration tolerance, and unconditional acceptance are secondary appraisal mechanisms/rational beliefs. However, the proposed structure of rational beliefs organization needs further investigation.

Another problematic aspect related to the clinical field it is revealed by the increasing number of researchers and clinicians that claim for updated methods of evaluating evidence-based psychotherapies over the last decade (David & Montgomery, 2011). Recently, a new system (David & Montgomery, 2011) was developed in order to evaluate not only the efficacy and effectiveness of a therapy, but also the underling theoretical assumptions, and especially the proposed mechanisms of change. This method is an evaluative and hierarchical approach, and targets two levels: (1) if the theory behind the psychological intervention and its derived mechanisms of change were scientifically evaluated; (2) efficacy and effectiveness of the respective therapeutic package (David & Montgomery, 2011). Based on these two levels and their intensity (well supported, mixed data, or contradictory evidence) nine hierarchical categories of psychological intervention were proposed (David & Montgomery, 2011). Using this new method, the pseudoscientific approaches (psychological interventions that have not a validated background theory or they are based on an invalidated theory) can be avoided in the clinical field (David & Montgomery, 2011). Hence, testing both the efficacy/effectiveness of REBT and its mechanisms of change is essential. The validity of the REBT model of psychological health, and especially the relationship between rational beliefs and distress, were not enough studied in the literature in order to confirm rational beliefs' status of mechanism of change,.

Regarding the distinction between dysfunctional and functional emotions, there are in literature two main models that attempt to discriminate between the two concepts based on different criteria. First, the unitary model of distress (Russell & Carroll, 1999), distinguishes functional and dysfunctional emotional based only on one criterion, namely the intensity of the emotions. Therefore, the unitary model of distress (Russell & Carroll, 1999) sees related emotions (e.g., sadness and depression) as bipolar constructs, placed on an intensity-based continuum. Contrariwise, the binary model of distress (Ellis & DiGiuseppe, 1993) makes a distinction between the two types of emotion based not only on quantitative reasons, but also on qualitative bases. There is still a debate in literature between these two models, but recent research seems to favor the binary model of distress (David & Cramer, 2009). However, a stringent need to enhance the literature regarding the validity of the two models can be observed. Developing more accurate and up-to-date studies is necessary in order to reach a firm, evidence-based conclusion.

Another issue spotted out when scanning psychological research literature is that, even that using language it is a ubiquitous process, its effects on psychological outcomes, especially on thoughts and emotions, are still in debate. The cognitive science paradigm (see Miller, 2003) provides an excellent framework for interdisciplinary research linking various linguistic and psychological aspects. Even there are a lot of studies which focused on the relationships between psychological features and several morphologic, semantic, syntax, or pragmatic characteristics, almost all of them targeted executive functions, the processes of language acquisition/production, and decisions-making aspects (e.g., Daneman & Merikle, 1996; Masgoret & Gardner, 2003; Milligan, Astington, & Dack, 2007). Another major line of research overlapping linguistic and psychology is the one investigating the effects that different languages have on thoughts (see Boroditsky, 2011; Zlatev & Blomberg, 2015). However, in spite of this large body of research, the literature connecting particular aspects of language, like using specific words or parts of speech, with thoughts and/or emotions is very scant (with only

one exception represented by a meta-analysis (Edwards & Holtzman, 2017) which showed that there is a significant association between using first person pronouns and levels of depression).

One starting point for dealing with this lack of research in the psycho-linguistic field could be the investigation of E-Prime theory. E-Prime represents a prescriptive version of Standard English which eliminates all form of the verb *to be*. Bourland (1965) claimed that using the verb *to be* have several semantic negative consequences, like unjustified abstractions, over-generalizations, and logical errors (Bourland, 2004). Moreover, Kellog and Bourland (1990) claim that using E-Prime instead of E-Standard has a lot of advantages, improving several psycho-social variables, such the decrease of the number of stressful situations, reducing the frequency and/or intensity of inter-personal conflicts, improving communication and problem-solving skills, and also creativity. Still, Menefee (1991) published a critical analysis of E-Prime, emphasizing the idea that the principles and the theory behind both General Semantics and E-Prime are not evidence-based (Menefee, 1991). Moreover, the presumed benefits of using E-Prime, claimed by its initiators, such as improvements at psychological, behavioral and social levels, have not been tested in any rigorous scientific studies (David, 2013; Menefee, 1991). Moreover, there is a total lack of research targeting the possible practical, ecological effects of E-Prime in various areas, including the clinical field.

1.2. Relevance and Impact of the Research Topic

Starting from the perspective that claims for updated methods of evaluating evidence-based psychotherapies, we consider that investigating the relationship between rational beliefs and distress is an important step which can bring more evidence for the validation of the REBT theoretical assumptions and its mechanisms of change. Taking into account the framework provided by the aforementioned evaluation system for evidence-based psychotherapies (David & Montgomery, 2011), this step could be the missing piece which, along with the corresponding meta-analysis that also revealed a medium, but positive relationship between irrational beliefs and distress (Vîslă et al., 2016), and the meta-analysis concerning the efficacy of REBT interventions, could provide the required empirical foundation to establish REBT as an evidence based form of therapy.

Also, taking into account the poor previous exploration of the E-Prime research area, we consider that there is a stringent need to examine the basic assumptions of E-Prime theory (Bourland, 1965; Kellogg & Bourland, 1990), which advocates for eliminating all the form of the verb *to be* from speech, claiming that this will have an important positive psychological effect.

Moreover, if E-Prime strategies could contribute to preventing distress, lowering associated dysfunctional thinking patterns, and decreasing maladaptive behaviour, this would confirm the core assumptions of this theory, validating therefore the original E-Prime and General Semantics' goal, namely to facilitate human adaptation to personal, professional, and public life. Going further, if E-Prime will prove to be useful for clinical patients, it would open an exciting research line by showing that specific aspects of language can influence essential psychological aspect. Hence, we consider a necessary step to study if incorporating E-Prime derived strategies in validated, evidence-base intervention protocols will lead to significant improvements in their efficacy and/or feasibility.

1.3. State of the Art in the Literature

1.3.1. General Semantics

General Semantics (Korzybski, 1933) represents a scientific branch of empirical sciences category, combining the neurosemantics and neurolinguistic fields (Kodish, 1998, 2003). General Semantics is an appraisal theory which aims to improve the way people communicate and interact with each other, by developing specific methodologies (Pula, 1991). Therefore, General Semantics developed several strategies by which a better adaptation of people to private and professional life it is promoted (Pula, 1991).

There are three major principles of General Semantics (Korzybski, 1933): 1) "*The map is not the territory"*; 2) "*The map depicts only part of the territory*"; and 3) "*Maps of maps condense the territory*".

1.3.2. E-Prime

Building on General Semantics' principles, a group of linguistic and philosophic researchers developed a linguistic tool named E-Prime (i.e., English Prime; Bourland, 1965) which represents a prescriptive version of English which involves eliminating all the forms of the verb *to be* from speech/writing.

According to E-Prime, the two functions of the verb *to be* which are the most harmful are (Kellogg & Bourland, 1990b): 1) *the identity function*; and 2) *the predication function*. The two functions are described below:

E-Prime proposes a major change of the linguistic structure and of personal focus of people which use English. In essence, E-Prime represents a version of standard English which moves the focus of the speakers more to their personal experience/perspective (Kellogg & Bourland, 1990b). The main goal of E-Prime, as well as of General Semantics, it is to increase the congruence between verbal *maps* and the real *territory* of human experience (Kellogg & Bourland, 1990b). By increasing this congruency, the number of available assumptions regarding a specific statement it is significantly reduced. Moreover, using a first person perspective helps to increase communication's accuracy (Kellogg & Bourland, 1990b). Another change suggested by E-Prime it is to preponderantly use an active voice instead of passive voice (Kellogg & Bourland, 1990b). E-Prime advocates that the passive voice could cause misunderstandings because decreases the quality of communicated information, which in turn may lead to negative psychological consequences (Kellogg & Bourland, 1990b).

One of the major supposed advantages of using the E-Prime, accordingly to Kellogg and Bourland (1990), is the reduction of stressful situations. The effect on stress levels may be caused by lowering the frequency and intensity of interpersonal conflicts due to higher communication accuracy (Kellogg & Bourland, 1990b). Replacing the verb *to be* with other words could generate higher mental flexibility, thus helping a person to generate more solutions for specific problems, thereby boosting creative skills (Kellogg & Bourland, 1990b). By a psychological point of view, an essential benefit of using E-Prime is that it precludes the possibility to make global evaluations, either about self or others (Kellogg & Bourland, 1990b).

1.3.3. R-Prime

R-Prime (e.g., *Romanian Prime*; David, 2013) represents a spin-off of E-Prime paradigm, being based on the same basic principles, but referring to Romanian language. From the General Semantics point of view, standard Romanian (R-Standard) has the same structural problems as English regarding the use of the verb *to be*, especially when it is used with predication or identity function (David, 2013).

Even data provided by these experimental research are mixed considering E-Prime assumptions, the results of the aforementioned studies are very important because suggest that E-Prime/R-Prime may be more related with functional feelings, while E-Standard/R-Standard seems to be predominantly associated with dysfunctional feelings. These data represent the starting point for a new line of research due to the fact that provides the first empirical evidence which show a relationship between the use of the verb *to be* and psychological outcomes.

1.3.4. Rational Emotive Behavior Therapy

1.3.4.1. Theoretical foundations

Rational Emotive Behavioral Therapy (Ellis, 1962) was one of the first forms of cognitive behavior therapies. The theory behind REBT differentiate it from the other CBT therapies mainly due to its assumption that the main determinant of feelings are the evaluative beliefs, not the descriptive and/or inferential beliefs as other CBT approaches assume (David & Cramer, 2010). According to REBT, different life situations represent activating events for one's evaluative beliefs, which may be irrational or rational. Then, these evaluative beliefs will generate specific emotional and behavioral consequences depending on the beliefs' nature and its degree of irrationality/rationality (David, Lynn, & Ellis, 2010; Ellis, 1994).

REBT defines irrational beliefs as cognitions which have not logical, pragmatic, and/or empirical support. (David & Cramer, 2010). Literature differentiates four distinct types of irrational beliefs (David, Lynn & Ellis, 2010): (1) demandingness (DEM); (2) catastrophizing (CAT); (3) low frustration tolerance/frustration intolerance (LFT); and (4) global evaluations/self-downing (GE/SD). There are several research articles (see David, Montgomery, Macavei, & Bovbjerg, 2005; DiLorenzo, David, & Montgomery, 2007; Hyland, Shevlin, Adamson, & Boduszek, 2014a) that provided evidence for the idea that the primary appraisal mechanism/irrational belief is represented by DEM, while CAT, LFT, and GE/SD are secondary appraisal mechanisms/irrational beliefs.

There is a large body of research showing that irrational beliefs are a strong predictor or even cause dysfunctional emotions, and/or maladaptive behaviors (see David, 2015; Vîslă, Flückiger, Grosse Holtforth, & David, 2016).

Rational beliefs represent flexible evaluative cognitions, having logical, pragmatic and/or empirical support (David & Cramer, 2009). There are four main categories of rational beliefs: (1) preference beliefs (PRE); (2) realistic evaluation of badness/non-catastrophizing (REB); (3) high frustration tolerance (HFT); and (4) unconditional acceptance of life, self, and/or other (UA/SA). Preference beliefs represent flexible thoughts about one's needs, about what he/she wants (e.g., "I would like to be the best in my professional field and I will do my best to accomplish it, but I can accept if it will not happen."; Hyland, Maguire, Shevlin, & Boduszek, 2014). REB refers to evaluate negative events in a non-awfulizing perspective (e.g., "This is a very bad thing, but it is not the worst thing that can happen to me, so it is not awful."; Hyland, Maguire, et al., 2014). HFT beliefs are thoughts by which a person know that he/she can tolerate difficult situations or events (e.g., "It would be nice that everything to be fine and easy, but if this won't happen, I will be able to tolerate it and go forward, even it will be hard."; Hyland, Maguire, et al., 2014). UA/SA imply to avoid general evaluation of self, others or life, but rather making situational evaluations based on specific behavior or events (e.g., "I would prefer that people to be nice to me every time, but if this is not happening, it doesn't mean that they are bad persons or worthless, it means that they behaved unfair or rude in that specific situation.; Hyland, Maguire, et al., 2014). There is some incipient evidence pointing out that PRE represents the primary appraisal mechanism/rational belief, while REB, HFT and UA/SA are secondary appraisal mechanisms/rational beliefs (Hyland, Maguire, Shevlin, & Boduszek, 2014; Oltean, Hyland, Vallières, & David, 2017).

REBT states that rational beliefs are associated with functional emotions, but this assumption was less tested in empirical studies. However, latest studies (Hyland, Shevlin, Adamson, & Boduszek, 2014b; Oltean, Hyland, Vallières, & David, 2017) revealed a medium negative association between rational beliefs and distress.

One development of REBT theory is represented by the extended 'ABC' model (David, 2003, 2015), which makes a clear distinction among cognitive processes (see Figure 1). First level of categorizing cognitions is represented by their consciousness nature, dividing them into unconscious and conscious processing. Further, conscious cognitions can be separated to descriptions, inferences, and evaluative beliefs. Also, these kind of cognitions (descriptions/inferences and evaluations) can have a general character or to be situational-specific. According to the model, general cognitions influence the interpretation of life events, generating specific descriptions, inferences, and evaluative beliefs, which in turn will determine the functionality of feelings and behaviors.

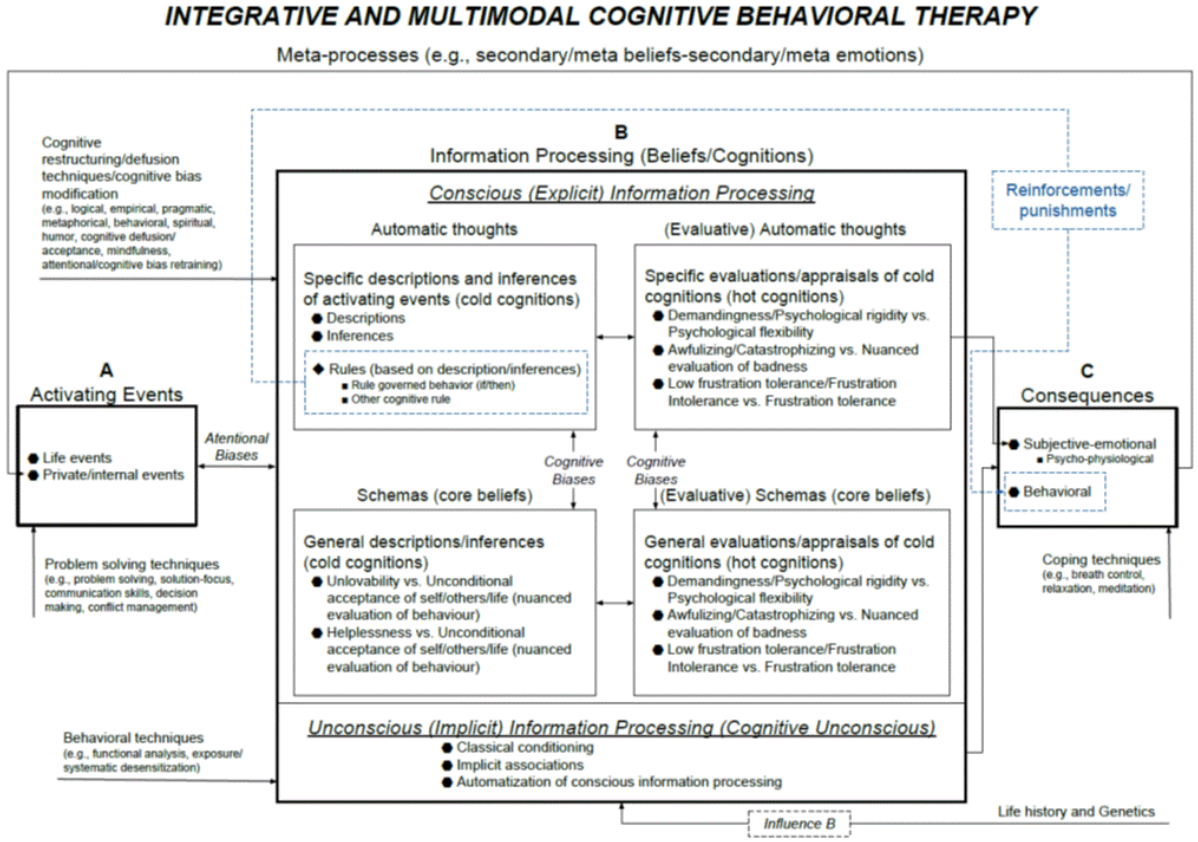

Figure 1. Extended ABC model (David, 2003, 2015)

1.3.4.2. The binary model of distress

Regarding the distinction between dysfunctional and functional emotions, there are in literature two main models that attempt to discriminate between the two concepts based on different criteria. First, the unitary model of distress (Russell & Carroll, 1999), distinguishes functional and dysfunctional emotional based only on one criterion, namely the intensity of the emotions. Therefore, the unitary model of distress (Russell & Carroll, 1999) sees related emotions (e.g., sadness and depression) as bipolar constructs, placed on an intensity-based continuum.

