BABEŞ-BOLYAI UNIVERSITY
FACULTY OF PSYCHOLOGY AND EDUCATIONAL SCIENCES
DOCTORAL SCHOOL "EVIDENCE-BASED PSYCHOLOGICAL ASSESSMENT AND INTERVENTIONS"

Ph.D. THESIS

THE ROLE OF THE IRRATIONALITY OF BELIEFS IN THE OCCURRENCE OF PARANOID THOUGHTS

AUTHOR: Ph.D. CANDIDATE RADU ȘOFLĂU

SCIENTIFIC ADVISOR: PROFESSOR Ph.D. DANIEL DAVID

CLUJ-NAPOCA

2017

TABLE OF CONTENTS

CHAPTER I. THEORETICAL BACKGROUND 3

1.1. Introduction and Research Topic 3

1.2. Relevance of the Research Topic 3

CHAPTER II. OBJECTIVES AND GENERAL METHODOLOGY 5

CHAPTER III. ORIGINAL RESEARCH 7

Study 1. A Meta-Analytical Approach of the Relationships between the Irrationality of Beliefs and the Functionality of Automatic Thoughts 7

Study 2. The Relationships between Irrational Beliefs, Unconditional Acceptance and Paranoia 13

Study 3. The Use of Virtual Reality in the Assessment of Paranoid Thoughts: a Comparison with Desktop-based Tools 21

Study 4. The Impact of Irrational Beliefs on Paranoid Thoughts 28

Study 5. An Experimental Investigation of the Impact of the Type of Irrational Beliefs on Paranoid Thoughts 32

CHAPTER IV. GENERAL CONCLUSIONS AND DISCUSSIONS 39

4.1. Theoretical Advances and Implications 39

4.2. Methodological Advances and Practical Implications 40

4.3. Limitations and Future Directions 42

CHAPTER I. THEORETICAL BACKGROUND

1.1. Introduction and Research Topic

Although pharmacological treatments have been the first line of treatment for psychosis since their introduction, psychological interventions received increased attention in the last three decades, considering the limitations of antipsychotic medication (e.g., poor adherence to treatment, severe side-effects, limited response; NICE, 2009). Among psychological treatments, Cognitive behavioral therapy (CBT) was found to be an effective treatment for psychosis, as indicated by a number of meta-analyses (e.g., Turner, van der Gaag, Karyotaki, & Cuijpers, 2014; Wykes, Steel, Everitt, & Tarrier, 2008), and is recommended for psychosis by NICE guidelines (NICE, 2009, 2014). However, given that these meta-analyses found the impact of CBT on positive symptoms of psychosis to be generally small (i.e., *d* up to 0.4), there is evidence that CBT interventions for psychosis need to be refined (Kingdon, 2013). Moreover, CBT was shown to be less effective in reducing delusions, a central symptom in psychosis, being superior to treatment as usual (and with a small effect size), but not to other interventions (Mehl, Werner, & Lincoln, 2015).

It was advocated that a better understanding of the involved cognitive factors and mechanisms of change would contribute to an increase in the effectiveness of intervention packages (Clark et al., 2006; Freeman, 2011). Although a number of psychological factors have been studied in association with paranoid delusions using this approach (Freeman, 2007), little is known about the relevance of the ABC trans-diagnostic model (Ellis, 1962, 1994) for delusions, even though CBT is based on this model (David & Szentagotai, 2006). The ABC model has been previously proposed for paranoia (Trower, 2003), the most frequent type of delusions in psychotic patients (Jørgensen & Jensen, 1994; Stompe et al., 1999) that was also found to be somewhat common in the non-clinical population (Freeman, 2006). Still, to date there is no empirical investigation of the links between irrational beliefs (IBs), a central causal factor in the ABC trans-diagnostic model (Ellis, 1994), and paranoid delusions. Thus, it is yet unclear whether the ABC model could be successfully applied to approach delusions, particularly paranoid delusions, and whether IBs might play a causal role in the occurrence of these delusions.

1.2. Relevance of the Research Topic

Paranoid delusions are reported by the majority (i.e., over 70%) of people suffering a first episode of psychosis (Coid et al., 2013), being the most prevalent type of delusions among patients with psychotic disorders (Jørgensen & Jensen, 1994; Stompe et al., 1999). Moreover, paranoia was found to be present in other psychiatric populations (Fischer, Bozanovic-Sosic, & Norris, 2004; Goodwin & Jamison, 2007) and to be frequently met in the general population, some studies reporting that paranoid delusions are as common as affective disorders (Freeman, 2006; van Os & Verdoux, 2003).

Patients presenting persecutory delusions tend to have very low levels of psychological wellbeing, with some data indicating that about half of them are among individuals within the lowest 2% levels of wellbeing in the general population (Freeman, Startup, et al., 2014). Moreover, persecutory delusions were found to be the most distressing and acted upon type of delusions (Freeman, Garety, et al., 2007; Wessely et al., 1993) and to predict hospital admission and increased need for treatment (Castle, Phelan, Wessely, & Murray, 1994; Freeman et al., 2011), as

well as to be associated with poor physical health and increased suicidal ideation (Freeman et al., 2011). Moreover, studies indicated that not only clinical paranoid delusions are associated with increased distress and significant functional impairment, but also non-clinical experiences of delusions (Olfson et al., 2002). Thus, determining factors involved in the etiology of non-clinical paranoia is of importance on its own. In addition, it would inform the investigation of clinically relevant paranoid delusions.

The results of a number of studies suggested that targeting etiologic factors individually in interventions for paranoid delusions would be beneficial (Freeman, 2016). For example, studies that implemented CBT interventions to specifically address worry (Freeman et al., 2015), beliefs about self (Freeman, Pugh, et al., 2014), or reasoning biases (Garety et al., 2015; Waller et al., 2015) in patients with paranoid delusions significantly improved the targeted factor and reduced the level of delusions, as compared to standard care. However, although significant progress has been made in determining psychological factors that contribute to paranoid delusions, the added value of addressing these variables in CBT interventions for delusions appears to be yet somewhat modest (Mehl et al., 2015).

Rational-emotive behavior therapy (REBT; Ellis, 1962, 1964), a therapy that is based on the ABC model and emphasizes the role of IBs in psychopathology, was found to be effective for a number of psychopathologies (Lyons & Woods, 1991; Szentagotai et al., 2005), with some findings suggesting that REBT could be even more effective than pharmacotherapy for depressive disorder on the long run (David, Szentagotai, Lupu, & Cosman, 2008). Thus, establishing the role of IBs in the occurrence of paranoid delusions might be a first step towards increasing the effectiveness of CBT interventions for this symptom. If a causal link between IBs and paranoia is to be confirmed, the available CBT treatments could be adapted in order to tackle beliefs' irrationality in individuals with paranoid delusions.