Contrariwise, the binary model of distress (Ellis & DiGiuseppe, 1993) makes a distinction between the two types of emotion based not only on quantitative reasons, but also

on qualitative bases. In a pioneering article, Ellis and DiGiuseppe (1993) support the existence of a qualitative difference between functional and dysfunctional feelings and their main arguments are: (1) both functional and dysfunctional feelings can have various intensity levels, ranging from very low to very high; (2) a person can feel simultaneously more than one emotion, and even experience both functional and dysfunctional emotions in the same time; (3) the functionality of an emotion can be determine based on its effects and personal relevance; (4) functional and dysfunctional emotions seems to be caused by rational or irrational beliefs respectively, these types of cognitions being also qualitatively different.

Based on this paradigm, seems that negative dysfunctional emotions correspond to clinical problems, while functional ones can be viewed as regular reactions in stressful activating situations (Mogoase & Stefan, 2013).

Also, the binary model of distress states that when a person feels a negative dysfunctional emotion (e.g., depression), he/she will also experience the corresponding functional negative emotion (e.g., sadness; David et al., 2005). On the other hand, one can have negative functional emotions, without feeling dysfunctional emotions too (David et al., 2005).

1.3.4.3. Evidence for the efficacy and effectiveness of REBT

1.3.4.3.1. Sources of empirical support for the REBT

In this section, we summarize the literature providing empirical support for the REBT interventions in psychological disorders/problems. Then, we present the status of REBT treatments in the most important international clinical guidelines.

Since the mid 1980's, the REBT clinical research field begun to develop more and more studies in order to assess the efficacy and effectiveness of REBT for various psychological disorders. The quality of the studies increased over the years, leading to sound evidence supporting REBT. Several early qualitative and quantitative syntheses (Engels, Garnefski, & Diekstra, 1993; Lyons & Woods, 1991) evaluated the efficacy of REBT and showed it to be significantly better than placebo or no treatment, and equally efficient with other therapies, with medium effect sizes.

Recently, a new and comprehensive meta-analysis (David, Cotet, Matu, Mogoase, & Stefan, 2017), which investigated the effects of REBT interventions, as well as their mechanisms of change, was published. Overall, a medium effect size of $d = 0.58$ was obtain for REBT compared to other interventions, at post-test.

The most relevant study arguing for the efficacy of REBT is a randomized clinical trial (David, Szentagotai, Lupu, & Cosman, 2008) that compared REBT with cognitive therapy, and with pharmacotherapy (i.e., SSRI medication - *fluoxetine*) for major depressive disorder. Results revealed that REBT held similar results with cognitive therapy and pharmacotherapy at posttest.

Another randomized clinical trial (Iftene, Predescu, Stefan, & David, 2015) investigated the effects of REBT for major depressive disorder in a youth sample compared with pharmacotherapy (i.e., SSRI medication - *sertraline*), and with the combination of REBT and pharmacotherapy. The data showed that REBT improved subjective, cognitive, and biological outcomes in youths to a similar degree as pharmacotherapy, and the combination of the two interventions (Iftene et al., 2015). The results regarding the clinical response rate presented the same pattern, with no differences between the three groups (Iftene et al., 2015).

1.3.4.3.2. REBT in international clinical guidelines

Based on the empirical data presented above, REBT was included in several international guidelines. In the case of depressive disorders, REBT was included as a probably efficient treatment in the *Research Supported Psychological Treatments List of the Division 12* of the American Psychological Association (APA).

Another major clinical guideline which recommends REBT as an viable intervention for depressive disorders is the one from the *National Institute for Health and Clinical Excellence Guidelines* (NICE; National Institute for Clinical of Excellence, 2009)..

1.3.4.4. Rational Emotive Education

Rational Emotive Education (REE; Digiuseppe & Kassinove, 1976; Ellis, 1971; Knaus, 1977) it is a mental program derived from REBT, which has prophylactic aims towards psychological problems for non-clinical population. REE was initially designed for children and adolescences, in order to be applied in school settings (Watter, 1988), but its use extended to various non-clinical population, including students. Several qualitative reviews (DiGiuseppe & Bernard, 1990; Gossette & O'Brien, 1993; Hajzler & Bernard, 1991; Watter, 1988) highlighted the effects of REE, such as: decreasing levels of irrational beliefs, of dysfunctional emotions such anxiety, and maladaptive school-related problems, while increasing rational beliefs levels, functional emotions, internal locus of control and adaptive behavior. A recent meta-analysis (Trip, Vernon, & McMahon, 2007) confirmed the prophylactic effect of REE on various age stages, including students. Finally, another meta-analysis (David et al., 2017) summarized data about the efficacy and effectiveness of all REBT interventions and found a medium effect size of REBT (d = 58) compared with other interventions on primary outcome, with no moderation effects regarding the type of intervention (psychotherapeutic, education - REE, or counseling).

1.3.5. Game Theory

One of the main goals of the present thesis is to test REBT and E-Prime assumptions in a rigorous, scientific manner. A piece of the present thesis' original research which is the core of this line of action tests the respective assumptions in an economic framework provided by the Behavioral Game Theory (Camerer, 2003). Therefore, the following section presents the particularities of this paradigm in order to provide a comprehensive overview of our approach.

1.3.5.1. Classic Game Theory

The theoretical underpins of Behavioral Game Theory are rooted in the classic Game Theory (Von Neumann & Morgenstern, 1947) which is a research area aiming to create models of strategies used in the interaction between decision-makers. Game theory analyzes the mathematical models of how decision-makers interact with each other in situations where one's actions/decisions affect the others (Myerson, 2013). Specific patterns of cooperation and/or conflict are systematically investigated using specific methods (Myerson, 2013). Game theory spread fast in the scientific field due to its possible application for a wide range of disciplines, such economics, sociology, politics, psychology, or anthropology (Myerson, 2013).

1.3.5.2. Behavioral Game Theory

Behavioral Game Theory investigates strategic decisions in a more experimental approach than the classic Game theory, also taking into account more psychological factors, such as the framing effects or fairness (Camerer, 2003). In contrast whit classic Game theory which assumed rational individuals, behavioral game theory expands the theoretical framework in order to better predict behaviors of persons in real-life situations (Bonau, 2017). A large

body of experiments clearly showed that individuals involved in several economic games do not act as predicted by game theory, maximizing their payoff not being their only drive (Bonau, 2017). Instead, players usually engage in other types of behavior, such altruistic cooperation, punishments, and unfairness/inequality aversions responses (Bonau, 2017).

Starting from this perspective, behavioral game theory provided significant experimental evidence in the favor of the idea that players are constantly trying to predict the behaviors of the others player engaged in a specific game/situations, and they adapt their decisions based on these predictions (Bonau, 2017; Camerer, 2003). Also, it was proved that instead of acting in a pure rational manner, people are not always aware of all alternatives, making decisions most often based on heuristics, settling for satisfactory solutions instead of optimal ones (Bonau, 2017). According to literature, the main factors that determine people to deviate from rational expected behavior are cognitive distortions, psychological predispositions, computational deficiencies, and time constraints (Bonau, 2017).

CHAPTER II. RESEARCH OBJECTIVES AND OVERALL METHODOLOGY

Starting from the identified gap from literature and taking into account the general purposes of the present thesis, namely to scientifically test the assumptions of E-Prime theory, to investigate the relationship between rational beliefs and psychological distress, and to test if REBT could be enhanced by incorporating E-Prime concepts, we formulated specific objectives which are presented in this section. This thesis aimed to be a pioneer by bringing a philosophical and linguistic movement, E-Prime, in the scientific field and investigated its possible benefits. Moreover, we have proposed to provide added value to the REBT field, especially regarding fundamental research.

In order to bring more evidence for the validation of REBT theoretical assumptions and its alleged mechanisms of change, the first study represented a qualitative meta-analytical review which aimed to investigate the direction and magnitude of the correlational relationship between rational beliefs and psychological distress. Moreover, we investigated the potential moderator role of several variables.

The second study aimed to investigate the intensity and the direction of the association between the frequency of using the verb *to be* and various psychological outcomes, namely general rational and irrational beliefs, negative functional and dysfunctional emotions, the functionality of inferences, and general psychological distress. Also, as a secondary objective we investigated the relationships among the psychological outcomes measured, as well as the

relationship between the frequency of using the verb *to be* and each of the rational and irrational beliefs type.

Further on, based on literature analysis and identified gaps, we measured what impact has the use or the absence of the verb *to be* in formulating specific evaluative beliefs during an activator event. Therefore, Study 3 had as objective to comparatively investigate the effects of using R-Prime vs. R-Standard in formulating rational and irrational beliefs, on affective, cognitive, and behavioral outcomes.

Finally, we wanted to look for possible applications of merging E-Prime and REBT perspectives. More specifically, we intended to see if incorporating E-Prime derived strategies in validated, evidence-based interventions protocols will lead to significant improvements in their efficacy. Consequently, Study 4 had two major goals: (a) to investigate the efficacy of Rational Emotive Education combine with E-Prime strategies (REE-Prime) vs. Rational Emotive Education (REE) in preventing exam-related psychological distress for students; (b) to assess the feasibility of the new protocol of REE-Prime intervention.

From a methodological point of view, in order to achieve our objective we developed four studies that used several designs, such as a meta-analytical approach (Study 1), a correlational design (Study 2), an experimental one (Study 3), and a randomized prevention trial (Study 4).

Being part of the PhD program, all four studies implemented within this thesis have the ethical approval from Babes-Bolyai University Ethical Review Board. The structure of the thesis, which follows the research objectives, is presented in Figure 2.

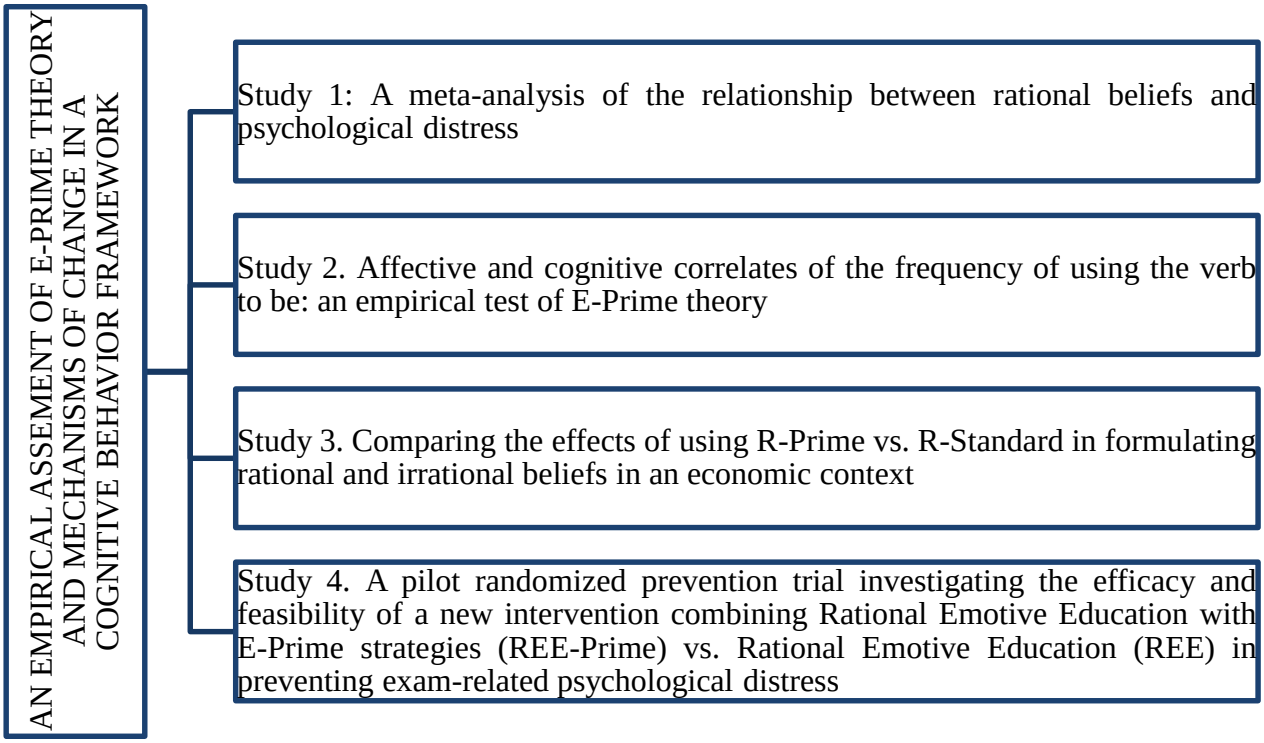

Figure 2. The schematic structure of the Ph.D. project

CHAPTER III. ORIGINAL RESEARCH

3.1. Study 1. A meta-analysis of the relationship between rational beliefs and psychological distress [1]

3.1.1. Introduction

Rationality was one of the main goals of human beings for centuries, starting from ancient and classic philosophers to modern science paradigms (Mele & Rawling, 2009). There is an important distinction between theoretical rationality, which refers to cognitions (such as beliefs), and practical rationality which may refer to actions, behaviors, decisions etc. (Audi, 2009). Within the psychological field, the focus of research was mainly on practical rationality, especially on the effect of rational decision-making, rather than on theoretical rationality, which also has an important impact in the clinical field (David, 2015; David, Lynn, & Ellis, 2009).

Rational Emotive Behavior Therapy (REBT), one of the first forms of cognitive-behavior theories (CBT) (Beck, 1976; Ellis, 1962), is the most important approach that considers the rationality of ones beliefs as highly important in the development and maintenance of psychological health (i.e., rationality) and/or psychological disturbances (i.e., irrationality) (Ellis, 1962). In contrast to other CBT approaches, REBT states that the proximal causes of emotions are the evaluative cognitions (i.e., appraisals) rather than descriptive or inferential cognitions (David & Cramer, 2009).

Rational beliefs are flexible evaluative cognitions which are logical and/or have empirical or pragmatic back-up (David & Cramer, 2009). REBT model of psychological health considers that rational beliefs cause functional emotions and adaptive behavior, thus protecting us from distress. Unlike the REBT model of psychopathology, the REBT model of psychological health was less empirically tested (David, 2015; Hyland, Maguire, Shevlin, & Boduszek, 2014; Hyland, Shevlin, Adamson, & Boduszek, 2014), so the presumed role of rational beliefs as protective factor against psychological distress/disorders is still in debate. Also the proposed structure of rational beliefs organization needs further investigation. Even though initial, both rational and irrational beliefs were conceptualized as bipolar constructs, recent research tends to provide evidence that they are distinct, qualitatively different constructs (David et al., 2009).

Two main paradigms that explain the nature of psychological distress are discussed in the literature, namely the unitary and the binary models of distress. There is still a debate in literature between these two models, but recent research seems to favor the binary model of distress (David & Cramer, 2009). The number of researchers and clinicians that claim for updated methods of evaluating evidence-based psychotherapies has increased over the last decade (David & Montgomery, 2011). Recently, a new system (David & Montgomery, 2011) was developed in order to evaluate not only the efficacy and effectiveness of a therapy, but also the underling theoretical assumptions, and especially the proposed mechanism of change.

[1]This study has been published.

Oltean, H. R., & David, D. O. (2018). A meta-analysis of the relationship between rational beliefs and psychological distress. *Journal of clinical psychology*, *74*(6), 883-895.

The authors contributed to the article as follows: Oltean, H.R.: study design, conducting the study, data analysis, results' interpretation and writing the manuscript. David. D.O.: study design, results interpretation, reviewing and writing the manuscript.

Using this new method, the pseudoscientific approaches (psychological interventions that have not a validated background theory or they are based on an invalidated theory) can be avoided in the clinical field (David & Montgomery, 2011). Therefore, investigating the relationship between rational beliefs and distress is an important step which can bring more evidence for the validation of REBT theoretical assumptions and mechanisms of change.

Taking into account the above arguments and identified gaps in the literature, the aim of the present meta-analysis is to investigate the direction and magnitude of the correlational relationship between rational beliefs and psychological distress. Moreover, we investigated the potential moderator role of several variables. These variables were grouped in four principal categories based on theoretical considerations: (1) distress-related moderators: distress type, distress measure, functionality of distress; (2) rational beliefs-related moderators: rational belief type, rational belief measure, generality of rational beliefs; (3) sample-related moderators: sample size, mean age of the sample, gender (the percent of males), the percent of students, level of irrational beliefs, clinical status, the country of origin; (4) author/study-related moderators: publication year, the comparison type, developer/validator status of the author(s) of a scale used in study to measure distress or rational beliefs, and if the study assumed or not objectives or hypotheses regarding the relationship between rational beliefs and distress.

We expected a negative relationship between rational beliefs and psychological distress, meaning that higher levels of rational beliefs will be associated with lower levels of distress, and vice versa.

Given the fact that some measures of distress also contained cognitive or behavioral indicators of distress, we expected that the association between rational beliefs and distress will be significantly influenced both by distress type and distress measure. Also, according to the binary model of distress (David et al., 2005; Ellis & DiGiuseppe, 1993), we expected that rational beliefs will be positively associated with functional negative emotions, while being negatively associated with dysfunctional negative emotions.

Regarding rational beliefs-related moderators, we expected that rational belief type will significantly influence the strength of the relationship, due to the presumed organization of rational beliefs, where PRE seems to be the primary appraisal mechanism, while REB, HFT and UA are considered secondary appraisal mechanisms. Thus, we expected significantly stronger associations for secondary rational beliefs (REB, HFT and UA beliefs) and distress, because these are more proximal to distress than PRE beliefs (David, 2015). Moreover, the rational belief measure was expected to be a significant moderator, because some of the measures might be contaminated by emotional items. We also expected a significantly different pattern of association when comparing different rational belief types with various distress types.

Due to the fact that previous research did not provide enough data, for other possible moderator variables we did not formulate hypotheses, but rather tested their possible moderator role in an exploratory fashion.

3.1.2. Method

3.1.2.1. Selection of studies

We searched for potential relevant studies in the following databases: PubMed, PsycInfo, Scopus and Web of Science. We looked for articles published up to June 2016, using the following search terms: (‘rational beliefs’ OR ‘rational cognitions’) AND (‘negative emotions’ OR ‘negative feelings’ OR ‘depression’ OR ‘anxiety’ OR ‘anger’ OR ‘guilt’). We

included in this meta-analysis primary data, peer-review articles, written in English which measured rational beliefs, and at least one type of distress and reported enough data to compute effect size. Dissertations were excluded because these papers do not go through a systematic peer-review process. Also, we excluded the studies which conceptualized rational beliefs as low levels of irrational beliefs in order to avoid cofounding variables which might bias the results. The literature search details can be views in Figure 1.

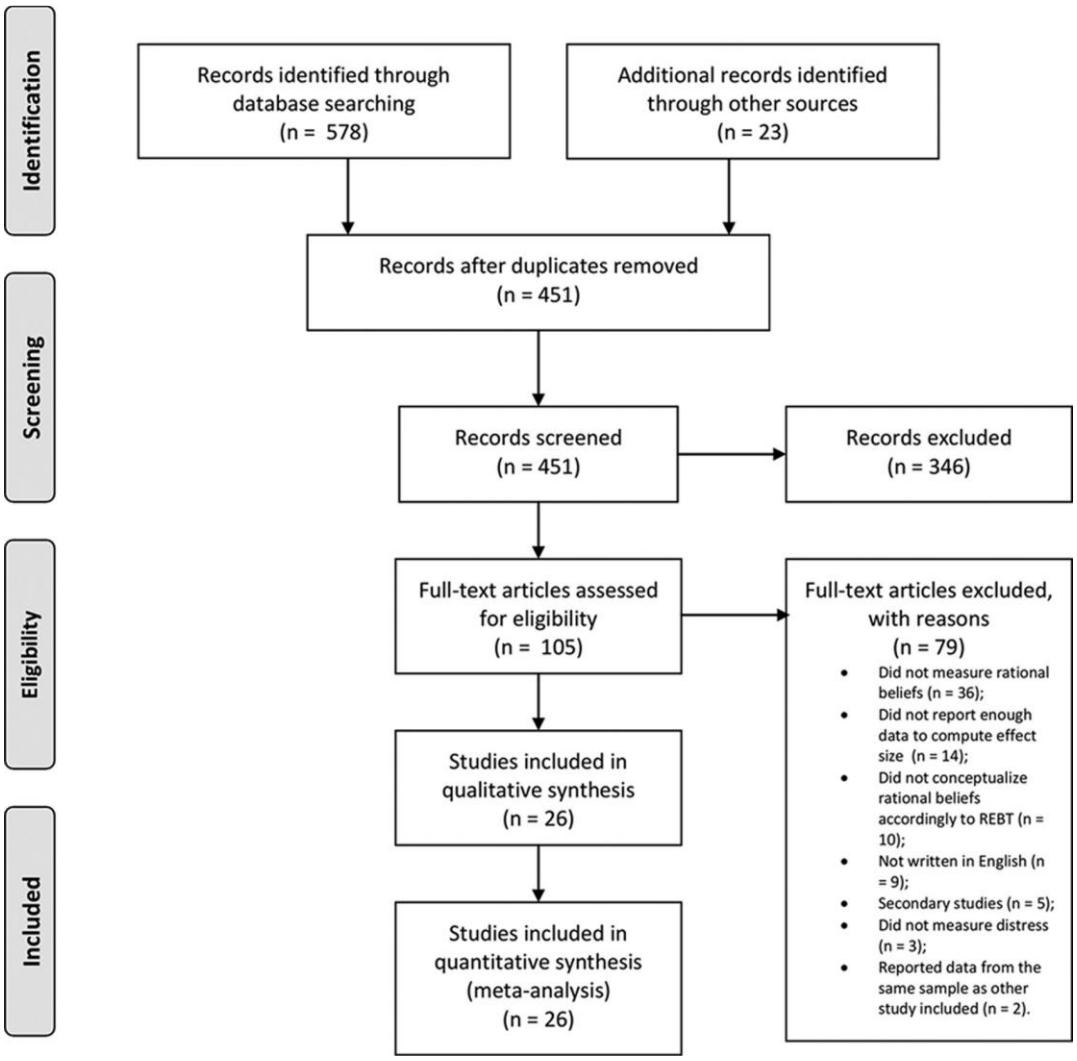

Figure 1. Flow diagram of the systematic search process. *From:* Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). *P*referred *R*eporting *I*tems for *S*ystematic Reviews and *M*eta-*A*nalyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097

3.1.2.2. Coding of study variables

Each study included in the meta-analysis was coded independently. The following variables were evaluated and coded: study identification data (study identifier, author[s]), publication year, country, developer or validator status of the author(s), sample size, mean age of participants, proportion of males, educational status (students' percent), clinical status (clinical or non/sub-clinical), rational beliefs measure, rational beliefs type, generality of rational beliefs (general or specific), distress measure, distress type, functionality of distress (functional negative emotions or dysfunctional negative emotions), comparison type, hypotheses/objectives status, effect size.

3.1.2.3. Statistical analyses

For all statistical analysis we followed the indications of Borenstein, Hedges, Higgins, & Rothstein (Borenstein, Hedges, Higgins, & Rothstein, 2009) and we used Comprehensive Meta-Analysis (CMA) software (Borenstein, Hedges, Higgins, & Rothstein, 2005). We opted for the random-effects model because we expected a real variation in effect size of different studies based on their intrinsic characteristics and because it allows a wider generalization of the results (Borenstein et al., 2009). As an index of effect size we used the Pearson correlation coefficient (*r*), with the following cut-off values: 0.10, 0.30 and 0.50 for a small, medium and large effect sizes, respectively (Cohen, 1988). For the overall analyses we used the study as our unit of analysis, so, if a study reported multiple effect sizes, an average effect size was computed and then used in analyses.

For continuous moderators analyses method-of-moments meta-regressions were employed, while for categorical moderators analog-to-ANOVA procedures were used (Borenstein et al., 2009). If there were different effect sizes reported in the same study corresponding to different categories of a categorical moderator, we used subgroup within the study as the unit of analysis (Borenstein et al., 2009).

In order to assess heterogeneity, we visually inspected he forest plot and we used Q and I^2 statistics (Higgins & Thompson, 2002). Risk for publication bias was also addressed by visual inspection of the forest plot, rank correlation test (Begg & Mazumdar, 1994), Egger's test for bias (Egger, Smith, Schneider, & Minder, 1997), classic (Rosenthal, 1991) and Orwin's (Orwin, 1983) *Fail-safe N*, and *trim-and-fill* (Duval & Tweedie, 2000) procedures.

3.1.3. Results

3.1.3.1. Descriptive statistics

There were 26 studies included in the meta-analysis, published between 1986 and 2015. Studies were conducted in six different countries, namely Australia, Ireland, Romania, Serbia, United States and United Kingdom. There was a total number of 5247 participants, with a weighed mean age by sample size of 29.72 years (SD = 7.70; range = 20.3–48.9 years). There was a mean weighed percent of males of 26.9. 10 studies had student samples, 2 had clinical samples, while the rest of them had non-clinical participants, from general population. 25 of the studies used a cross-sectional design and only 1 employed an experimental design.

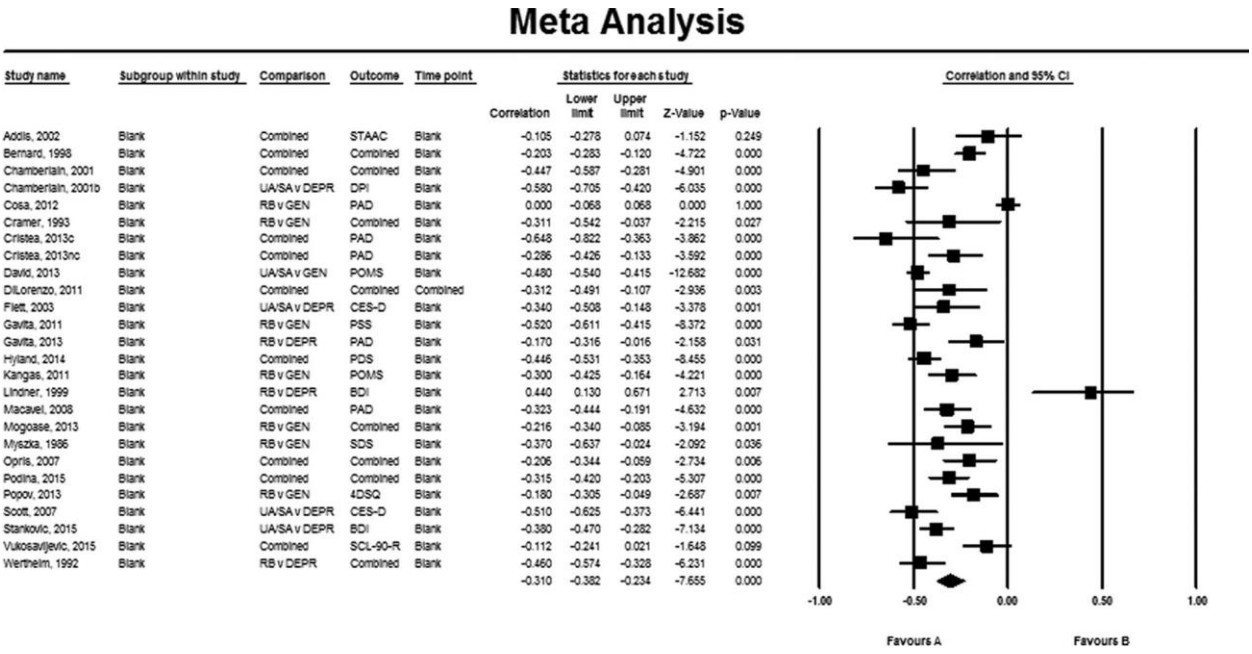

Figure 2. The forest plot.

3.1.3.2. Overall analysis

Results identified a medium negative effect size for the correlation between rational beliefs and psychological distress, r = -0.31 ($p < 0.001$, 95% CI = -0.38– -0.23, k = 26). There was significant, high heterogeneity across effect sizes, as reveled by visual inspection of the forest plot (see Fig. 2), Q statistics, and I^2 statistics ($Q(25) = 214.096$, $p < 0.001$; $I^2 = 88.32\%$).

Regarding publication bias analyses, visual inspection of the funnel plot (see Fig. 3) showed that effect sizes generally fall symmetrically around the mean. Moreover, results for rank correlation test ($p = 0.39$), and for Egger's test for bias ($p = 0.14$) reflected that publication bias was not present. Classic Rosenthal's Fail-safe N (Rosenthal, 1991) indicated that it would be necessary to have a number of 3015 studies (115.99/included study) with null correlational relationship to obtain a non-significant correlation between rational beliefs and psychological distress. Orwin's Fail-safe N (Orwin, 1983) pointed out that if we would add 50 studies with a mean correlation of 0, the correlation between rational beliefs and psychological distress would become trivial (i.e., $r < 0.10$). Finally, the Duval and Tweedie's Trim and Fill procedure (Duval & Tweedie, 2000) indicated that 4 studies are necessary to be imputed to the right of the mean in order to obtain complete symmetry, in which case the effect size would be r = -0.26 ($p <$ 0.001, 95% CI = -0.34– -0.19, k = 26).

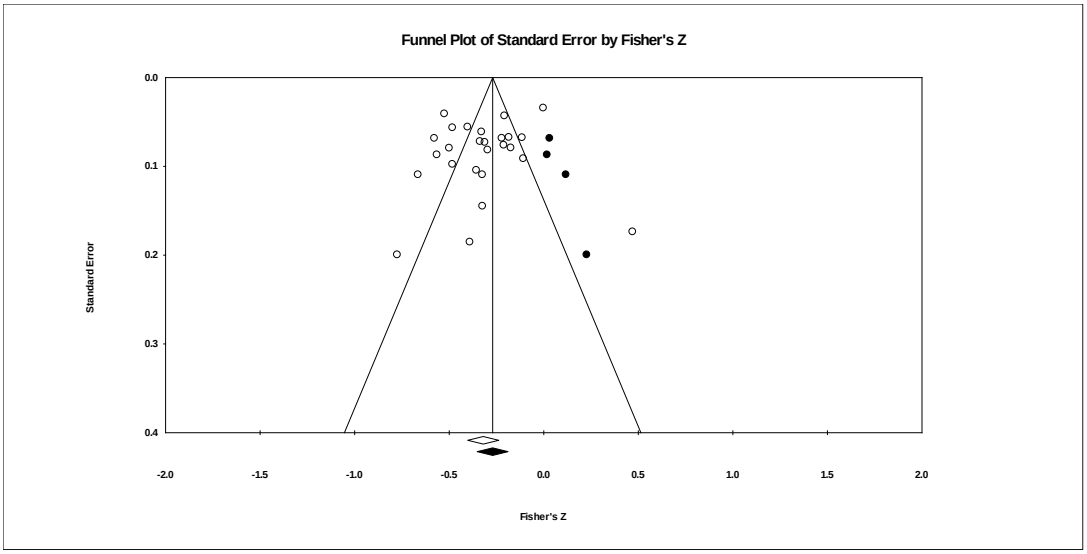

Figure 3. The imputed funnel plot of publication bias: white dots represent the studies included in the analyses; black dots represent the studies that would be needed for attaining complete symmetry.

3.1.3.3. Moderation analyses

The detailed results from categorical moderation analyses are presented in Table 1, while results from continuous moderation analyses are presented in Table 2.

Distress-related moderators

The distress type was not a significant moderator of the relationship between rational beliefs and distress ($Q_B(5) = 4.16$, $p > 0.05$).

The distress measure was also not a significant moderator ($Q_B(6) = 10.68$, $p > 0.05$).

The effect size for dysfunctional negative emotions ($r = -0.31$, $p < 0.001$, $k = 26$) was slightly larger than for functional negative emotions ($r = -0.24$, $p < 0.01$, $k = 5$), but there were no statistical difference between them, meaning that **functionality of distress** was neither a significant moderator ($Q_B(1) = 0.70$, $p > 0.05$).

Rational beliefs-related moderators

Rational beliefs type significantly moderated the relationship between rational beliefs and distress ($Q_B(1) = 10.63$, $p < 0.01$).

Rational beliefs measure was not a significant moderator overall ($Q_B(3) = 7.34$, $p > 0.05$).

Generality of rational beliefs did not significantly moderate the relationship between rational beliefs and distress ($Q_B(1) = 0.16$, $p > 0.05$).