CHAPTER II. OBJECTIVES AND GENERAL METHODOLOGY

This research sought to address a number of theoretical and methodological issues concerning the relationship between the irrationality of beliefs and paranoid thoughts. A number of studies have been designed to attain the general and specific goals outlined below.

The first general goal of this thesis was to systematically review and synthetize the available empirical data concerning the links between beliefs' irrationality and dysfunctional automatic thoughts, as well as to identify relevant variables that could impact on this relation. In order to attain this goal, a quantitative meta-analysis was employed, including both correlational and experimental studies that reported a measure of the relationship between the two variables, regardless of the population on which the variables were investigated (Study 1; see *Figure 1*). A number of demographic and clinically relevant variables were coded and tested as moderators of the relationship between beliefs' irrationality and dysfunctional automatic thoughts.

The second goal was to investigate the direction and magnitude of the relationships between different measures of beliefs' irrationality and paranoid delusions, as well as the unique predictive value of IBs for paranoid thoughts in psychotic patients and non-psychotic individuals. A correlational study was implemented in order to investigate these issues, participant being asked to complete self-report questionnaires assessing irrationality of beliefs, paranoid delusions, as well as a number of psychological factors that have been previously linked to paranoia (Study 2).

The third objective was to determine whether VR is a better assessment environment for investigating paranoia and associations with relevant psychological factors than less immersive systems (i.e., desktop). Thus, in an experimental study with random group allocation, the ability of the two assessment environments to discriminate between individuals with high/low levels of paranoia and to detect significant predictors of paranoia was compared (Study 3).

The fourth aim was to test causal links between IBs and paranoid thoughts and perception of others. A randomized experimental study using a role-play procedure was employed to attain this objective, comparing the impact of holding either RBs or IBs on paranoid delusions and perceptions of others (Study 4).

The fifth objective of this work was to test whether any type of IBs could individually impact on paranoid delusions and perceptions of others. This objective was met through the means of a randomized experimental study where IBs were manipulated using a priming procedure (Study 5).

Sixth, this thesis aimed to explore whether the irrationality of beliefs that refer to contents/themes that are directly relevant for paranoia are associated with paranoia and have a similar predictive value for paranoid thoughts as general (i.e., not specific to paranoia) measures of beliefs' irrationality. Since there was no available measure for IBs specific for paranoia, a new instrument was developed (Study 2). The sixth aim was attained through multiple studies (Study 2, Study 3, Study 4, and Study 5).

The seventh goal was to explore whether the links between irrationality of beliefs/ IBs and paranoid delusions differ between individuals with low/ high levels of trait paranoia. This objective was also reached thorough a number of studies (Study 2, Study 3, Study 4, and Study 5).

The last goal of this thesis was to test whether people with higher levels of paranoia report more negative perceptions of others than individuals with lower levels, as well as to investigate links between IBs and perceptions of others.

Given that this is the first investigation of the role of beliefs' irrationality in the occurrence of paranoia, no hypotheses were formulated for a number of specific aims of this thesis. Thus, the analyses corresponding to these aims are exploratory in nature.

Most primary studies that were conducted for he aims of this thesis (Study 3, Study 4, and Study 5) were realized on samples of adults (i.e., mostly students) that were not required to meet any paranoia-related inclusion criterion. In study 2, a group of patients diagnosed with a disorder from the psychotic spectrum and a non-student sample were also investigated. Considering the etiologic continuity of paranoia and psychotic symptoms (Freeman et al., 2010; Myin-Germeys et al., 2003), this methodology is expected to generate results that would also be of relevance for the clinical experiences of paranoia and to inform future research on psychotic patients. Thus, the general methodology was developed assuming a continuum, symptom-based perspective of psychosis according to which clinical symptoms of paranoid delusions are considered to be the severe end of a continuum with the normal (i.e., non-clinical) experiences (Chapman & Chapman, 1980; Van Os et al., 2009). All studies conformed to the ethical guidelines of Babes-Bolyai University's Institutional Review Board.

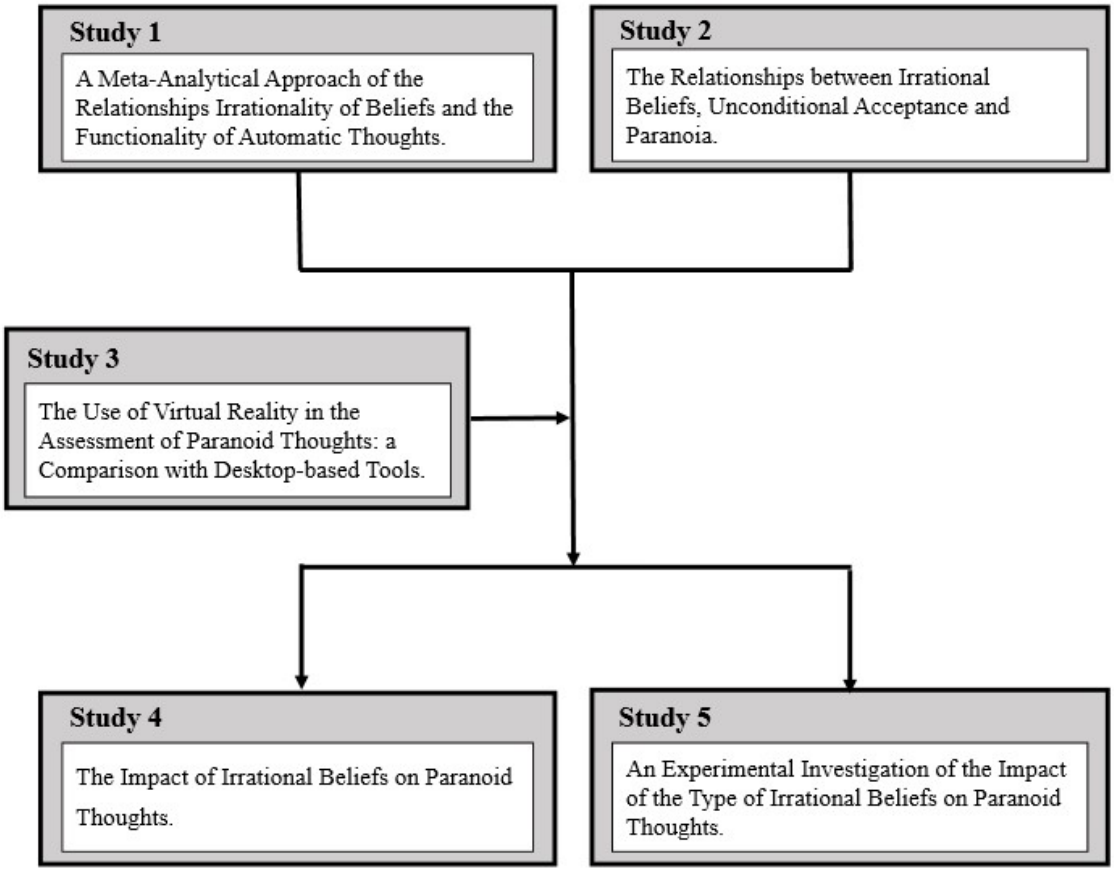

Figure 1. The schematic structure of the Ph.D. project

CHAPTER III. ORIGINAL RESEARCH

Study 1. A Meta-Analytical Approach of the Relationships between the Irrationality of Beliefs and the Functionality of Automatic Thoughts

3.1.1. Introduction

Despite the high efficacy of CBT for a wide range of psychological problems, there is still a need for further developments in CBT techniques and subsequent theories, given that CBT is less effective for some problems (David & Szentagotai, 2006; Hofmann, Asnaani, Vonk, Sawyer, & Fang, 2012), such as psychosis (Mehl et al., 2015). Therefore, taking steps towards increasing the efficacy of these evidence based treatments is of great importance, considering the high burden of mental disorders (e.g., Bloom et al., 2012; Kessler et al., 2009). Shedding light on less clear theoretical aspects of CBT might be an important first step in increasing the efficacy of these interventions. Moreover, it has been recently argued that in order to establish a psychotherapy as evidence based it is important to determine the empirical support for its proposed theoretical underpinnings (David & Montgomery, 2011).

Establishing the magnitude of the relationships between different variables would inform the potential relevance of investigating associations with conceptually similar factors. Thus, in the case of paranoia, given that there is no empirical data concerning the links between the irrationality of beliefs and paranoid thoughts and considering that paranoid delusions represent dysfunctional inferences/ attributions (Freeman et al., 2002), a relevant first step would be to determine the mean magnitude of the relationship between IBs and dysfunctional inferences/ automatic thoughts in general. If the mean magnitude of the associations between IBs and dysfunctional automatic thoughts is of relevance (i.e., medium or high), then it is more plausible for IBs to also be linked with paranoid dysfunctional inferences.

3.1.1.1. Beliefs and automatic thoughts in CBT approaches

One of the important theoretical aspects in CBT theory concerns the relationships between different types of cognitions involved in psychological problems, considering that CBT views client's thoughts as central to the emotional and behavioral problems experienced (A. T. Beck & Dozois, 2011). All CBT theories assume that while encountering an undesirable activating event, certain types of beliefs (i.e., rational, adaptive, functional, healthy) lead to functional consequences on both cognitive (e.g., automatic thoughts - ATs) and emotional levels, while other types of beliefs (i.e., irrational, maladaptive, dysfunctional, unhealthy) lead to dysfunctional consequences on the same variables (e.g., Beck, 1976; Beck & Dozois, 2011; Dryden & David, 2008; Ellis, 1962; Lazarus, 1994). The functionality of a cognition/emotion is determined by the degree to which a certain thought/emotion is helpful (i.e., functional/adaptive) or unhelpful (i.e., dysfunctional/maladaptive) (Bond & Dryden, 1997).

Considering the detrimental effects that dysfunctional beliefs and ATs have on the emotional level (see A. T. Beck, 2005; Browne, Dowd, & Freeman, 2010; David, Freeman, & DiGiuseppe, 2010), it is of both theoretical and practical importance to assess the relationship between the irrationality of beliefs and the functionality of the ATs, and how other variables (e.g., content of IBs) might impact on the magnitude and/or direction of this relationship.

3.1.1.2. Current status of the literature on the relationship between irrationality of beliefs and functionality of ATs

There are some published experimental and correlational studies available that assessed this relationship. Most of the experimental studies are focused on inferences (e.g., Bond & Dryden, 1997; W. Dryden, Ferguson, & Clark, 1989; McDuff & Dryden, 1998), while other focus on combined ATs (i.e. descriptions, inferences, attributions, and evaluations taken together) (i.e., Pössel & Knopf, 2008). Studies generally reported significant effects, but it is unclear what the magnitude of these effects is, given that most studies failed to report effect sizes in the original articles and no meta-analytic synthesis is available on this topic.

3.1.1.3. Overview of the current study

The current study had two main goals. First, it aimed to systematically evaluate the literature on the relationship between the irrationality of beliefs and the functionality of ATs. The present investigation sought to establish the significance as well as the overall magnitude of this relationship. Second, this meta-analysis aimed to investigate potential moderators of the relationship between beliefs' irrationality and the functionality of ATs. For the second goal, we aimed to analyze potential moderators derived from the common CBT theoretical corpus, and from the specific conceptual differences implied by the two main approaches within CBT theory (i.e., REBT and CT).

3.1.2. Methods

3.1.2.1. Literature search

For the present meta-analysis we searched for experimental studies in which beliefs were manipulated to assess the impact on the functionality of ATs, and studies in which both functional/dysfunctional beliefs and ATs were evaluated and a measure of their relationship was provided. Potentially relevant studies were identified through a systematic search of the PsychInfo, PubMed, Scopus and Web of Science databases. The search has been conducted through February 2015, using the following keywords: (belief* AND (inference* OR "automatic thought*") AND (functional OR dysfunctional OR rational OR irrational). Additionally, we searched for potentially relevant articles within the references of recent articles and reviews relevant for the topic.

3.1.2.2. Study selection

A number of 847 records were identified through database search and 2 additional records were identified within the references of the articles. After duplicates removal, 513 records were screened for relevance. The remaining 65 potentially relevant articles were further analyzed for relevance based on the full-text. In order to be included in the meta-analysis, studies had to pass the following criteria: (a) assessed both the irrationality of beliefs (as defined in CBT approaches) and the functionality of ATs; *OR* manipulated the irrationality of beliefs and assessed the impact on the ATs; (b) reported original empirical findings; (c) were written in English; (d) provided enough data to calculate the effect sizes; (e) were not case studies. Thirty articles comprising 34 studies conducted on independent samples ($N = 5086$) were included in the meta-analysis.

Twenty two of the included studies were correlational and twelve were experimental. Most of the experimental studies ($n = 10$) were conducted within the REBT approach, and two (i.e., in Possel, Knopf, 2008) used a CT approach.

3.1.2.3. Procedure

For each study the following variables were coded, if available: study identification data (names of the authors, year of publication), mean age of the participants, number of subjects, clinical status (i.e., clinical, nonclinical, mixt), population type (i.e., general, clinical (MDD or dysthymia), clinical + general, preselected), percentage of married participants per study, country of data collection, design (i.e., correlational, experimental) beliefs approach (i.e., CT, REBT) beliefs type (i.e., primary, secondary, evaluative), contents of beliefs (i.e., certainty, control), object of the beliefs (i.e., self, others), beliefs scale, ATs scale, context (i.e., personal, social, academic, exposure to spiders), internal consistency of the used scales, outcome (i.e., combined ATs, inferences).

Two coders developed a coding schema, which was independently used to systematically capture data for coding the aforementioned variables for each primary study. An inter-rater agreement of 95.11% was obtained. All disagreements were solved through discussions.