Sample-related moderators

Neither **sample size** ($\beta = 0.0002$, $SE = 0.0002$, $z = 0.96$, $p > 0.05$, $k = 26$) nor **mean age** ($\beta = 0.0037$, $SE = 0.0062$, $z = 0.59$, $p > 0.05$, $k = 22$) of the sample were a significant moderator of the relationship. Also, **gender** ($\beta = 0.0039$, $SE = 0.0023$, $z = 1.67$, $p > 0.05$, $k = 25$), measured

as the percent of males, did not moderate the relationship. **Irrational beliefs level** (β = -0.0224, *SE*= 0.0874, *z* = 0, *p* > 0.05, *k* = 10) of the sample was not a significant moderator either.

On the other hand, **the percent of students** was a significant moderator (β = -0.0025, *SE*= 0.0010, *z* = -2.47, *p* < 0.05, *k* = 18), meaning that a higher percent of students is associated with larger effect sizes.

Even if there was a small difference between effect sizes for clinical (*r* = -0.47, *p* < 0.01, *k* = 2) and non/sub-clinical (*r* = -0.30, *p* < 0.001, *k* = 24) samples, it was not significant, thus **clinical status** of the sample was not a significant moderator ($Q_B(1) = 1.21$, *p* > 0.05).

Country of origin of the sample also did not moderate the relationship ($Q_B(4) = 4.74$, *p* > 0.05).

Author/study-related moderators

Publication year was not a significant moderator of the association between rational beliefs and psychological distress (β = 0.0002, *SE*= 0.0057, *z* = 0.03, *p* > 0.05, *k* = 26).

The comparison type significantly moderated the relationship between rational beliefs and distress ($Q_B(8) = 20.88$, *p* < 0.01).The association was significant smaller for studies which reported correlations between total rational beliefs scores and depression (*r* = -0.22, *p* <0.01, *k* = 7) than for those reporting correlations between UA scores and depression (*r* = -0.39, *p* <0.001, *k* = 7). In the case of anxiety, the same pattern was revealed, with significant smaller effect sizes for studies that reported correlations between total rational beliefs scores and anxiety (*r* = -0.18, *p* < 0.05, *k* = 5) compared to those reporting correlations between UA scores and anxiety (*r* = -0.52, *p* < 0.001, *k* = 3).

The developer/validator status of the author(s) did not moderate the association ($Q_B(4) = 0.004$, *p* > 0.05).

Studies which assumed **objectives/hypotheses** regarding the relationship between rational beliefs and distress (*r* = -0.40, *p* < 0.001, *k* = 11) presented significant higher associations than studies which did not assume such objectives/hypotheses (*r* = -0.25, *p* <0.001, *k* = 15).

Table 1.
Moderation analyses for categorical variables.

Moderator	Category	k	r	95% CI	Q_w	I^2	Q_b (df)
Distress type							**4.157 (5)**
	Anger	2	**-0.14**	[-0.38, 0.12]	2.16	54	
	Anxiety	8	**-0.23*****	[-0.35, -0.11]	51.43***	86	
	Depression	12	**-0.29*****	[-0.39, -0.19]	58.96***	81	
	General	13	**-0.32*****	[-0.42, -0.22]	134.82***	91	
	Sadness	2	**-0.19**	[-0.43, 0.07]	0.04	0	
	Other	3	**-0.16**	[-0.36, 0.05]	0.95	0	
Distress measure							**10.681 (6)**

	BDI	6	**-0.30*****	[-0.42, -0.17]	27.86***	82	
	CES-D	3	**-0.44*****	[-0.59, -0.27]	2.37	16	
	PAD	7	**-0.25*****	[-0.37, -0.13]	45.50***	87	
	POMS	3	**-0.38*****	[-0.53, -0.20]	8.11*	75	
	STAI	3	**-0.17**	[-0.35, 0.01]	6.71*	70	
	STAXI-2	2	**-0.08**	[-0.30, 0.15]	0.09	0	
	Others	10	**-0.34*****	[-0.44, -0.24]	59.34***	85	
Distress functionality							**0.698 (1)**
	Dysfunctional	26	**-0.31*****	[-0.38, -0.24]	214.59***	88	
	Functional	5	**-0.24****	[-0.40, -0.06]	3.30	0	
Rational belief type							**10.627 ** (1)**
	Total	18	**-0.24*****	[-0.33, -0.15]	116.59***	85	
	UA	11	**-0.47*****	[-0.56, -0.36]	94.07***	89	
Rational belief measure							**7.343 (3)**
	ABS-II	8	**-0.28*****	[-0.40, -0.15]	75.70***	91	
	GABS	6	**-0.17***	[-0.31, -0.02]	33.52***	85	
	USAQ	9	**-0.41*****	[-0.52, -0.30]	18.42*	57	
	Others	6	**-0.35*****	[-0.48, -0.20]	34.56***	86	
Generality of rational belifs							**0.160 (1)**
	General	23	**-0.30*****	[-0.38, -0.22]	194.31***	89	
	Specific	4	**-0.35****	[-0.52, -0.14]	15.45**	81	
Country							**4.744 (4)**
	Australia	5	**-0.17**	[-0.35, 0.02]	30.79***	87	
	Romania	10	**-0.31*****	[-0.43, -0.19]	128.77***	93	
	Serbia	3	**-0.23**	[-0.44, 0.01]	12.26**	84	
	UK	3	**-0.40****	[-0.59, -0.16]	3.28	39	

	USA	4	**-0.44*****	[-0.61, -0.23]	5.07	41	
Clinical status							**1.21 (1)**
	Clinic	2	**-0.47****	[-0.70, -0.16]	3.33	54	
	Non(sub)-clinic	24	**-0.30*****	[-0.37, -0.22]	208.27***	86	
Developer/validator status							**0.004(1)**
	No	11	**-0.31*****	[-0.42, -0.20]	84.26***	88	
	Yes	15	**-0.31*****	[-0.40, -0.21]	105.69***	87	
Objectives/hypothesis status							3.945 * (1)
	No	15	-0.25***	[-0.34, -0.15]	155.17***	91	
	Yes	11	-0.40***	[-0.50, -0.28]	35.85***	72	

Note: *k* = number of effect size included in the analysis, *r* = Pearson correlation coefficient, BDI = Beck Depression Inventory, CES-D = The Center for Epidemiologic Studies Depression Scale, PAD = Profile of Affective Distress, POMS = the Profile of Mood States, STAI = State Trait Anxiety Inventory, STAXI-2 = The State-Trait Anger Expression Inventory-2, UA = unconditional acceptance/self-acceptance, ABS-II = Attitudes and Beliefs Scale-II, GABS = General Attitudes and Beliefs Scale, USAQ = Unconditional Self-Acceptance Questionnaire, UK = United Kingdom, USA = United States of America. * $p < 0.05$, ** $p < 0.01$., *** $p < 0.001$.

Table 2.
Moderation analyses for continuous variables.

Predictor	**k**	**β**	**SE**	**95 % CI**	**z**	**p**	**Q_{model} (df)**
Publication year	26	0.00016	0.00570	[-0.01101, 0.01134]	0.029	0.977	0.001
Sample size	26	0.00020	0.00021	[-0.00021, 0.00062]	0.962	0.336	0.925
IB level	10	-0.02241	0.08744	[-0.194, 0.149]	0	0.797763	0.06566
Gender	25	0.00388	0.00232	[-0.00066, 0.00842]	1.674	0.094	2.802
Mean age	22	0.00368	0.00619	[-0.00846, 0.01582]	0.594	0.552	0.353
Student percentage	18	-0.00250	0.00101	[-0.00447, -0.00052]	-2.473	0.013	**6.116***

Note: *k* = number of effect size included in the analysis, β = meta-regression coefficient, IB= irrational beliefs. * $p < 0.05$, ** $p < 0.01$., *** $p < 0.001$.

3.1.4. Discussion

The present review aimed to investigate the direction and intensity of the relationship between rational beliefs and psychological distress, as well as the possible moderators of the relationship, using specific meta-analytical procedures. Our systematic literature search led to the identification of 26 studies, with a total number of 5247 participants, which met the inclusion criteria and were included in the quantitative review.

The overall results revealed a medium negative association between rational beliefs and psychological distress, r = -0.31. These results show that higher levels of rational beliefs are associated with lower levels of distress, and vice versa, as we predicted. Thus, present data supports the possible protective factor role of rational beliefs assumed by REBT theory. The present study, along with the corresponding meta-analysis that also revealed a medium, but positive relationship between irrational beliefs and distress (Vîslă et al., 2016) and the meta-analysis concerning the efficacy of REBT intervention tends to indicate an empirical foundation for this therapeutic approach.

Additionally, the moderating analyses revealed equally important information, nuancing the overall results, especially considering the high heterogeneity of the effect sizes. Thus, this might suggest that rational beliefs can attenuate the impact of various emotional problems/disorders.

As we expected, rational belief type was a significant moderator, with significant larger effect sizes when measured with UA beliefs than when measured with a total score of rational beliefs. For the other types of rational beliefs there were not enough effect sizes available to compute the analyses. These results can be explained by the proximity to emotional responses of the UA beliefs, even if these represent a secondary appraisal mechanism.

The results showed that there is not a significant difference between general beliefs and specific beliefs regarding their association with distress. These facts support the extended ABC model (David, 2015) of REBT theory.

The fact that country is not a significant moderator points out that the relationship between rational beliefs and distress does not vary by culture, but the generalization of the result it is narrowed by the fact that almost all studies were conducted in western countries. Likewise, data showed that the association is robust no matter the age, gender, clinical status or level of irrational beliefs of the participants. These might mean that rational beliefs act like a protective factor against psychological disturbances both for male and females, young and old persons, and for people diagnosed with mental disorders and those without a mental health diagnosis.

On the other hand, the percentage of students from the sample turned out to significantly influence the association between rational beliefs and distress, namely the effect sizes increased by the percentage of students.

Another interesting finding was that studies which had objectives/hypotheses regarding the relationship between rational beliefs and distress presented significantly larger effect sizes than those which did not have such objectives/hypotheses.

One limitation of this study is that all studies used only subjective measures of both rational beliefs and distress. Other limitation might be that almost all studies used non-clinical or sub-clinical samples.

In conclusion, the present study represents the first meta-analytical summarization of the relationship between rational beliefs and psychological distress, revealing a medium negative association. Results add important empirical evidence for the underling theory of REBT, and revealed that the strength of the association is robust for a wide range of emotional problems, so that rational beliefs could be a trans-diagnostic protective factor against distress. Moreover, the results emphasized that the type of rational beliefs is an important factor, suggesting an increased therapeutic focus on the developing of unconditional acceptance and self-acceptance beliefs. Future research should test the nature of the relationship in experimental designs and for clinical samples. In addition, future research is needed in order to clarify the organizational structure of the rational beliefs and to analyze the possible association between rational beliefs and positive emotions.

3.2. Study 2. Affective and cognitive correlates of the frequency of using the verb *to be*: an empirical test of E-Prime theory [2]

3.2.1. Introduction

Building on General Semantics' principles (Korzybski, 1933), especially on the first principle, "the map is not the territory", a new research area it was developed, namely the E-Prime (i.e. English-Prime) linguistic tool. E-Prime represents a prescriptive version of Standard English which eliminates all form of the verb *to be*. Bourland (1965) was claiming that using the verb *to be* have several semantic negative consequences, like unjustified abstractions, over-generalizations, and logical errors (Bourland, 2004). Moreover, some papers from the linguistic field proposed the idea that these semantic and structural problems may lead to negative psychological consequences (Bourland, 2004; Kellogg & Bourland, 1990).

Kellog and Bourland (1990) claim that using E-Prime instead of E-Standard has a lot of advantages, improving several psycho-social variables, such the decrease of the number of stressful situations, reducing the frequency and/or intensity of inter-personal conflicts, improving communication skills and creativity, and making problem-solving more efficient. However, the most important presumed effect of E-Prime at the psychological level seems to be that it makes almost impossible for people to make global evaluations, both internal and external (Kellog & Bourland, 1990).

R-Prime (i.e., Romanian-Prime) is an equivalent form of E-Prime, but it refers to Romanian language.

Albert Ellis, the founder of REBT, stressed the important role of General Semantics' theory in the development of REBT and ABC cognitive model (Ellis, 2002). Ellis (2002) showed the common vision behind the two approaches, both of them promoting a rational and realistic way of thinking about self, others, and about the world. Moreover, both General Semantics and REBT claim that a rational thinking style leads to mental health, while unrealistic, absolutist, and/or dichotomous thinking leads to cognitive and emotional disturbances (Ellis, 2002). Another important aspect linking the two paradigms is that the demandingness, seen as the main etiopathogenetic factor in REBT, implies almost always the use of the verb *to be* with an identity function (Ellis, 1991).

3.2.1.1. Overview of the study

Therefore, current study aimed to investigate the intensity and the direction of the association between the frequency of using the verb *to be* and various psychological outcomes, namely general rational and irrational beliefs, negative functional and dysfunctional emotions, the functionality of inferences, and general psychological distress. We expected a negative significant relationship between the frequency of using the verb *to be* and the levels of rational beliefs, negative functional emotions, and functionality of inferences. On the other hand, we expected a positive significant association between the frequency of using the verb *to be* and the levels of irrational beliefs, negative dysfunctional emotions, and psychological distress. As secondary analyses, we investigated the relationships among the psychological outcomes measured. Moreover, we explored the relationship between the frequency of using the verb *to be* and each of the rational and irrational beliefs processes.

[2] This study was accepted for publication in Journal of Rational-Emotive & Cognitive Behavior Therapy.

3.2.2. Method

3.2.2.1. Design and participants

The present study implied a cross-sectional design, all variables being measured at the same time. The convenience sample included 197 participants. 155 of the participants were females (78.7%), while 42 were males (21.3%). The number of participants who were students was 108, representing 54.8% of the sample. The age range was 18-50 years, while the mean age was *M* = 24.55 years (*SD* = 7.008).

3.2.2.2. Procedure

Persons who signed-up for the study after the recruitment phase were given a web-link where they completed and signed the informed consent. After completing the informed consent, participant completed online the questionnaires described below in the *Measure* section.

1.2.2.3. Measures

The *Attitudes and Belief Scale 2-Abbreviated Version* (ABS-2-AV: Hyland, Shevlin, Adamson, & Boduszek, 2014a) is a 24-item self-report measure of general rational and irrational beliefs, derived from the original 72 item Attitudes and Belief Scale 2 (DiGiuseppe, Leaf, Exner, & Robin, 1988). Cronbach alpha levels for each irrational and rational belief processes proved satisfactory internal consistency both for the two primary measure, namely irrational beliefs (Cronbach's α = .860) and rational beliefs (Cronbach's α = .843), and also for the each subscale measuring the eight belief types (DEM = .792, CAT = .669, LFT = .772, GE = .808, PRE = .861, REB = .631, HFT = .623, and UA = .774).

The *Profile of Affective Distress (*PDA; Opris & Macavei, 2007) is 39-item self-report questionnaire developed to measure negative functional and dysfunctional emotions, as well as positive emotions, consistent with REBT theory. Internal consistency indexes for the current study were satisfactory: negative dysfunctional emotions - Cronbach's α = .933, negative functional emotions - Cronbach's α = .918, positive emotions - Cronbach's α = .947, and distress - Cronbach's α = .960.

The functionality of inferences was measured using a scale which is an adaptation after the one used by Bond and Dryden (1999). The internal consistency for this scale in our sample was Cronbach's α = .876.

In order to measure the frequency of using the verb *to be* we developed a new task. The participants were asked to present in short paragraph (e.g., maximum 300 words) the experience they had with their last exam or job interview. We counted every use of the verb *to be* in all its forms, and then we calculated the exact indicator of the frequency of using the verb *to be* as the ratio between the number of uses and the total number of words used.

3.2.2.4. Data analysis

In order to test our hypotheses, we ran multiple Pearson product-moment correlation to assess the intensity and the direction of the relationships among our variables. For effect size analyses, we used the *r* coefficient with the following thresholds: small effect size - *r* = .10; medium effect size - *r* = .30; large effect size - *r* = .50 (Cohen, 1988).

Due to the nature of the study, the problem of multiple comparisons may have been arise. Hence, Holm-Bonferroni corrections (Holm, 1979) were used to decrease as much as possible the false discovery rate.

3.2.3. Results

3.2.3.1. Descriptive statistics

Means and standard deviations for the variables used in the study are presented in Table 1.

Table 1.