For studies reporting multiple outcomes or multiple subgroups, a combined effect size was computed within each study (i.e., across multiple outcomes/subgroups). For the experimental studies the effect sizes were coded so that a positive value indicates higher levels of dysfunctional ATs in the irrational beliefs condition, while for the correlational studies a positive value indicates a direct association between the irrational beliefs and the dysfunctional ATs.

The *r* correlation coefficient was chosen for effect size estimates (Borenstein, Hedges, Higgins, & Rothstein, 2005). To compute effect sizes for all studies, we used the random effects model under the assumption that the effect sizes differ in the population. In order to assess whether effect sizes from the studies included in the meta-analysis are heterogeneous, we used the Q statistic and I^2 statistic (Borenstein, Hedges, Higgins, & Rothstein, 2009). For moderators with more than two categories, we first conducted an omnibus analysis, and further used simple comparison between sub-groups only if omnibus analyses were significant (Borenstein et al., 2009).

To assess for potential publication bias, we visually inspected the symmetry of the data represented in the funnel plot. Additionally, we used Rosenthal's Fail-safe *N* (Rosenthal, 1979) to compute the number of non-significant studies that would be required to nullify the effect. We also used the Trim and Fill method (Duval and Tweedie, 2000) to estimate the unbiased effect size.

3.1.3. Results

3.1.3.1. Main effect of B's irrationality on ATs' functionality

There was a significant medium overall effect size for the relationship between the irrationality of beliefs and the functionality of ATs, $r = .428$, 95% CI [0.364; 0.488], $p < 0.001$. The effect was pooled from 34 studies, with a total of 5086 participants.

Also, there was evidence of heterogeneity in results, $Q(33) = 237.686$, $p < 0.001$; $I^2 = 86.116$, (see Higgin, Thompson, Deeks, & Altman, 2003). Given that around 86% of the observed variance comes from real differences between studies, the between study variability could be explained by study-level variables. Therefore, we tested potential moderators.

3.1.3.2. Theoretically derived moderators

The type of theoretical approach in which the beliefs were conceptualized (i.e., CT vs. REBT). Results revealed that although there appears to be a somewhat higher effect size for the REBT approach (i.e., large effect size for REBT, and medium effect size for CT), B's theoretical approach did not significantly moderate the relation between B's irrationality and the functionality of ATs ($Q_{between}$ = 1.496, p = .221).

The context of the beliefs (i.e., academic, personal, social, spider exposure) did not significantly moderate the magnitude of the relationship, although the effect size is high for spider exposure, medium for social and academic contexts, and low for the personal context ($Q_{between}$ = 1.313, p = .726).

The object of the beliefs (i.e., self vs. others) and **type of the beliefs** (i.e., primary, secondary, evaluative), did not moderate the relationship between beliefs' irrationality and ATs' functionality ($Q_{between}$ = 0.194, p = .660; see Table 2). To further explore the type of beliefs as a potential moderator, we tested the differential relationship of specific REBT beliefs or their combination (the categories extracted from the available studies were: DEM+AWF, DEM+SD, DEM+SD/AWF, DEM, SD) with ATs' functionality. The type of specific beliefs' also did not moderate the relationship between the two cognitive variables ($Q_{between}$ = 9.493, p = .174; see Table 2). Yet, the theme/content of the beliefs (i.e., certainty, control), significantly moderated the effect size of the relationship between B's irrationality and ATs' functionality ($Q_{between}$ = 40.992, p < .001; see Table 2).

The type of ATs assessed (i.e., combined ATs vs. inferences) did not moderate the effect size of the relationship ($Q_{between}$ = 0.242; p = .623).

The type of combination between the approach to beliefs (CT vs. REBT) **and the type of ATs** (i.e. general ATs vs. inferences) did not moderate the effect size ($Q_{between}$ = 1.298, p = .523).

The type of scale used for assessing dysfunctional beliefs significantly moderated the relationship. The association between the irrationality of beliefs and the functionality of ATs was smaller in studies reporting SDBQ and ABS as instruments for assessing beliefs than in studies reporting the other aforementioned measurements for beliefs. No other significant difference was found. Studies measuring dysfunctional beliefs with SDBQ reported significantly smaller effect sizes than studies measuring beliefs with GABS-SF ($Q_{between}$ = 12.911; p < .001), SDI ($Q_{between}$ = 6.556; p = .010), ICDS ($Q_{between}$ = 10.099; p = .001), IBQ ($Q_{between}$ = 10.619; p = .001), and CASI ($Q_{between}$ = 6.753; p = .009). Similarly, results indicated smaller effect sizes for studies assessing dysfunctional beliefs with ABS, as compared with studies using ICDS ($Q_{between}$ = 4.017; p = .045), and DAS ($Q_{between}$ = 10.953; p = .001).

The instrument used for assessing ATs significantly moderated the effect size ($Q_{between}$ = 23.828, p < 0.001; see Table 2). Results of the two by two comparisons showed differences between studies evaluating ATs with SMQ-AT and some form of interview, and studies measuring ATs with others instruments. In the studies assessing ATs with SMQ-AT the effect sizes obtained were smaller than those obtained in studies assessing ATs with Inference Scale (Qb = 8.465; p = .004), single items scales (i.e., VAS (Qb = 7.524; p = .006), and ATQ (Qb = 25.997; p = .000). In studies that evaluated ATs using Interview procedure, effect sizes were also smaller than in studies evaluating ATs with ATQ (Qb = 12.428; p = .000). Therefore, there was a less powerful

relationship between beliefs' irrationality and ATs' functionality in studies assessing ATs with an interview procedure and SMQ-AT relative to studies using the measurements specified above.

3.1.3.3. Procedure related moderators

From the procedure related moderators, only and **gender of the sample** (i.e., female, male, mixed) significantly moderated the effect size of the relationship between the irrationality of beliefs and the functionality of ATs.

Type of population (i.e., general, clinical, clinical + general, preselected). The two by two comparisons between the modalities of the population variable revealed a significant difference only between general (r = .194; *CI* [0.034, 0.343]) and preselected (r = .481; *CI* [0.421, 0.536] populations (Qb = 12.973, p < .001), and between general population samples (r = .193; *CI* [0.124; 0.261] and populations with major depression disorder or dysthymia (MDD) (r = .491*; CI* [0.257; 0.670]) (Qb = 5.559; p = .018), higher effect sizes for the association between beliefs and ATs being reported on preselected and MDD & dysthymia samples.

The gender of the sample (i.e., female, male, mixed) significantly moderated the effect size of the relationship ($Q_{between}$ = 12.376, p = .002). The two by two comparisons showed significantly higher effect sizes for mixed samples (r = .480; *CI* [0.442; 0.535]), as compared to female samples (r = .235; *CI* [0.092; 0.368]) (Qb = 11.482; p = .001). No other differences between the categories of this variable were statistically significant.