Means and standard deviations of variables investigated within the study

Measure	*M*	*SD*	*N*
The verb 'to be'	4.45	3.25	197
Irrational beliefs	31.63	8.43	197
Rational beliefs	49.17	7.04	197
Negative dysfunctional emotions	24.96	10.20	197
Negative functional emotions	29.85	9.32	197
Positive emotions	40.44	10.74	197
Distress	92.38	22.81	197
Functionality of inferences	54.24	16.70	197
DEM	10.94	2.72	197
CAT	7.15	2.82	197
LFT	8.66	3.01	197
GE	4.87	2.43	197
PRE	11.88	2.72	197
REB	12.38	2.15	197
HFT	11.87	2.30	197
UA	13.02	2.17	197

** Note: M*= mean; *SD*= standard deviation; *N*= number of participants; DEM= demandingness; CAT= catastrophizing; LFT= low frustration tolerance; GE= global evaluations; PRE= preferences; REB= Realistic evaluation of badness; HFT= high frustration tolerance; UA= unconditional acceptance.

3.2.3.2. Primary analyses

The results of the Pearson product-moment correlations between the frequency of using the verb *to be* and the others investigate variables are the following: general irrational beliefs, $r = .104$, $p = .879$; general rational beliefs, $r = -.211$, $p = .021$; negative functional emotions, $r = .027$, $p = 1.000$; negative dysfunctional emotions, $r = .009$, $p = 1.000$; positive emotions, $r = -.002$, $p = 1.000$; the functionality of inferences, $r = -.053$, $p = 1.000$; psychological distress, $r = .016$, $p = 1.000$.

The frequency of using the verb *to be* was significantly negatively associated with levels of general rational beliefs, $r = -.211$, $p = .021$.

3.2.3.3. Secondary analyses

The results of the Pearson product-moment correlations between the frequency of using the verb *to be* and each type of irrational and rational beliefs are the following: demandingness, $r = .065$, $p = 1.000$; catastrophizing, $r = .096$, $p = .720$; low frustration tolerance, $r = .122$, $p = .444$; global evaluations, $r = .025$, $p = 1.000$; preferences, $r = -.251$, $p = .003$; realistic evaluation of badness, $r = -.058$, $p = 1.000$; high frustration tolerance, $r = -.169$, $p = .125$; and unconditional acceptance, $r = -.132$, $p = .386$.

The frequency of using the verb *to be* was significantly negatively associated with levels of preference beliefs, $r = -.251$, $p = .003$.

Additionally, Table 2 presents the correlation matrix for the following measured variables: general rational and irrational beliefs, negative functional and dysfunctional emotions, positive emotions, the functionality of inferences, and psychological distress.

Table 2.
The correlation matrix for the following measured variables: general rational and irrational beliefs, negative functional and dysfunctional emotions, positive emotions, psychological distress and the functionality of inferences.

Measure	1	2	3	4	5	6	7
1. Rational beliefs	-						
2. Irrational beliefs	-.590**	-					
3. Negative functional emotions	-.132	.245**	-				
4. Negative dysfunctional emotions	-.218**	.323**	.881**	-			
5. Positive emotions	.070	-.070	-.098	-.122	-		
6. Distress	-.184**	.277**	.849**	.865**	-.565**	-	
7. Functionality of inferences	-.118	.189**	.252**	.349**	.061	.230**	-

** Note: **Correlation is significant at the 0.01 level*

3.2.4. Discussion and conclusions

Current paper represent the first study which investigated the intensity and the direction of the association between the frequency of using the verb *to be* and several psychological outcomes. Promising results were emphasized, highlighting a negative significant small to medium association between the frequency of using the verb *to be* and rational beliefs, as we expected. Moreover, the frequency of using the verb *to be* was also significantly negatively related with the primary rational beliefs type (primary appraisal mechanism), namely preference beliefs. E-Prime advocates presumed that using the verb *to be* less often will decrease the number of unjustified generalizations, leading in turn to a less rigid and non-judgmental style of thinking (Bourland, 2004). These findings are utterly important due to the fact that represent the first piece of evidence which links specific aspects of language with psychological characteristics, specifically with cognitive outcomes. This could mean that the way we formulate our sentences or phrases could considerable impact the way we think, opening exciting research opportunities in this area, as well as possible useful clinical or psycho-social implications.

Speaking about rational beliefs types, frequency of using the verb *to be* was significantly negatively associated with PRE beliefs. The shared variance of the two variables can be explained by the fact that eliminating the verb *to be* from speech may prevent dogmatic or rigid thinking, thus stimulating flexibility and through that increasing PRE beliefs levels.

On the other hand, contrary to our predictions, the frequency of using the verb *to be* was not significant associated with irrational beliefs and neither with any irrational beliefs' type. Furthermore, results did not show significant relationships with any affective outcome, such as distress, negative functional/dysfunctional emotions, or positive emotions. A surprising result was the lack of association between frequency of using the verb *to be* and GE and/or UA beliefs. Taking into account their nature, GE beliefs implies almost always the use of *to be*. Other results that did not confirm our hypotheses were the ones showing no significant associations between frequency of using the verb *to be* and any emotional outcomes. It is possible that the lack of an activating event may have prevented the activation of specific

evaluative beliefs and therefore restrained the highlight of the association with affective variables.

The present study is limited mainly by its cross-sectional nature. Also, the fact that we only used self-report measured for the psychological outcomes could also limit the generalization of the results. Moreover, future studies should develop and validate more accurate and psychometric adequate measurement of the frequency of using the verb *to be*. Another limit of the study may be the lack of an activating event.

In conclusion, the present study aimed to scientifically test basic predictions of E-Prime theory, using an REBT framework. Results showed for the first time that a low frequency of using *to be* is associated with positive psychological outcomes, such high levels of rational beliefs, and especially with preference beliefs. These results could open a very interesting line of research. If future studies will experimentally confirm these relationships, valuable implications may arise, particularly for the clinical psychology field. Clinical psychology could benefit from these findings by incorporating some E-Prime strategies in clinical protocols, in order to enhance the development of a more helpful and adaptive way of thinking, with possible indirect effects on different symptomatology.

3.3. Study 3. Comparing the effects of using R-Prime vs. R-Standard in formulating rational and irrational beliefs in an economic context

3.3.1. Introduction

Even that using language it is a ubiquitous process, its effects on psychological outcomes, especially on thoughts and emotions, are still in debate. Hence, the present study aimed to provide valuable data in order to provide some clarification in this area of research, by investigating how some specific aspects of the language impact on several cognitive, affective, and behavioral variables. More specifically, we experimentally tested how using or not the verb *to be* when formulating irrational/rational beliefs influences the way we think, feel, or behave.

The cognitive science paradigm (see Miller, 2003) provides an excellent framework for interdisciplinary research linking various linguistic and psychological aspects. Even there are a lot of studies which focused on the relationships between psychological features and several morphologic, semantic, syntax, or pragmatic characteristics, most of them targeted executive functions, the processes of language acquisition/production, and decision-making aspects (e.g., (Daneman & Merikle, 1996; Masgoret & Gardner, 2003; Milligan, Astington, & Dack, 2007). However, in spite of this large body of research, the literature connecting particular aspects of language, like using specific words or parts of speech, with thoughts and/or emotions is rather scant.

Therefore, taking into account the poor previous exploration of this research area, we proposed to examine the basic assumptions of E-Prime theory (Bourland, 1965; Kellogg & Bourland, 1990), which advocates for eliminating all the form of the verb *to be* from speech, claiming that this will have an important positive psychological effect.

In order to experimentally test E-Prime predictions in a REBT framework, we used as a mood induction procedure an adaptation of game named the *Ultimatum* (Güth, Schmittberger, & Schwarze, 1982). The game implies two players who have to decide how to split a certain amount of money. One of the players is the proponent which makes an offer regarding how to divide the money, and the other player is the respondent which decides if he/she accepts or not the respective offer. If the respondent accepts the offer, the money is split accordingly, but if the respondent rejects the offer, both players lose all the money. According to Game Theory, the rational decision in this case it would be to accept all offers, no matter how small they are, but a large body of research (see Pillutla & Murnighan, 1996; Xiao & Houser, 2005) showed that the actual behavior of players has another pattern, rejecting small offers. Previous studies showed that the rejection of small offers, especially when expectations are set to receive big offers, it caused by the perception that the offers are not fair (Pillutla & Murnighan, 1996). Moreover, the affective response to this perceived unfairness it is represented by high levels of negative emotions, usually anger (Xiao & Houser, 2005). Moreover, neuropsychology studies revealed that brain activation of emotion-related areas of the brain, such as anterior insula (Sanfey, Rilling, Aronson, Nystrom, & Cohen, 2003), and the skin conductance activity (van 't Wout, Kahn, Sanfey, & Aleman, 2006) were higher when participant had to respond to unfair offers than when they received fair offers, and were significantly associated with rejection rates. Based on the above arguments which showed that unfair offers during *Ultimatum* game cause negative emotionality, for the purpose of this study, we used the *Ultimatum* game as activator event in order to induce to participants negative emotions in an ecological way, given the fact that participants were told that they have to split real money. We used a computerized version of the *Ultimatum* game adapted after Sanfey (2009) which is described in detail in the *Method* section.

Using the extended ABC model of REBT framework, we used the *Ultimatum* game as a negative activator event (A part of the ABC model), while we experimentally manipulated the specific beliefs of the participants (B part of the ABC model). During the *Ultimatum* game, participants were given several beliefs which were rational or irrational and formulated in R-Prime or R-Standard depending on each experimental group. Specifically, we wanted to see what impact has the use or the absence of the verb *to be* when formulating specific evaluative beliefs during an activator event on emotions and behavior (C part of the ABC model), as well as on other types of cognitions (B).

3.3.1.1. Overview of the study

The aim of the present study was to comparatively investigate the effects of using R-Prime vs. R-Standard in formulating specific rational and irrational beliefs on affective (negative functional emotions, negative dysfunctional emotions, positive emotions, distress), behavioral (the total gains from the *Ultimatum* game), and cognitive outcomes (the functionality of specific inferences). Moreover, we tested the possible moderator role of general rational/irrational beliefs on the relationship between specific evaluative beliefs and all affective, behavioral, and cognitive outcomes. Taking into account the REBT theory and the binary model of distress presented above we set the following hypotheses.

Regarding intergroup hypotheses, we expected a significant higher level of negative dysfunctional emotions and distress in the irrational R-Standard group than in the irrational R-Prime group at posttest. Also, we expected a significant lower level of total game winnings, positive emotions, and inferences' functionality in the irrational R-Standard group than in the irrational R-Prime group at posttest.

In term of intragroup hypotheses, we expected a significant increase of negative dysfunctional emotions and distress from pretest to posttest in the irrational R-Standard group, but not in the irrational R-Prime groups. Moreover, we expected a significant increase of the negative functional emotions, and functionality of inferences in both rational R-Prime group and rational R-Standard group.

Regarding the difference between rational R-Prime group and rational R-Standard group we did not have enough theoretical arguments to formulate specific hypotheses, but we decided to investigate it in an exploratory fashion.

3.3.2. Method

3.3.2.1. Design

The current study has a bifactorial mixt design, with two independent variables, one with two conditions, while another with four conditions. The independent variables were:

1) Time – with two conditions, pretest (Time 1) and posttest (Time 2);

2) Group – with four conditions, namely: a. irrational R-Standard, b. irrational R-Prime, c. rational R-Standard and d. rational R-Prime.

The dependent variables were the following:

1) Affective outcomes: negative dysfunctional emotions, negative functional emotions, positive emotions, distress;
2) Behavioral outcomes: the total gains from the *Ultimatum* game;
3) Cognitive outcomes: the functionality of specific inferences.

Also, we tested as possible moderators two variables, namely general rational beliefs and general irrational beliefs.

3.3.2.2. Participants

Initially, 127 participants completed study's procedure. After the manipulation check analyses described below, we eliminated 8 participants from the analyses. Therefore, the final sample of this study consisted of 119 participants. 87 of them were females (73.1%), while 32 were males (26.9%). A number of 75 participants were students, this representing 63% of our convenience sample.

3.3.2.3. Measures

The *Attitudes and Belief Scale 2-Abbreviated Version* (ABS-2-AV: Hyland, Shevlin, Adamson, & Boduszek, 2014) is a 24-item self-report measure of general rational and irrational beliefs, derived from the original 72 item Attitudes and Belief Scale 2 (DiGiuseppe, Leaf, Exner, & Robin, 1988). In the present study, Cronbach alpha levels for each irrational (Cronbach's $\alpha = .845$) and rational belief (Cronbach's $\alpha = .820$) processes proved satisfactory internal consistency, both for the two primary measure, and also for the each subscale measuring the eight belief types (DEM = .773, CAT = .689, LFT = .755, GE = .763, PRE = .831, REB = .680, HFT = .605, and UA = .697).

The *Profile of Affective Distress (*PDA; Opris & Macavei, 2007) is 39-item self-report questionnaire developed to measure negative functional and dysfunctional emotions, as well as positive emotions, consistent with REBT theory. Internal consistency indexes for the current study were satisfactory: negative dysfunctional emotions - Cronbach's $\alpha = .926$, negative functional emotions - Cronbach's $\alpha = .913$, and positive emotions - Cronbach's $\alpha = .931$.

The functionality of inferences was measured using a scale which is an adaptation after the one used by Bond and Dryden (1999). The internal consistency for this scale in our sample was Cronbach's $\alpha = .852$.

Manipulation check measure consisted in six memory test items replicating the sentences presented on the screen during the *Ultimatum* game between offers. We assumed that if the manipulation worked properly, the specific beliefs that participants saw on the screen should be activated enough at the end of the procedure so that participants to be able to recall/recognize them. If a participant did not respond correctly to at least three items, he/she was excluded from the study.

3.2.2.4. Apparatus

We developed an *Ultimatum game* application for the purposes of the present study. We developed the application using the PsychoPy 1.90.3 software (Peirce, 2007), based on previous models of *Ultimatum game* from the literature (Sanfey, 2009; Sanfey et al., 2003). Players had to split at each round 10 RON (i.e., Romanian currency).The first part of the application presents to participants the instructions for playing the game. The next part is the training stage and consists of ten fair offers (4-6 RON). Participants have 30 seconds to decide to either accept or reject the offers. The final part represents the actual task, where participants received ten unfair offers (1-3 RON), having also 30 seconds to decide to either accept or reject the offers. Beside of this, after the response for each offer, the software displays on the screen for 30 second a sentence representing a specific belief. The application records participants' code, the number of accepted/rejected offers, the total amount of winnings, as well as the response time for each offer.

The study was presented as an experiment which aims to evaluate the financial abilities of the participant, in order to cover the real purpose, and avoid the demand characteristics

effect. After registration participants were randomly assigned to one of the four groups, and were invited to our laboratory individually.

The instructions included a clear statement about the possibility of gaining real money based on the performance of the participant at the *Ultimatum* game. Furthermore, participants were told that the offers in the game are generated by an algorithm based on their response to the offers, the algorithm being developed in order to simulate as much as possible the behavior of a human being. Next, the participants completed all the questionnaires/tasks presented in the *Measure* section.

The following step was the practice phase of the *Ultimatum* game, through which the expectation of the participants regarding the offers were set high, they receiving ten fair offers. Then, participants had to perform the actual task of the *Ultimatum* game, receiving 10 unfair offers. Between each offer, on the screen was displayed for 30 seconds a phrase containing a rational or irrational belief, formulated in R-standard or R-Prime, accordingly to the each experimental group.

Then, the posttest questionnaires were completed along with the manipulation check measure.

3.3.3. Results

3.3.3.1. Data analysis

After running descriptive statistics, the variables which had a quasi-normal distribution, and did not violate the homogeneity of variance assumption were included in the parametric analysis. Thus, a 2 (time) X 4 (group) multivariate analysis of variance (MANOVA) was conducted. Beside the main and interaction effects of the MANOVA, taking into account the nature of our study, in order to test our specific hypotheses, we decided *apriori* to analyze the results of the pairwise comparisons (Sidak (1967) adjustments) for multiple comparisons even if the interaction effect would not be significant. Pairwise comparisons could show us how each variable varied from pretest to posttest in every group, and also if there are significant differences at posttest among groups regarding a specific variable

For the variables which violated the homogeneity of variance assumption, we conducted nonparametric analyses. Specifically, we used Kruskal-Wallis (Kruskal & Wallis, 1952) procedure in order to test if there are significant differences regarding the distributions of the four independent groups, and we also analyzed pairwise comparisons results where Kruskal-Wallis test indicated significant differences. For testing for possible significant differences from pretest to posttest we ran Wilcoxon matched pairs signed rank test (Wilcoxon, 1945) for each experimental group, adjusting the significance level using Holm-Bonferoni corrections (Holm, 1979) for multiple comparisons.

In the case of total gains variable, due to fact that it was measured only at posttest, we performed a one-way ANOVA to test if there are significant differences between groups regarding this outcome.

For moderating analyses we followed the procedure proposed by Hayes (2017). Also, in order deal with issues regarding high multicollinearity, the variables were centered and an interaction term between outcomes was created (Aiken, West, & Reno, 1991).

Descriptive statistics of the studied variables are presented in Table 1. Due to the fact that homogeneity of variance assumption was not respected in the case of negative dysfunctional emotion variable, both at pretest (*Levene statistics* = 3.165, p = .027) and at posttest (*Levene statistics* = 5.118, p = .002) we did not include it in the MANOVA analysis.

Table 1.

Means and standard deviations of variables investigated within the study

	Irrational R-standard			Irrational R-Prime			Rational R-Standard			Rational R-Prime		
Measure	*M*	*SD*	*N*	*M*	*SD*	*N*	*M*	*SD*	*N*	*M*	*SD*	*N*
Time period												
Irrational beliefs												
Time 1	33.25	7.13	27	29.76	7.20	30	30.80	7.56	35	30.33	9.28	27
Rational beliefs												
Time 1	44.29	4.76	27	43.63	5.94	30	44.14	5.80	35	45.25	5.38	27
PDA negative functional emotions												
Time 1	31.62	9.30	27	26.20	8.49	30	29.40	9.11	35	27.33	7.29	27
Time 2	29.29	9.96	27	23.10	8.96	30	27.68	10.25	35	23.77	7.55	27
PDA negative dysfunctional emotions												
Time 1	24.96	9.39	27	20.76	7.50	30	25.71	10.88	35	20.66	7.51	27
Time 2	24.11	9.03	27	19.73	7.41	30	25.08	11.88	35	19.77	6.91	27
PDA positive emotions												
Time 1	42.55	9.41	27	45.06	8.72	30	44.57	8.75	35	43.62	9.98	27
Time 2	41.11	11.04	27	42.76	10.90	30	44.28	8.90	35	43.81	10.52	27
Functional inferences												
Time 1	53.25	15.42	27	52.06	14.59	30	57.11	14.06	35	53.70	16.01	27
Time 2	58.51	15.70	27	56.53	14.59	30	60.60	15.51	35	60.33	17.28	27
Distress												
Time 1	92.04	24.41	27	79.9	21.14	30	88.54	25.30	35	82.37	21.69	27
Time 2	90.30	26.74	27	78.07	23.22	30	86.49	27.52	35	77.74	21.70	27
Total gains												
Time 2	8.96	5.93	27	10.23	6.57	30	9.43	5.63	35	10.70	5.78	27

* *Note: M*= mean; *SD*= standard deviation; *N*= number of participants

3.3.3.2. Parametric analyses

Results from the mixed MANOVA point out an overall significant main effect of time, Wilk's $\Lambda = .561$, F (4, 112) = 21.88, $p = .00$, $\eta 2 = .439$. Univariate test indicated a significant time effect for the PDA negative functional emotions, F (1, 115) = 20.54, $p = .00$, $\eta 2 = .40$, PDA positive emotions subscale, F (1, 115) = 5.58, $p = .02$, $\eta 2 = .04$, PDA distress subscale, F (1, 115) = 14.25, $p = .00$, $\eta 2 = .11$, and functionality of inferences levels, F (1, 115) = 14.53, $p = .00$, $\eta 2 = .11$.

Comparative analysis of the four interventions showed a significant between subjects' effects, Wilk's $\Lambda = .831$, F (12, 296.61) = 1.79, $p = .048$, $\eta 2 = .06$, but univariate test revealed no significant between subjects effects for any variables ($p_s > .05$). Comparative analysis revealed no significant interaction effect group x time, Wilk's $\Lambda = .894$, F (12, 296.61) = 1.07, $p = .38$, $\eta 2 = .03$.

Pairwise comparisons revealed that the significant main effects for all the variables reflects significant differences between Time 1 and Time 2 ($p_s = .00$), with significant lower levels of negative functional emotions, positive emotions, and distress levels and significant higher levels of functional inferences at Time 2. Further on, results showed significant decreases from Time 1 to Time 2 of negative functional emotions levels in all four groups [irrational R-Standard ($p = .00$, $d = 0.60$), irrational R-Prime ($p = .00$, $d = 1.10$), rational R-Standard ($p = .00$, $d = 0.54$), and rational R-Prime ($p = .00$, $d = 1.19$)], significant decreases of positive emotions levels from Time 1 to Time 2 in the irrational R-Prime group ($p = .00$, $d = 0.70$),)], significant decreases of distress levels from Time 1 to Time 2 in the rational R-Prime group ($p = .00$, $d = 0.21$), and significant increases from Time 1 to Time 2 of functionality of inferences levels in the rational R-Prime group ($p = .01$, $d = 0.39$). There were no significant differences from Time 1 to Time 2 of the levels of 1) positive emotions in the irrational R-Standard ($p = .09$), rational R-Standard ($p = .70$) and rational R-Prime ($p = .82$) groups, 2) distress levels in the irrational R-Standard ($p = .22$), irrational R-Prime ($p = .17$) and rational R-Standard ($p = .10$), and 3) functional inferences in the irrational R-Standard ($p = .055$), irrational R-Prime ($p = .08$) and rational R-Standard ($p = .14$) groups.

Regarding total gains variable, one-way ANOVA test revealed no significant between groups effects F (3,115) = .479, $p = .698$.

3.3.3.3. Nonparametric analyses

Both at pretest ($H(3) = 8.603$, $p = .035$) and at posttest ($H(3) = 7.921$, $p = .048$) Kruskal-Wallis tests showed significant differences among the four groups regarding levels of negative dysfunctional emotions. However, pairwise comparisons revealed no significant difference between any two groups, neither at pretest or at posttest (see Table 2).

Table 2.
Pairwise comparisons for Kruskal-Wallis test for PDA negative dysfunctional emotions

Sample 1-Sample 2	***Test Statistic***	***Std. Error***	***Std. Test Statistic***	***Sig.***	***Adj.Sig.***
Rational R-Prime - Irrational R-Prime	2.50	9.12	.275	.783	1.00
Rational R-Prime – Irrational R-Standard	19.66	9.36	2.10	.036	.214
Rational R-Prime – Rational R-Standard	19.82	8.81	2.25	.024	.147

Irrational R-Prime – Irrational R-Standard	17.15	9.12	1.88	.060	.361
Irrational R-Prime – Rational R-Standard	-17.31	8.56	-2.02	.043	.259
Irrational R-Standard – Rational R-Standard	-.15	8.81	-.018	.986	1.00

** Note:* Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same. Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

In terms of intragroup analyses, the levels of negative dysfunctional emotions did not vary significantly from pretest to posttest, in any of the experimental groups. Results of the Wilcoxon matched pairs signed rank test for each group are: irrational R-Standard, $T = 69.50$, $p = .460$, $r = .19$; irrational R-Prime, $T = 40.00$, $p = .056$, $r = .44$; rational R-Standard, $T = 128.50$, $p = .460$, $r = .20$; and rational R-Prime, $T = 29.00$, $p = .069$, $r = .43$.

3.3.3.4. Moderation analyses

Results from moderation analyses showed that general irrational beliefs measured at pretest did not significantly moderate (at $p < .01$; Hayes, 2017; Aiken, West, & Reno, 1991) the relationship between specific beliefs type (independent variable) and any of our outcomes: negative functional emotions, $b = -.00$, $SE = .08$, $t = -.01$, $\Delta R^2 = .00$, $p = .99$; dysfunctional negative emotions, $b = .05$, $SE = .07$, $t = .61$, $\Delta R^2 = .00$, $p = .54$; positive emotions, $b = -.13$, $SE = .10$, $t = -1.35$, $\Delta R^2 = .01$, $p = .18$; distress, $b = .18$, $SE = .23$, $t = .78$, $\Delta R^2 = .00$, $p = .44$; functionality of inferences, $b = .01$, $SE = .16$, $t = .04$, $\Delta R^2 = .00$, $p = .97$; total gains, $b = .05$, $SE = .06$, $t = .82$, $\Delta R^2 = .01$, $p = .41$.

Also, general rational beliefs measured at pretest did not significantly moderate ($p < .01$; Hayes, 2017; Aiken, West, & Reno, 1991) the relationship between specific beliefs type and any of our outcomes: negative functional emotions, $b = -.25$, $SE = .11$, $t = -2.22$, $\Delta R^2 = .02$, $p = .03$; dysfunctional negative emotions, $b = -.17$, $SE = .11$, $t = -1.56$, $\Delta R^2 = .01$, $p = .12$; positive emotions, $b = .36$, $SE = .15$, $t = 2.35$, $\Delta R^2 = .04$, $p = .02$; distress, $b = -.79$, $SE = .31$, $t = -2.52$, $\Delta R^2 = .03$, $p = .013$; functionality of inferences, $b = -.06$, $SE = .25$, $t = -.24$, $\Delta R^2 = .00$, $p = .81$; total gains, $b = .03$, $SE = .10$, $t = .29$, $\Delta R^2 = .00$, $p = .78$.

3.3.4. Discussion and conclusions

Present study aimed to comparatively investigate the effects of using R-Prime vs. R-Standard in formulating rational and irrational beliefs, on several affective, cognitive, and behavioral outcomes. Intergroup analyses showed no significant differences between groups at posttest for any outcome.

However, intragroup analyses results showed a significant decrease from pretest to posttest of distress levels only in the rational R-Prime group, but no significant changes in the other groups. Also, the functionality of inferences significantly increased from pretest to posttest only in the rational R-Prime group. These findings underline a trend which could be confirmed by future studies. The fact that results show intragroup differences from pretest to posttest, in the absence of any intergroup differences (neither at pretest nor at posttest) could be a result of the statistical power. A larger sample could better confirm this tendency, by spotlighting the intergroup differences too due to a statistical power increase.

These results are very interesting due to fact that they provide some incipient pieces of evidence in favor of E-Prime/R-Prime. Important implications may arise from the fact that expressing specific evaluative beliefs in a rational manner, without using the verb *to be*, seems to significantly impact both cognitive and affective levels. Present data show that an important advantage of using rational beliefs in E-Prime style could protect from experiencing, or could reduce distress even in the presence of a negative activator event. Moreover, using this style of thinking helps a person to generate more functional inferences, which in turn may lead to healthier emotions. Linking E-Prime rational thoughts with cognitive and affective improvements is the first experimental data that suggests some possible psychological benefits of eliminating the verb *to be* from speech.

Moreover, moderation analyses revealed that general evaluative belief, either rational or irrational, did not influence the direction or magnitude of the relationship between specific beliefs type and any of the dependent variables.

The fact that also the rational or irrational character of the specific beliefs did not influence the outcomes may have multiple explanations. For example, it is possible that the activating event was not relevant enough for the participants in order to generate emotional activation. Even if we chose the *Ultimatum* game intending to provide an ecological situations based on the loos aversion framing effect (Kahneman & Egan, 2011; Kahneman & Tversky, 1979), it is possible that the amount of money or the context to not have represented a proper activating event.

This was the first study, as far as we know, which aimed to test REBT predictions in an economic context. Also, we wanted to test the relationships among different types of cognitions described by the extended ABC model (David, 2003, 2015), such as general evaluative beliefs, specific evaluative beliefs, and specific inferences. This approach could be an impulse for the cognitive regulation field, a research area which it is not enough developed.

An important limitation of the present study is the fact that we used mainly self-report instruments. Moreover, the short time of the experimental manipulation could have negatively influence the results. Studies which will develop longer-time intervention in order to eliminate or reduce the frequency of using *to be* may better highlight the E-Prime effects.

In conclusion, present study sought to investigate effects of using R-Prime vs. R-Standard in formulating rational and irrational beliefs in an economic context provided by the *Ultimatum* game. Current data only partially support our hypotheses, by showing that rational thoughts formulated without the verb *to be* could lead to more functional inferences and lower distress, even in adverse situations. Contrariwise, results pointed out no between group effects and the lack of any effect at behavioral level. More work is needed in order to provide firm answer regarding causality between using E-Prime/R-Prime and feeling and behaviors. Even the results showed a mixed pattern, the methodology and apparatus that we developed could be used in further studies in order to refine them especially regarding the ecological relevance and manipulation time. These developments could further stimulate a more intense research in the E-Prime field, in an evidence-based manner.

3.4. Study 4. A pilot randomized prevention trial investigating the efficacy and feasibility of a new intervention combining Rational Emotive Education with E-Prime strategies (REE-Prime) vs. Rational Emotive Education (REE) in preventing exam-related psychological distress

3.4.1. Introduction

Starting from the results of the previous two studies which tested E-Prime basic assumptions, we decided to investigate within this study the effect of integrating some E-Prime derived strategies in psychological interventions protocols. We choose to use for the purposes of this study an educational intervention, namely the Rational Emotive Education (REE), applied to a non-clinical participants. More specifically, we tested comparatively the effect of REE and an intervention combining REE with E-Prime strategies (REE-Prime) in preventing exam-related distress in the case of first year students. We consider this a first step in the process of testing if integrating E-Prime principles into psychotherapy would provide significant benefits.

Academic distress is a more and more stringent problem within the mental health field (Verger et al., 2009). Academic distress refers to negative emotional responses generated mostly by concerns regarding motivation, confidence, changing in living conditions, financial problems, or abilities (Lockard, Hayes, McAleavey, & Locke, 2012; Verger et al., 2009). There is a large body of research proving that students experience significant higher levels of distress compared with non-student persons of same age, controlling for other socio-economic factors (Adlaf, Gliksman, Demers, & Newton-Taylor, 2001; Dyrbye, Thomas, & Shanafelt, 2006; Roberts, Golding, Towell, & Weinreb, 1999). Psychological distress among students it is a significant predictor of various mental health problems, including depression, anxiety, and addiction disorders (see Verger et al., 2009).

Rational Emotive Education (REE; Digiuseppe & Kassinove, 1976; Ellis, 1971; Knaus, 1977) it is a mental program derived from Rational Emotive Behavior Therapy (REBT), which has prophylactic aims towards psychological problems/disorders for non-clinical population. REE was initially design for children and adolescences, in order to be applied in school settings (Watter, 1988), but its use extended to various non-clinical population, including students. Several qualitative reviews and meta-analyses (Trip, Vernon, & McMahon, 2007; David, Cotet, Matu, Mogoase, & Stefan, 2017; Raymond DiGiuseppe & Bernard, 1990; Gossette & O'Brien, 1993; Hajzler & Bernard, 1991; Watter, 1988) highlighted the effects of REE, such as: decreasing levels of irrational beliefs, of dysfunctional emotions such anxiety, maladaptive school-related, while increasing rational beliefs levels, functional emotions, internal locus of control, and adaptive behavior. For persons who had academic problems, the average effect size was d = 2.10, with the following effect sizes: academic performance, d = .56; grade point average, d = .95; academic motivation, d = .47, behavioral problems, d = 1.02 (Trip et al., 2007).

Based on the above arguments, we used in the present study REE as an evidence-based prevention program for exam-related distress for first year students. We used it as a comparative landmark for a new developed intervention which combines REE with strategies based on E-Prime theory (REE-Prime). E-Prime represents a prescriptive version of Standard English which eliminates all form of the verb *to be*, claiming that using the verb *to be* causes

several semantic and psychological negative consequences (Bourland, 2004). REE-Prime protocol it is described in the *Method* section. For both interventions we used a four session protocol, relying on the results of REE meta-analysis (Trip et al., 2007) which showed no moderation of efficacy based on the duration of the intervention (short – less than 4 meetings, medium – 4-17 meetings, and long –17-85 lessons).

Summarizing, we intended to study if incorporating E-Prime derived strategies in validated, evidence-based intervention protocols will lead to significant improvements in their efficacy, while assessing also the feasibility of the new protocol. We chose to use a non-clinical sample for this pilot study because the results of the previous studies were not firmly conclusive regarding the effects of eliminating the verb *to be* from speech. However, this study intends to be a forerunner for the integration of E-Prime in psychotherapeutic interventions.

3.4.1.1. Overview of the present study

This pilot randomized prevention trial has two major goals: (a) to investigate the efficacy of a new Rational Emotive Education combine with E-Prime strategies (REE-Prime) vs. Rational Emotive Education (REE) in preventing exam-related psychological distress for students; (b) to assess the feasibility of the new protocol of REE-Prime intervention.