The regression coefficient for the **proportion of married people** included in the sample indicated that every increase with one unit of married people corresponds to a decrease of 0.006 units in effect size (see Table 1).

Table 1

Continuous moderators

Variables	*k*	*B*	*z*	Q_{Model}	*p*	$Q_{Rezidual}$	*p*
α Cronbach for beliefs	6	-0.318	-0.547	0.300	.584	4.264	.371
α Cronbach for ATs	13	-1.038	-1.314	1.726	.189	14.097	.228
Sample size	34	0.000	0.550	0.303	.582	31.709	.481
Mean age	29	-0.006	-1.053	1.109	.292	25.622	.540
% married subjects	9	-0.006	-2.297	5.275	.022	9.241	.236
Publication year	34	-0.003	-0.682	0.465	.495	27.614	.688

The effect size of the relationship was not moderated by **reward** (i.e., received reward vs. no reward for participation), **internal consistency of the scales** used for assessing beliefs and ATs, **sample size**, **mean age of the sample**, or **publication year** (see Table 1).

3.1.3.3. Publication bias

For the overall analysis of the meta-analysis, we obtained a Fail-safe N = 8420. Therefore, it would be needed to locate and include 8420 studies (i.e., 247.6 studies for each observed study) with no effect (i.e., "null" studies) for the effect to be nullified (i.e., p > .050). The computed value of Fail-safe N is greater than the critical Fail-safe N value for this meta-analysis (5*34+10=180). Trim and Fill method estimated no study with effects lower or higher than the mean that could

modify the results for the combined studies. Trim and Fill imputed point estimate and 95% confidence interval are identical to those already reported (r = .428*; CI* [0.364; 0.488]).

3.1.4. Conclusions

This meta-analysis examined the mean magnitude of the relationship between irrationality of beliefs and functionality of ATs, and tested theoretical derived moderators, as well as explored additional potential moderators of this relationship.

The results of this study confirmed the CBT hypothesis concerning the relationship between IBs and ATs, revealing a medium to high effect size that somewhat contradict the conclusions of MacInnes (2004) who claimed that the association between IBs and dysfunctional inferences is small. Therefore, as expected, higher levels of B's irrationality are associated with increased levels of dysfunctional ATs. These findings have important implications, considering the relationships that both IBs and ATs have been hypothesized and found to have with distress and negative dysfunctional emotions (see A. T. Beck, 2005; Browne et al., 2010; David, Freeman, et al., 2010).

The findings of the present meta-analysis also suggest that the magnitude of this relationship does not depend on the theoretical perspective (i.e., CT, REBT) on which the two variables are approached. As for the theme/content of beliefs, based on a somewhat limited number of studies reporting necessary data, we conclude that IBs with a "certainty" theme are more closely related to dysfunctional ATs than "control" related IBs, while the type of beliefs (i.e., primary, secondary, evaluative) does not impact on this relationship. From a theoretical point of view, this meta-analysis is of importance, given that it is the first study to systematically review and summarize the available published data on the relationship between two central concepts from the CBT theory, as well as to assess variables that could influence this relationship. From a clinical perspective, the results of this meta-analysis suggest that both primary and secondary IBs should be addressed in interventions and need to be investigated in future studies that aim to test links between IBs and other types of dysfunctional inferences (e.g., paranoid thoughts). Also, it appears that IBs related to certainty might be more problematic than control related beliefs. Future studies are still needed to further clarify how the magnitude of the relationships between different types of beliefs and the functionality of ATs could impact on the emotional level. Finally, it is worth noting that addressing some important limitations (e.g., aforementioned conceptual confusions, methodological limitations) of the literature synthetized here concerning the two variables might be a necessary first step, in order to increase both the internal and external validity of future studies approaching these relationships.

It is worth nothing that most studies are related to anxiety and depression. Studies relating irrationality/dysfunctionality of beliefs with the functionality of the ATs in the context of other psychological problems need to be conducted in order to generalize the results of this meta-analysis. However, considering that anxiety and paranoia are expected to share some similar cognitive factors (Freeman & Garety, 2002) and that the anxiety-related dysfunctional inferences from the studies included in this systematic review were also related to the threat theme (i.e., a central theme in paranoia), the findings of this meta-analysis suggest that IBs might also be relevant for the occurrence of paranoid delusions.

Study 2. The Relationships between Irrational Beliefs, Unconditional Acceptance and Paranoia

3.2.1. Introduction

Paranoid thoughts are among the most prevalent type of delusions in psychotic patients (Jørgensen & Jensen, 1994; Paolini, Moretti, & Compton, 2016; Stompe et al., 1999). Moreover, paranoid delusions occur in other psychiatric populations as well (Fischer et al., 2004; Goodwin & Jamison, 2007; Hamner, Frueh, Ulmer, & Arana, 1999). Thus, it is not surprising that within the symptom-based approach that has been increasingly used in psychosis research (Bentall et al., 2009; Hélène Verdoux & van Os, 2002), paranoid ideation is one of the psychotic symptoms that have been most frequently addressed.

It was maintained that clinical and non-clinical psychotic symptoms are displayed on a continuum and share similar etiological factors (Chapman et al., 1994; Myin-Germeys et al., 2003; Poulton et al., 2000). Hence, identifying predictors of delusions in general population should also contribute to the understanding of the corresponding psychotic experiences arising in clinical populations.

Based on the continuum perspective, a number of studies investigated predictors of paranoid delusions in both clinical and non-clinical samples (e.g., Freeman et al., 2003, 2012, 2013; Freeman, Garety, Bebbington, Slater, et al., 2005; Udachina, Varese, Myin-Germeys, & Bentall, 2014; Vorontsova, Garety, & Freeman, 2013). Key factors that have been proposed (e.g., (Freeman et al., 2004, 2002) and/or found to be somewhat consistently associated with paranoid thoughts include affective processes (i.e., depression (Ben-Zeev et al., 2011; Drake et al., 2004; Fowler et al., 2011; Myin-Germeys et al., 2003), anxiety (Ben-Zeev et al., 2011; Freeman et al., 2013), negative affect (Appelbaum, Robbins, & Roth, 1999)), negative beliefs about self (see (Tiernan, Tracey, & Shannon, 2014b), and low self-esteem (Kesting & Lincoln, 2013).

However, although Cognitive Behavioral Therapy (CBT) is recommended for psychosis by NICE guidelines (NICE, 2014) and there are some data supporting the efficacy of CBT in psychosis (Gould, Mueser, Bolton, Mays, & Goff, 2001; Mehl et al., 2015), there is a scarcity of data concerning the predictive value of the components of the ABC model, on which CBT is based, for paranoid ideation. According to the ABC trans-diagnostic model (Ellis, 1962, 1994), irrational beliefs (IBs) generate dysfunctional emotional, cognitive, and behavioral consequences in the presence of an activating event. Thus, while triggered by an event, IBs would lead to dysfunctional automatic thoughts, such as paranoid thoughts/inferences. The findings of the meta-analysis conducted in Study 1 bring some support for this assumption, revealing a medium to high association for the relationship between IBs and dysfunctional inferences and automatic thoughts, based on both correlational and experimental studies. However, none of the studies included in this meta-analysis focused specifically on paranoid thoughts. Therefore, it is unclear whether the results of this meta-analysis could apply to paranoid ideation. Nevertheless, this might be the case, given that this association was consistently found throughout different psychological problems (e.g., depression, anxiety) and populations (see Study 1).