Regarding the first objective, the study aimed to test the efficacy of REE-Prime vs. REE primarily on affective outcomes (psychological distress, negative dysfunctional emotions, negative functional emotions, positive emotions, negative affect, and positive affect), and as secondary objective on cognitive (rational and irrational beliefs, and negative automatic thoughts) and behavioral outcomes (grade point average). Based on the above mention arguments, we expected that REE-Prime to be superior to REE at all three levels, affective, cognitive, and behavioral.

3.4.2. Method

3.4.2.1. Design

The present pilot study had a randomized prevention trial design with two conditions: 1) Rational Emotive Education (REE) – as an evidence-based control intervention, and 2) Rational Emotive Education with E-Prime/R-Prime techniques (REE-Prime) – as the experimental intervention. Time had 3 conditions, namely pretest, intermediate evaluation, and posttest. Measurements of all dependent variables were taken at each time point. Participants were randomly assigned to their experimental conditions, and they did not know to which group they belong. Two experienced clinical psychologists trained in CBT treatment protocols provided the intervention in the two conditions. The two clinical psychologists did not know which of the interventions represents the control condition, and which one is the experimental one.

3.4.2.2. Participants

The inclusion criteria for this study were: 1) age over 18 years old; 2) the participants to be first year students. Potential participants were excluded if: 1) they lived in another place and were unable to travel in order to participate actively to the study; 2) did not agree to take part to group sessions.

63 persons were contacted telephonically after they registered to the study, of which 40 met our inclusion criteria, did not meet our exclusion criteria, and agreed to participate in the study after all the previous mentioned conditions were presented to them. The 40 participants were then randomly assigned to one of the two conditions, namely REE or REE-Prime. After

the randomization, participants were contacted again to schedule them to group sessions. 19 participants, 9 from the REE group and 10 form the REE-Prime group, did not completed the interventions protocols, hence being excluded from analyses.

Therefore, our finale sample of the present pilot study consisted of 21 participants: 11 in the REE group and 10 in the REE-Prime groups. Sample consisted of 17 (81%) females and 4 (19%) males, ranged in age from 18 to 23 years, with a mean age of 19.43 years (*SD* = 1.02). The average number of group session was 3.14 (*SD* = 1.15), with no significant differences (*p* = .565) between groups regarding this aspect.

3.4.2.3. Measures

The *Attitudes and Belief Scale 2* (ABS-2; DiGiuseppe, Leaf, Exner, & Robin, 1988) is a 72-item self-report measure of general rational and irrational beliefs, and their subtypes. Internal consistency for the current study is α = .943 for irrational subscale and α = .946 for rational subscale.

The *Automatic Thoughts Questionnaire* (ATQ; Hollon & Kendall, 1980) is a self-report instrument, containing 15 items aimed to measure to the frequency of negative automatic thoughts. Internal consistency for the current study was α = 0.907.

The *Profile of Affective Distress (*PDA; Opris & Macavei, 2007) is 39-item self-report questionnaire developed to measure negative functional and dysfunctional emotions, as well as positive emotions, consistent with REBT theory. Internal consistency for the current study is α = .902 for negative functional emotions subscale, α = .932 for negative dysfunctional emotions subscale, α = .855 for positive emotions subscale and α = .952 for global distress subscale. We used as a cut-off point for very high levels of distress the score of 85, as recommended by the validation studies of PDA for the Romanian population (Opriș & Macavei, 2007).

The *Positive and Negative Affect Schedule* (PANAS; Watson, Clark, & Tellegen, 1988) represents a 20-item mood scale and was developed to measures positive and negative affect. Internal consistency for the current study is α = .672 for positive affect subscale and α = .590 for negative affect subscale.

The *Exam Beliefs Scale* (EBS; Dilorenzo, David, & Montgomery, 2011) is an 8-item scale design to measure of specific exam-related rational and irrational beliefs for this study. For the current study, internal consistency for the irrational subscale was α = .844, while for the rational subscale was α = .664.

Satisfaction with intervention was measured using a scale derived from the *Satisfaction with Therapy and Therapist Scale* (Oei & Shuttlewood, 1999). Internal consistency for the present sample was α = .791.

Expectation toward interventions effects were measured using a 3 items scale developed for the purposes of this study. The items were adapted from the *Milwaukee Psychotherapy Expectations Questionnaire* (Norberg, Wetterneck, Sass, & Kanter, 2011) to fit the nature of the intervention which were used in the study. Internal consistency for the present sample was α = .691.

In order to measure participants' performance at exams, we calculated the grade point average of each participant, as the total number of grade points received over a given period divided by the total number of credits awarded.

3.4.2.4. Procedure

At the first meeting, before starting the intervention, all participants completed the informed consent and the following questionnaires: *ABS-2, ATQ, PDA, PANAS, EBS*, and the *Expectation questionnaire*.

For each intervention group the protocol consisted in four meetings. For the REE group the protocol was adapted after the protocols used in previous studies (Vernon, 1998, 2006; Vernon & Bernard, 2006). For the REE-Prime group, beside the standard REE protocol, various techniques, strategies, and theory from E-Prime principle were implemented.

3.4.3. Results

3.4.3.1. Data analysis

Due to the sample size of the present study, we choose to use nonparametric statistical methods to analyze data. The results from the descriptive statistics, means, standard deviations, and medians of variables investigated within the study are summarized in Table 1.

Table 1.
Means, standard deviations, and medians of variables investigated within the study

	Rational Emotive Education				Rational Emotive Education & E-Prime strategies			
Measure	*M*	*SD*	*N*	*Median*	*M*	*SD*	*N*	*Median*
Time period								
Frequency of negative automatic thoughts								
Time 1	36.09	14.41	11	35.00	40.25	9.42	8	40.00
Time 2	34.54	16.59	11	30.00	37.20	11.34	10	38.00
Time 3	32.40	14.15	10	30.00	28.00	6.67	8	27.50
Positive affect								
Time 1	25.36	5.16	11	24.00	26.90	6.77	10	24.50
Time 2	28.63	5.18	11	28.00	27.70	5.69	10	29.00
Time 3	28.80	1.93	10	29.00	31.50	6.43	8	31.50
Negative affect								
Time 1	28.20	3.01	10	27.50	28.90	6.40	10	28.50
Time 2	27.54	10.82	11	33.00	26.90	9.76	10	25.50
Time 3	22.50	8.08	10	21.00	19.62	7.53	8	18.00
Exam-related rational beliefs								
Time 1	12.90	2.38	11	13.00	13.50	2.75	10	14.50

Time 2	13.45	1.91	11	13.00	13.00	3.71	10	14.00
Time 3	13.70	2.16	10	14.50	14.37	1.76	8	14.50
Exam-related irrational beliefs								
Time 1	8.63	3.17	11	8.00	7.80	2.39	10	7.50
Time 2	7.18	2.82	11	7.00	7.10	2.42	10	7.00
Time 3	7.20	2.89	10	7.00	6.75	2.37	8	6.00
General rational beliefs								
Time 1	109.90	24.71	11	118.00	112.80	21.85	10	118.00
Time 2	117.09	17.82	11	118.00	114.80	16.48	10	115.50
Time 3	114.30	22.80	10	119.00	113.75	27.85	8	122.00
General irrational beliefs								
Time 1	48.81	24.11	11	50.00	64.60	23.93	10	55.50
Time 2	35.72	22.84	11	33.00	53.50	23.83	10	50.50
Time 3	35.30	20.49	10	35.50	47.75	24.16	8	46.50
Negative dysfunctional emotions								
Time 1	30.36	13.54	11	27.00	30.60	11.97	10	27.00
Time 2	33.00	15.22	11	29.00	32.20	14.64	10	28.50
Time 3	26.60	10.25	10	27.50	23.00	10.41	8	19.00
Negative functional emotions								
Time 1	34.18	9.45	11	32.00	33.50	10.04	10	30.00
Time 2	35.54	12.11	11	35.00	37.10	11.25	10	36.00
Time 3	29.10	7.75	10	31.50	26.50	10.71	8	23.00
Positive emotions								
Time 1	42.36	6.29	11	43.00	42.50	7.70	10	39.50
Time 2	39.09	10.80	11	39.00	34.50	8.30	10	33.50
Time 3	37.20	10.33	10	38.50	43.00	6.63	8	42.00
Distress								
Time 1	100.18	26.22	11	95.00	99.60	25.71	10	93.00
Time 2	107.45	34.11	11	107.00	112.80	30.09	10	105.00

Time 3	96.50	24.63	10	95.00	84.50	22.80	8	79.50
Expectancy								
Time 1	206.18	48.00	11	210.00	201.95	35.15	9	190.00
Satisfaction								
Time 3	25.72	5.17	11	28.00	26.20	3.91	10	27.50
Grade point average								
Time 3	7.30	1.01	9	7.13	7.55	1.26	8	7.14

* *Note: M*= mean; *SD*= standard deviation; *N*= number of participants

Then, for testing the difference between the proportions of highly distress participants from the two groups we used the 'N-1' Chi-squared test according to the recommendations of Campbell (2007) and Richardson (2011). Also, in order to test our hypotheses regarding the possible differences in efficacy of interventions we used the Mann-Whitney U test (Mann & Whitney, 1947; McKnight Patrick E. & Najab Julius, 2010) to detect possible differences between the distributions of the two groups. The advantage of the Mann-Whitney U test is that in addition to testing for differences in medians, it can also identify differences regarding the shape and/or spread of distributions (Hart, 2001). Therefore, this analysis procedure is the best nonparametric method when comparing the efficacy of two interventions in clinical or prevention studies with low sample size (Hart, 2001). First, we ran multiple Mann-Whitney U tests for each variable in order to test if there are any differences between the two groups at pretest. Next, we performed for each variable two Mann-Whitney U tests, one for intermediate evaluation and one for posttest, to assess if there are differences regarding the efficacy of the two interventions. The corrections were performed by each time point independently.

In order to avoid biases resulting from multiple comparisons, we performed several corrections. Holm-Bonferroni corrections (Holm, 1979) were used to decrease as much as possible the false discovery rate.

For drop-out analyses, the 'N-1' Chi-squared test was performed (Campbell, 2007; Richardson, 2011).

3.4.3.2. Pretest analyses

Mann-Whitney U tests showed that there were no significant differences between REE-Prime and REE groups at pretest for any of the measured variables (all $p_s > .05$).

Moreover, there were no differences regarding the expectations regarding the intervention between REE-Prime (*Mdn* = 190) and REE group (*Mdn* = 210) at pretest, U = 46.00, z = -.26, p = .405 (1.000), r = -.05.

3.4.3.3. Efficacy analyses

3.4.3.3.1. Primary outcomes

At posttest, 60% of the participants from REE group and 37.5% of the participants from REE-Prime group were highly distress according to the PDA cut-off point. However, there were no significant differences between the two proportions, χ^2 = .850, p = .357. At the intermediate evaluation, 72.3% of the participants from REE and 80% of the participants from

REE-Prime group had high levels of distress, with no significant differences, χ^2 = .145, *p* = .703.

Also, Mann-Whitney U tests revealed no significant differences regarding levels of psychological distress between REE-Prime (*Mdn* = 105) and REE group (*Mdn* = 107) neither at intermediate evaluation, *U* = 51.50 , *z* = -.25, *p* = .412 (1.000), *r* = -.05, or at posttest, REE-Prime (*Mdn* = 79.5) and REE group (*Mdn* = 95), *U* = 29.50 , *z* = -.94, *p* = .186 (1.000), *r* = -.22.

The results for the other affective outcomes at the intermediate evaluation were: PDA negative dysfunctional emotions, *U* = 53.00 , *z* = -.14, *p* = .452 (1.000), *r* = -.031; PDA negative functional emotions, *U* = 51.00, *z* = -.28, *p* = .389 (1.000), *r* = -.06; PDA positive emotions, *U* = 42.50 , *z* = -.88, *p* = .198 (1.000), *r* = -.19; PANAS negative affect, *U* = 54.50 , *z* = -.04, *p* = .494 (1.000), *r* = -.01; and PANAS positive affect, *U* = 50.50 , *z* = -.32, *p* = .385 (1.000), *r* = -.07.

The results for the other affective outcomes at posttest were: PDA negative dysfunctional emotions, *U* = 30.50 , *z* = -.85, *p* = .209 (1.000), *r* = -.18; PDA negative functional emotions, *U* = 32.50 , *z* = -.71, *p* = .249 (1.000), *r* = -.15; PDA positive emotions, *U* = 28.50 , *z* = -1.03, *p* = .162 (1.000), *r* = -.22; PANAS negative affect, *U* = 29.50 , *z* = -.94, *p* = .185 (1.000), *r* = -.20; and PANAS positive affect, *U* = 22.00 , *z* = -.1.61, *p* = .057 (.791), *r* = -.351.

3.4.3.3.2. Secondary outcomes

a. Cognitive outcomes

Mann-Whitney U tests revealed no significant differences regarding levels of irrational beliefs between REE-Prime (*Mdn* = 50.5) and REE group (*Mdn* = 33) at intermediate evaluation *U* = 30.00, *z* = -1.76, *p* = .040 (.5240), *r* = -0.38. Similar results were pointed out at posttest too, for REE-Prime (*Mdn* = 46.5) and REE group (*Mdn* = 35.5), *U* = 28.50, *z* = -1.02, *p* = .163, *r* = -0.24.

The results for rational beliefs also showed no significant differences between REE-Prime (*Mdn* = 115.5) and REE group (*Mdn* = 118) neither at intermediate evaluation *U* = 50.00, *z* = -.35, *p* = .372, *r* = -.07, or at posttest, REE-Prime (*Mdn* = 122) and REE group (*Mdn* = 119), *U* = 38.00, *z* = -.18, *p* = .440, *r* = -.04.

Neither the levels of negative automatic thoughts significantly differed between REE-Prime (*Mdn* = 38) and REE group (*Mdn* = 30), at intermediate evaluation *U* = 42.00, *z* = -.91, *p* = .118, *r* = -.20, or at posttest, REE-Prime (*Mdn* = 27.5), and REE group (*Mdn* = 30), *U* = 36.00, *z* = -.35, *p* = .373, *r* = -.08.

b. Behavioural outcomes

The grade point average of the participants did not significantly differed between REE-Prime (*Mdn* = 7.14) and REE group (*Mdn* = 7.13), *U* = 34.50, *z* = -.15, *p* = .453, *r* = -.03.

3.4.3.4. Feasibility analyses

In terms of satisfaction with intervention and therapist, there were no significant differences between REE-Prime (*Mdn* = 27.5) and REE group (*Mdn* = 28), *U* = 55.00, *z* = .00, *p* = .507, *r* = .00.

Moreover, there were no significant differences between the drop-out rates for the two groups, , χ^2 = .098, *p* = .755.

3.4.4. Discussion and conclusions

This pilot randomized prevention trial investigated the efficacy of a new Rational Emotive Education combined with E-Prime strategies (REE-Prime) vs. classic Rational Emotive Education (REE) in preventing exam-related psychological distress for students, and also assessed the feasibility of the new protocol of REE-Prime intervention.

The results revealed no differences between REE and REE-Prime either at intermediate evaluation, or at posttest, on any primary or secondary outcomes. We expected that REE-Prime to be superior to REE in preventing exam-related distress and associated outcomes. Current data showed that REE-Prime was not superior to the evidence-based prevention intervention REE on any aspects. However, being a pilot study and taking into account the sample size, present results can also show a trend regarding the investigated relationships. Future studies using the new developed protocol, but using larger sample size should test more accurately the effects of these interventions.

Regarding feasibility analyses, the satisfaction with therapy and the therapist showed no differences between REE-Prime and REE. Hence, providing satisfaction scores as good as an evidence-based intervention, we can affirm that REE-Prime protocols showed high feasibility. These results show that the new E-Prime strategies incorporated in the classical protocol of REE did not negatively affect it, proving equal effects regarding satisfaction with intervention. These are very important results in the light of future research directions provided. The fact that E-Prime derived strategies were successfully integrated into an evidence-based protocol is a first step toward testing E-Prime assumptions' in clinical samples.

If the trend emphasized by the current results will be confirmed by future studies, showing that REE-Prime is it at least as efficient as REE could have important implication. If E-Prime strategies could contribute to preventing distress, lowering associated dysfunctional thinking patterns, and maladaptive behaviour, this would confirm the core assumptions of this theory, validating therefore the original E-Prime and General Semantics' goal, namely to facilitate human adaptation to personal, professional, and public life

Limitations of this study are mainly related with the low sample size. This issue hindered us to attain adequate statistic power to detect significant differences. Furthermore, the small sample size determined us to use nonparametric statistical analyses, which did not allow us to use specific superiority or equivalence analyses. Also, the use of self-report measures for the majority of the studied variables could have biased the final results. Moreover, the low proportion of the E-Prime elements in the REE-Prime protocol comparing to original REBT-derived elements could have influenced the results. Adding more E-Prime strategies to classic REE protocol may better emphasize possible positive effects of eliminating the verb *to be*.