Somewhat in line with the ABC model, some findings indicated an association between negative beliefs about the self and others and paranoia (Fowler et al., 2006; Smith et al., 2006). These beliefs overlap conceptually with the type of IBs identified as global evaluation (GE) (i.e., of self (SD) and others (OD)) in the original ABC model (Ellis, 1962, 1994). However, GE is just one of the four IBs emphasized in the original ABC model, along with demandingness (DEM),

awfulizing (AWF), and low frustration tolerance (LFT) (Ellis, 1994). Still, somewhat surprising, virtually no study investigated the associations between these central IBs and paranoid thoughts.

Although there are several questionnaires available for the assessment of IBs (Bernard, 1998; DiGiuseppe, Leaf, Exner, & Robin, 1988; Lindner, Kirkby, Wertheim, & Birch, 1999). there is no readily available instrument for evaluating IBs that might be specific to paranoid contents. Considering that CBT models claim the existence of specific contents/themes of the beliefs for each psychopathology/ psychological disturbance (A. T. Beck & Dozois, 2011) and that the impact of IBs on specific dysfunctional automatic thoughts appears to be influenced by the beliefs' content (Bond & Dryden, 1997; see Study 1), it could be necessary to use assessment tools that evaluate IBs related to themes specific to paranoia while investigating their association with paranoid thoughts (see Study 1).

In the literature pertaining to the investigation of predictors of paranoia, self-esteem and other self-related concepts have drawn particular attention (see Kesting & Lincoln, 2013; Tiernan et al., 2014b). Considering the criticism around the concept of self-esteem (e.g., Ellis, 1995) and the somewhat mixed findings concerning the links between self-esteem and paranoia (see Freeman et al., 2002; Kesting et al., 2013), it would be important to compare the relevance of self-esteem and unconditional acceptance, a construct that has been opposed to self-esteem (Ellis, 1995), for paranoia.

3.2.1.1. Overview of the current study

This research had two sets of objectives. Thus, two studies are presented. The first study (Study 2a) aimed to first investigate the associations between specific and non-specific IBs and their relationships with trait paranoia (i.e., trait paranoid thoughts) in a student sample. The second aim of Study 2a was to assess if specific and non-specific IBs predict trait paranoia beyond the variables that have been consistently linked to paranoia. The third objective was to compare the predictive value of self-esteem and unconditional acceptance. Fourth, it assessed the combined predictive value of general and specific IBs and unconditional acceptance for paranoia, as well as the unique contribution of each in the prediction of paranoia. The final goal of Study 2a was to explore whether the associations between IBs and paranoia differ between individuals with high/low levels of trait paranoia.

Study 2b was initially aimed to replicate Study 2a in individuals from the general populations (i.e., non-student sample), as well as in individuals with a psychiatric diagnosis of psychosis. However, given that patients were generally reluctant to complete a large battery of tests, only a limited number of variables were assessed. First, the levels of paranoia and beliefs irrationality were compared between the clinical and the general population samples. Higher levels were expected in the psychotic group. The second aim was to explore associations between the general and specific irrationality of beliefs and paranoid delusions within each group, as well as overall (i.e., psychotic and non-clinical combined). The third objective was to evaluate the unique predictive values of general and specific irrationality of beliefs for paranoid thoughts. The fourth aim was to test the combined predictive value of the two measures of belief irrationality. The final goal of Study 2b was to explore whether the associations between IBs and paranoia differ between individuals with high/low levels of trait paranoia.

Study 2a

3.2.2.a Methods

3.2.2.1.a Participants

Two hundred and twelve student participants (mean age = 21.84 years, SD = 4.24, range = 18, 47, 84.4% female) were recruited from a Faculty of Psychology and through internet-based outlets. Like in the previous studies that sought to determine links between different theoretical factors and paranoia in non-clinical individuals, no paranoia-related criteria were used for inclusion in this study. Participants who completed all the required measurements received course credits for participation.

3.2.2.2.a Measurements

Green Paranoia Thoughts Scale (G-PTS; Green et al., 2008) was developed to assess trait paranoia. It consists of two 16-item subscales (Social Reference, and Ideas of Persecution).

Depression Anxiety Stress Scales 21 (DASS-21). DASS-21 is the short form developed by Lovibond & Lovibond (1995) from their 42-items self-report measure of depression, anxiety, and stress (DASS).

The Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988). The scale consists of 20 words describing positive and negative emotions. Items are generally grouped in two scales (i.e., Positive Affect; Negative Affect).

Rosenberg Self-Esteem Scale (RSE; Rosenberg, 1965) was applied to assess self-esteem.

Unconditional Acceptance Questionnaire (UAQ; David, Cotet, et al., 2013) was used to measure unconditional acceptance toward self, others, and life.

Brief Core Schema Scales (BSCC; Fowler et al., 2006). The BCSS consists of 24 items developed to assess self- and other-evaluations. Four subscales derive: negative-self, negative-others, positive-self, positive-others.

The Attitude and Beliefs Scale II (ABS-II; DiGiuseppe et al., 1988). ABS-II measures IBs. It contains 72 items that assess four cognitive processes (i.e., DEM, AWF, LFT, and GE/SD). A global score of irrationality and the scores on the four subscales were calculated for the aims of this study.

Paranoia Rational and Irrational Beliefs Scale (Paranoia-RIBS). The scale has been developed to measure RBs and IBs related to paranoia for the aims of this thesis, on the basis of the general format proposed by Montgomery and colleagues (Montgomery et al., 2007b; see Appendix B). The statements of the Paranoia-RIBS were built to reflect IBs and RBs related to two domains (i.e., social rejection and vulnerability) that have been previously hypothesized to be central themes for delusional beliefs (Freeman, Garety, Bebbington, Slater, et al., 2005b) and were found to predict the occurrence of. Thus, eight items were conceived for each domain (16 items for the entire scale), one item for each IB (i.e., DEM, AWF, LFT, GE) and RB (i.e., PRE, BAD, FT, non-GE). Lower scores indicate higher levels of paranoia-specific irrationality. The scale demonstrated good internal consistency on this sample (α Cronbach = .84 for the general score; α Cronbach = .69 for Vulnerability IBs; α Cronbach = .79 for Rejection IBs).

3.2.2.3.a Procedure

After signing the informed consent, participants were required to fill in a battery of tests comprising the aforementioned measurements. The study was conducted online and no partial submissions were allowed. Thus, only the responses from individuals who completed the entire set of questionnaires were registered.