Taking all into account, we can say that this pilot prevention randomized trial showed that REE-Prime was not superior to REE in any efficacy aspects, but proved adequate feasibility regarding the new developed protocol. Hence, present finding should be considered an incipient step toward the integration and testing the adding effects of E-Prime elements into evidence-based interventions protocols, whether they target non/sub-clinical or clinical populations.

CHAPTER IV. GENERAL CONCLUSIONS AND IMPLICATIONS

4.1. General Conclusions

The general goal of the present thesis was to test if REBT theory and practice could be enhanced by incorporating E-Prime concepts/strategies in order to achieve a significant improvement for research and clinical field. Another objective of the thesis was to scientifically test the assumptions of E-Prime theory which propose the elimination of the verb *to be* from speech. Also, we aimed to investigate the relationship between rational beliefs and psychological distress in order to contribute to the building of a solid empirical foundation for the theory behind Rational-Emotive Behavior Therapy. Basically, we have proposed to complete the fundamental research area of REBT, and then to expand current knowledge by bringing a theory from philosophical/linguistic field in the scientific domain, and rigorously test its possible beneficial implications for clinical psychology.

We started our demarche by observing that even the REBT literature thrived and developed lately, an extensive investigation of one of its main mechanisms of change, namely rational beliefs, is mandatory. This step seemed utterly important considering the high number of researchers and clinicians that claim for updated methods of evaluating evidence-based psychotherapies in order to evaluate not only the efficacy and effectiveness of a therapy, but also the underling theoretical assumptions (David & Montgomery, 2011). Hence, the first original study of the present thesis represented the first meta-analytical summarization of the associations between rational beliefs and psychological distress. Results showed that the respective relationship is significant, has medium strength, and it is robust for a wide range of emotional problems.

Going further, we intended to develop the clinical psychology filed, and especially the REBT area, beyond its regular, classic framework, by importing and incorporating new concepts from tangent, complementary disciplines. In order to do that, we begun from the observation that even language it is a ubiquitous process, its effects on psychological outcomes, especially on thoughts and emotions, are still in debate. Also, we consider the cognitive science paradigm provides an excellent framework for interdisciplinary research linking various linguistic and psychological aspects. Therefore, we chose to focus on the E-Prime theory, a neurolinguistic approach which argues for removing the verb *to be* from speech. Thus, taking into account the poor previous exploration of this E-Prime research area, we considered necessary to first examine the basic assumptions of E-Prime theory. Therefore, our second study used a cross-sectional design to scientifically test basic predictions of E-Prime theory, using an REBT framework. Specifically, we sought to investigate the intensity and the direction of the association between the frequency of using the verb *to be* and several psychological outcomes. The most important finding of this research was proving that a low frequency of using *to be* is significantly associated with positive psychological outcomes, such high levels of rational beliefs, and especially with preference beliefs. However, no associations between using the verb *to be* and any emotional outcome were highlighted, in spite of what E-Prime theory predicted.

The next step in investigating the alleged benefits proposed by E-Prime was to scrutinize the possible causal effects of using or not the verb *to be* by using an experimental approach. So, the third study had as objective to comparatively investigate the effects of using R-Prime vs. R-Standard in formulating rational and irrational beliefs, on affective, cognitive, and behavioral outcomes. We used an economic context provided by the Behavioral Game Theory paradigm. Our data only partially supported E-Prime hypotheses, by showing that rational thoughts formulated without the verb *to be* could increase inferences' functionality, and lower distress, even in adverse situations. Contrariwise, results pointed out no between

group effects and the lack of any effect at behavioral level, revealing a mixed pattern. More work is needed in order to provide firm answers regarding causality between using E-Prime/R-Prime, and feeling and behaviors.

Further on, the last stage of our proceeding was to look for possible applications of merging E-Prime and REBT perspectives. Also, we put in question the core assumption, the original E-Prime and General Semantics' goal, namely if they can facilitate human adaptation to personal, professional, and public life. More specifically, we intended to see if incorporating E-Prime derived strategies in validated, evidence-base intervention protocols will lead to significant improvements in their efficacy and/or feasibility. Consequently, the fourth study was a randomized prevention trial which had two major goals: (a) to investigate the efficacy of a new Rational Emotive Education combined with E-Prime strategies (REE-Prime) vs. Rational Emotive Education (REE) in preventing exam-related psychological distress for students; (b) to assess the feasibility of the new protocol of REE-Prime intervention. We chose to use a non-clinical sample for this pilot study because the results of the previous studies were not firmly conclusive regarding the effects of eliminating the verb *to be* from speech. Results showed that REE-Prime was not superior to REE in any efficacy aspects, but proved adequate feasibility regarding the new developed protocol. Hence, present finding should be considered an incipient step toward the integration and testing the adding effects of E-Prime elements into evidence-based interventions protocols, whether they target non/sub-clinical or clinical populations. This study intends to be a forerunner for the integration of E-Prime in psychotherapeutic interventions.

Therefore, the general conclusions that can be drawn from the studies included in this thesis are the following:

1. There is a medium negative association between rational beliefs and psychological distress, meaning that higher levels of rational beliefs are associated with lower levels of distress, and vice versa.
2. The respective association between rational beliefs and psychological distress is robust for a wide range of emotional problems, including depression and anxiety.
3. Rational beliefs act as protective factors against psychological problems/disorders.
4. Unconditional acceptance beliefs have larger effects size than other rational beliefs regarding the negative association with distress.
5. There is a negative significant small to medium association between the frequency of using the verb *to be* and rational beliefs.
6. Among rational beliefs' types, only preference beliefs were also significantly negatively related to the frequency of using the verb *to be*.
7. No significant association between the frequency of using the verb *to be* and any emotional variable was observed.
8. Formulating specific beliefs without using the verb *to be* and in a rational manner contribute to the increase of inferences' functionality and to lowering distress.
9. No differences were observed when comparing the effects of using R-Prime vs. R-Standard in formulating rational/irrational beliefs on any emotional, behavioral, or cognitive outcomes.
10. REE-Prime was not superior to the evidence-based prevention intervention REE, no differences being observed between the two interventions either at intermediate evaluation, or at posttest, on any primary or secondary outcomes.
11. The new intervention that we developed combining Rational Emotive Education with E-Prime strategies (REE-Prime) showed high feasibility.
12. The fact that E-Prime derived strategies were successfully integrated into an evidence-based protocol is a first step toward testing E-Prime assumptions in clinical samples.

In the next sections of the paper we highlighted several theoretical, practical, and methodological implications that resulted from this Ph.D. thesis. Although this work fills a number of research gaps, it is not without limits. In the last part of this thesis we will present its limitations and possible future directions of research.

4.2. Theoretical Implications

Given that the present thesis is focused more on fundamental research, the theoretical implications that arise from our result are of great importance. Considerable developments in both REBT and E-Prime fields can devolve from present findings, helping to refine the two theoretical frameworks and to boost the related research.

4.2.1. Theoretical implication for REBT

First of all, the results of the meta-analysis included in this thesis showed a medium negative association between rational beliefs and psychological distress. These findings are highly relevant because they emanate from a qualitative review procedure, so their validity and degree of generalization being very high. Proving this association adds essential evidence for confirming one of the main REBT' assertion which states that rational beliefs can protect from distress and other associated psychological problems/disturbance (David & Cramer, 2009). Even though we cannot draw firm conclusions about the causality of this relationship due to the cross-sectional nature of the most of the studies included in the meta-analysis, proving that there is a negative association between the two constructs analyzed is an important first step, by adding important empirical evidence for the underling theory of REBT. Current data completes the empirical foundation for this therapeutic approach, completing the corresponding meta-analysis that also revealed a medium, but positive relationship between irrational beliefs and distress (Vîslă et al., 2016) and the meta-analysis which confirmed the efficacy of REBT interventions (David et al., 2017).

Also, we showed that unconditional acceptance beliefs are the most important type of rational beliefs in negatively predicting distress. This findings are in line with other recent study (Oltean et al., 2017) which revealed the high contribution of unconditional acceptance in increasing life satisfaction. Literature provides additional data that more and more emphasizes the essential role of unconditional acceptance in enhancing human functioning. These results can be explained by the proximity to emotional responses of the UA beliefs, even if they represent a secondary appraisal mechanism.

Moreover, we showed that there is not a significant difference between general beliefs and specific beliefs regarding their association with distress. These facts support the extended ABC model (David, 2015) of REBT theory by confirming the equal importance of both types of evaluative beliefs, general and specific, in generating the emotional response. Hence, more support was provided for the view that general beliefs bias perception during life events, determining specific descriptions, inferences, and beliefs (David, 2015).

Also, correlational data from the second study was in line with REBT theory predictions. Therefore, irrational beliefs were significantly positively associated with both functional and dysfunctional negative emotions and distress, while being negatively associated with rational beliefs and functionality of inferences. Also, rational beliefs were negatively related with negative dysfunctional emotions and with distress. Another significant negative association was observed between positive emotions and distress. Least, functionality of inferences was negatively associated with negative functional and dysfunctional emotions, as well as with distress. This is an additional validation for REBT models of psychopathology and psychological health.

Of higher importance are the results regarding inferences, the literature being quite scant in this regard. Showing a positive relationship between inferences' functionality and adaptive affective responses can make some light in regard to how different cognitions regulate each other. In addition, the third study provided experimental evidence that using a rational E-Prime style of thinking helps a person to generate more functional inferences, which in turn may lead to healthier emotions. Testing the relationships among different types of cognitions described by the extended ABC model, such as general evaluative beliefs, specific evaluative beliefs, and specific inferences, could help REBT field to advance. This approach could be an impulse for the cognitive regulation field, a research area which it is not enough developed.

4.2.2. Theoretical implications regarding E-Prime theory

One of the most innovative findings of this thesis is the revealing of a significant association between frequency of using the verb *to be* and rational beliefs levels. E-Prime presumed that using the verb *to be* less often will decrease the number of unjustified generalizations, leading in turn to a less rigid and non-judgmental style of thinking (Bourland, 2004). Our data confirms this relationship, showing that infrequent use of *to be* is related with high levels of rational beliefs which reflect a flexible thinking pattern.

Also, another significant theoretical contribution is the finding that significantly negatively links the frequency of using the verb *to be* with PRE beliefs. The shared variance of the two variables can be explained by the fact that eliminating the verb *to be* from speech may prevent dogmatic or rigid thinking, thus stimulating flexibility and through that increasing PRE beliefs levels. Also, the fact that PRE beliefs represent the primary appraisal mechanism may also contribute to the aforementioned relationship.

An interesting and surprising result from a theoretical point of view is the lack of correlation between frequency of using the verb *to be* and GE and/or UA beliefs. Taking into account their nature, GE beliefs implies almost always the use of *to be*. Also, GE beliefs represent generalizations about different life aspects, usually unjustified. Moreover, our research team showed in a previous experimental study (Oltean & David, 2015) that using E-Prime may prevent increasing in GE beliefs compared with E-Standard when using a Velten-like depression induction procedure (Velten, 1968). Therefore, taking all this arguments into account, we expected a significant positive association between using *to be* and GE beliefs, alongside with a reverse association in the case of UA beliefs, but our data did not confirm these hypothesis.

Another core stone of the present thesis is showing that rational beliefs formulated in an E-Prime manner could contribute to increase the functionality of inferences and to lower distress. Revealing for the first time some potential benefits of eliminating the verb *to be* from speech opens multiple theoretical opportunities. Going further into investigating the psychological effects of various words/expressions, parts of speech, or grammatical aspects could provide important information for a better understanding of human mind and of development/maintenance of psychological disorders. Existent literature focused too much on relations between language and executive functions, the processes of language acquisition/production, and decisions-making aspects, ignoring clinical-related problems. Future studies making inquiries about the different aspect of language and emotions/behaviors could continue our work by filling this gap.

4.3. Practical Implications

Besides to previously mention theoretical contributions, this Ph.D. thesis outlines a number of practical and clinical implications which could help to improve psychological

treatments, to give practitioners additional useful tools, and in turn to contribute to improve patients' mental health and well-being.

Most important aspect in this regard is the fact that we showed that rational beliefs buffer the effect of distress for a wide range of emotional problems, so that rational beliefs could be a trans-diagnostic protective factor against distress. These might mean that rational beliefs act like a protective factor against psychological disturbances both for male and females, young and old persons, and for people diagnosed with mental disorders and those without a mental health diagnosis.

Further on, given the fact that unconditional acceptance/self-acceptance beliefs were the most important type of rational beliefs in negatively predicting distress, there are some interesting potential clinical implications arising from these data. UA/SA beliefs being related with lower distress might inform the clinical practice by suggesting an increased focus in developing this type of beliefs in therapy in order to tackle emotional problems and disorders.

Also, the lack of difference between general beliefs and specific beliefs regarding their association with distress could provide clinical guidance. Therefore, from a clinical standpoint, therapist should target equally general and specific evaluative beliefs so that the interventions to be more comprehensive.

Another major practical contribution of this thesis was making the first step toward the integration and testing the adding effects of E-Prime elements into evidence-based interventions protocols, whether they target non/sub-clinical or clinical populations. Results showed that REE-Prime was not superior to REE in any efficacy aspects, but proved adequate feasibility regarding the new developed protocol. The used interventions targeted mainly the academic distress. Academic distress is a more and more stringent problem within the mental health field (Verger et al., 2009). There is a large body of research proving that students experience significant higher levels of distress compared with non-student (Adlaf, Gliksman, Demers, & Newton-Taylor, 2001; Dyrbye, Thomas, & Shanafelt, 2006; Roberts, Golding, Towell, & Weinreb, 1999), academic distress representing a strong significant predictor of various mental health problems, including depression, anxiety, and addiction disorders (see Verger et al., 2009). Therefore, trying to develop more efficient interventions for this problem is essential, and through this thesis we contributed to do so. In essence, this thesis intends to be a forerunner for the integration of E-Prime in psychotherapeutic interventions.

4.4. Methodological Implications

This paper answers to a lot of methodological issues spotted in the literature, and also brings some innovations which could impact the field. First, approaching the relationship between rational beliefs and psychological distress by using a meta-analytical framework allowed us make a reliable qualitative synthesis which integrates previous research in a comprehensive, concluding outcome. Second, we used a wide range of methodological paradigms, such cross-sectional designs, experimental designs, and randomized trials in order to scientifically test basic assumption of E-Prime, and how it could be integrated into REBT structure.

Moreover, we contributed by developing a computerized version of the *Ultimatum* game which also incorporates features design to assess various psychological variables, including behavioral data collected during the game. Also, this computerized application can be connected for future studies with diverse neurophysiological devices to obtain more objective data. Besides, we developed the first method of measuring the frequency of the verb *to be* used in the literature, and also we constructed an automatic system for assessing the

respective outcome. We consider that these aspects represent major methodological implications of the present thesis, being tasks that can be used/developed in future research.

4.5. Limits and Future Directions

The conclusions of the current thesis are circumscribed by the some inherent limits of the included studies. First, the meta-analysis did not allow us to draw conclusion about the causality of the investigated relationship because almost all studies had a cross-sectional nature. Moreover, most of include studies used non-clinical or sub-clinical sample. Second, the investigation of the relationship between the frequency of the verb *to be* and psychological outcomes was limited by the lack of an activating event. Regarding our experimental demarche, we consider that the short time of the experimental manipulation could have negatively influence the results. Besides, the randomized prevention trial's results are limited by the low sample size, which hindered us to attain adequate statistic power to detect significant differences.

Speaking about more general limits, we consider that it would have been useful to also test E-Prime's integration into interventions targeted to clinical samples. We were restricted to do so by the mixt results of the first studies. Taking into account ethical implications, we decided that there were not enough arguments to already move to test the effects of adding E-Prime strategies to interventions for persons diagnosed with psychological disorders.

All thing being considered, analysing the relation between the important implications of the present thesis and its limitations, we consider that this paper add valuable findings to the clinical psychology field in general, and specially for REBT. Our results consolidates REBT's theoretical foundation, and also boosts its research and practice by bringing new, novel elements from philosophical and linguistic fields and examine them in a scientific paradigm. We consider interdisciplinary processes like this one essential for the development and innovation of research, particularly in areas where "puzzle" studies trend inhibit wider approaches.

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