3.2.3.a Results

The results indicated that higher levels of general irrationality are associated with higher levels of specific irrationality ($p < .05$) and higher levels of general and non-specific IBs are significantly related with both measures of trait paranoia ($p < .05$).

The first set of hierarchical regressions showed that general IBs significantly add predictive value above and beyond the other predictors of paranoia (R^2 change = .01, $F(1,202) = 4.12$, $p = .044$ for social reference and R^2 change = .02, $F(1,202) = 4.865$, $p = .029$ for persecution; see Table 3). Similarly, specific IBs significantly increased the explained variance of both social reference (R^2 change = .04, $F(1,202) = 11.35$, $p = .001$) and persecution (R^2 change = .02, $F(1,202) = 6.61$, $p = .011$; see Table 3). Unconditional acceptance ads predictive value above and beyond the other predictors for social reference (R^2 change = .06, $F(1,202) = 19.41$, $p < .001$), but does not add any predictive value for persecution (R^2 change = .01, $F(1,202) = 3.37$, $p = .068$). In contrast, self-esteem does not appear to be significantly related to paranoia ($p > .05$).

Results of the second set of regression analyses indicated that general and specific IBs and unconditional acceptance predicted together 28.82 % of variance in social reference ($F(3, 208) = 28.09$, $p < .001$), and 16.17 % of variance in persecution ($F(3, 208) = 13.38$, $p < .001$). However, general IBs did not have a unique contribution above and beyond specific IBs and unconditional acceptance in predicting social reference (R^2 change = .002; $F(1, 208) = 0.52$, $p = .472$) and persecution (R^2 change = .009; $F(1, 208) = 2.12$, $p = .147$). In contrast, specific IBs uniquely predicted 6.87 % of variation in social reference ($F(1, 208) = 20.08$, $p < .001$) and 4.93 % of variation in persecution ($F(1, 208) = 12.24$, $p = .001$). Unconditional acceptance uniquely predicted 5.44 % of variation in social reference ($F(1, 208) = 15.89$, $p < .001$), but had no unique predictive value for persecution (R^2 change = .009, $F(1, 208) = 2.32$, $p = .130$).

The addition of interaction terms between the level of social reference (i.e., high/ low scores of social reference) and general IBs significantly contributed to the models, indicating that the predictive values of general IBs on social reference (R^2 change = .009, $F(1, 208) = 5.60$, $p = .019$) and persecution (R^2 change = .02, $F(1, 208) = 5.38$, $p = .021$) differ between individuals with high and low levels of social reference. Social reference level also moderated the predictive values of specific IBs for social reference (R^2 change = .007, $F(1, 208) = 4.41$, $p = .037$), but not for persecution (R^2 change = .004, $F(1, 208) = 1.09$, $p = .298$). In contrast, social reference level did not moderate the predictive value of unconditional acceptance for social reference (R^2 change = .002, $F(1, 208) = 0.95$, $p = .331$) and persecution (R^2 change = .001, $F(1, 208) = 0.28$, $p = .593$). For all three significant moderations, the predictive value was higher for the individuals holding higher levels of social reference than for those with lower levels.

The level of trait persecution (i.e., high/low scores of persecution) moderated the predictive value of general IBs for persecution (R^2 change = .02, $F(1, 208) = 6.48$, $p = .012$), but not for social reference (R^2 change = .001, $F(1, 208) = 0.48$, $p = .491$). The addition of interaction terms between persecution level and the other two predictors (specific IBs and unconditional acceptance) did not significantly add to the variance explained by each predictor alone ($p > .05$). Thus, persecution level din not moderate the predictive value of specific IBs for social reference (R^2 change = .00003, $F(1, 208) = 0.01$, $p = .911$) and persecution (R^2 change = .009, $F(1, 208) = 3.42$, $p = .066$), nor the predictions of unconditional acceptance for social reference (R^2 change = 0.000004, $F(1, 208) = .001$, $p = .971$) and persecution (R^2 change = .001, $F(1, 208) = 0.27$, $p = .607$).

Study 2b

3.2.2.b Methods

3.2.2.1.b Participants

Two groups of participants were recruited for the aims of the second part of this study. The first group comprised twenty-eight individuals (mean age = 48.33 years, SD = 7.72, range = 34, 61, 52% female) with a psychiatric diagnostic of a psychotic disorder. Still, three participants did not fill in the questionnaire assessing paranoid delusions and were excluded from the study. Given that participants from this group were recruited through a number of day centers for psychiatric patients, all participants were under medication and psychiatric observation.

For the second group, individuals from the general population were recruited through internet-based outlets. Fifty-three individuals (mean age = 38.74 years, SD = 11.79, range = 18, 65, 84.4% female) completed the online questionnaires. However, given that this part of the study aimed to explore whether the relationships between beliefs' irrationality and paranoia are replicated in non-student and clinical populations, the five students that completed the instruments were excluded from the analyses. Thus, the group from the general population comprised forty-eight participant (mean age = 40.27 years, SD = 11.08, range = 23, 65, 70.8% female) in the end. No participant from this group reported a diagnostic of a psychotic disorder, and only three reported having a psychiatric diagnostic (i.e., generalized anxiety disorder, bipolar disorder, and major depression disorder respectively).

3.2.2.2.b Measurements

Given that individuals form the clinical population were reluctant to complete a large number of questionnaires, a reduced number of assessment tools were administered in the second part of this study.

Green Paranoia Thoughts Scale (G-PTS; Green et al., 2008). The scale was used to assess trait paranoia (see Study 2a).

Depression Anxiety Stress Scales 21 (DASS-21; Lovibond & Lovibond, 1995). The scales was described in detail in the first part of the study.

Interpersonal Sensitivity Measure (*IPSM*; Boyce & Parker, 1989). The scale comprises 36 items that were developed to assess 5 dimensions of interpersonal sensitivity: interpersonal awareness, need for approval, separation anxiety, timidity, and fragile inner-self. Items are scored on a 4 point Likert scale ranging from 1 (very unlike me) to 4 (very like me).

The *Attitudes and Belief Scale 2-Abbreviated Version* (*ABS-II-AV*; Hyland, Shevlin, Adamson, & Boduszek, 2014) is the short version of the 72 item Attitudes and Belief Scale 2 (DiGiuseppe et al., 1988). Like the original version described in Study 2a, the ABS-2-AV was developed to assess the four irrational processes (DE, AWF, LFT, and GE) and the four rational processes (PRE. BAD, FT, and non-GE). High scores indicate high levels of the measured variable.

Paranoia Rational and Irrational Beliefs Scale (Paranoia-RIBS). The scale was used to assess RBs and IBs specific to paranoia (see Study 2a).

3.2.2.3.b Procedure

This study was realized in accordance to the ethical guidelines of Babes-Bolyai University's Institutional Review Board. After signing the informed consent, participants were required to fill in a battery of tests comprising the aforementioned measurements. Participants from the clinical group completed the questionnaires in the paper and pencil format, while individuals from the general population completed all measurements online. Given that no partial submissions

were allowed in the online survey, only the responses from individuals who completed the entire set of questionnaires were registered for the non-clinical group.

3.2.3.b Results

There were significant differences between the two groups concerning paranoia and beliefs' irrationality combined ($F(4, 62) = 4.22$, $p = .004$, Wilk's $\lambda = .786$, partial $\eta^2 = .214$). Groups differed significantly concerning the level of social reference ($F(1, 65) = 11.402$, $p = .001$, partial $\eta^2 = .15$), persecutory delusions ($F(1, 65) = 6.45$, $p = .014$, partial $\eta^2 = .09$), general irrationality ($F(1, 65) = 13.491$, $p < .001$, partial $\eta^2 = .17$), but not on the level of specific irrationality ($F(1, 65) = 3.33$, $p = .073$, partial $\eta^2 = .05$). As expected, all significant differences indicated higher levels among clinical individuals.

Results indicated that higher levels of general irrationality are significantly associated with higher levels of specific irrationality only in the general ($p < .05$), but not in the clinical population ($p > .05$). Both general and specific measures of beliefs' irrationality were significantly associated with social reference in the general, as well as in the clinical populations ($p < .05$). Concerning persecutory delusions, the same pattern of associations was found in the general population, while in the case of clinical subjects only the general measure of beliefs' irrationality was significantly linked to persecutory delusions ($p < .05$). Overall (i.e., clinical and general population samples combined), both measures of irrationality were significantly related to both measures of paranoid delusions ($p < .05$).

The first set of hierarchical regressions showed that general IBs significantly added predictive value above and beyond the other predictors of paranoia (R^2 change = .11, $F(1, 61) = 14.492$, $p < .001$ for social reference and R^2 change = .19, $F(1, 62) = 19.26$, $p < .001$ for persecution; see Table 10). Similarly, specific IBs significantly increased the explained variance of both social reference (R^2 change = .06, $F(1, 61) = 6.81$, $p = .011$) and persecution (R^2 change = .12, $F(1, 62) = 10.83$, $p = .002$).

The two measures of belief irrationality significantly predicted social reference ($R^2 = .44$, $F(2, 64) = 25.33$, $p < .001$) and persecutory delusions ($R^2 = .40$, $F(2, 66) = 21.54$, $p < .001$). In the combined model, both general and specific irrationality were significant predictors of social reference, but only general ($p < .001$) and not specific belief irrationality had a unique contribution to the model in the case of persecutory delusions ($p = .083$).

The addition of interaction terms between the level of social reference (i.e., high/ low scores of social reference) and general IBs did not significantly contribute to the model of prediction for social reference (R^2 change = .009, $F(1, 64) = 2.48$, $p = .120$), but significantly added to the model for persecution (R^2 change = .06, $F(1, 64) = 7.89$, $p = .007$), indicating that the predictive values of general IBs on persecution differ between individuals with high and low levels of social reference. The same pattern was found for specific IBs. The level of social reference did not significantly moderate the predictive value of specific irrationality for social reference (R^2 change = .06, $F(1, 64) = 7.89$, $p = .076$), but moderated its predictive value for persecution (R^2 change = .04, $F(1, 65) = 4.48$, $p = .038$). For the significant moderations, the predictive value was better for the individuals holding higher levels of social reference than for those with lower levels.

The level of trait persecution (i.e., high/low scores of persecution) did not moderate the predictive value of general IBs for social reference (R^2 change = .001, $F(1, 64) = 0.08$, $p = .776$), but significantly moderated the prediction for persecution (R^2 change = .03, $F(1, 64) = 4.35$, $p =$

.041). Like in the case of general IBs, the addition of interaction terms between persecution level and specific IBs did not significantly add to the variance explained for social reference (R^2 change = .002, $F(1, 65) = 0.33$, $p = .566$), but contributed to the predictive model for persecution (R^2 change = .03, $F(1, 68) = 4.83$, $p = .031$).

3.2.4. Discussions

To our knowledge, this is the first study to investigate the links between IBs and paranoia. Overall, the results of the current study bring some additional support for the ABC transdiagnostic model of psychopathology (Ellis, 1994), as well as to the continuum perspective. Thus, it was found that both general and specific IBs are associated with higher levels of trait paranoia (i.e., social reference and persecution) in both samples (i.e., student and general population + clinical). The association between specific irrationality of beliefs and persecutory delusions in the clinical sample was the only one that did not reach significance. Moreover, the fact that both general and specific IBs predicted paranoia beyond affective and cognitive factors that have been previously linked to paranoid delusions additionally supports the relevance of IBs for paranoia. These findings and the strong positive correlation that were found on both samples between high levels of general and specific beliefs' irrationality (i.e., indicating that the two measures assess similar constructs) suggest that *Paranoia-RIBS* might be fit to evaluate paranoia-specific IBs.

Given the criticism around the concept of self-esteem (e.g., Ellis, 1995) and the somewhat mixed findings concerning the links between self-esteem and paranoia (see Freeman et al., 2002; Kesting et al., 2013), Study 2a aimed to compare the predictive value of self-esteem and unconditional acceptance, a construct that has been opposed to self-esteem (Ellis, 1995), for paranoia. While self-esteem was not found to be significantly related to none of the two measures of paranoia, unconditional acceptance was significantly associated with both measures and significantly predicted social reference beyond the other cognitive and affective variables. The findings are in line with those of the previous studies that found no links between self-esteem and paranoid delusions (Fowler et al., 2006; McCulloch, Clare, Howard, & Peters, 2006). Moreover, these results bring additional support to the REBT claim that unconditional acceptance is related to mental health (Ellis, 1994) as they suggest that unconditional acceptance might be a protective factor for paranoia.

Since general and specific IBs and unconditional acceptance are somewhat related constructs (i.e., unconditional acceptance is a rational alternative to global evaluation, (David, Cotet, et al., 2013), their combined and unique contribution to predicting paranoia were also investigated in Study 2a. The combined model was successful in predicting both measures of paranoia (28.82 % of variance in social reference and 16.17 % of variance in persecution) in the student sample. However, it appears that specific IBs are the only factor that predict both social reference and persecution above and beyond the other two predictors. In contrast, general IBs were not found to have a unique contribution in explaining differences in levels of paranoia, while unconditional acceptance uniquely predicted social reference, but not persecution.

Interestingly, in Study 2b (i.e., comprising both non-clinical individuals and psychotic patients) the two measures of belief irrationality combined appeared to predict somewhat better both measures of paranoia (44% of variance in social reference and 40% of variance in persecution) than the combined model tested in Study 2a. Thus, these results suggest that beliefs' irrationality might be at least equally important for the occurrence of paranoia in psychotic patients

as it is in the non-clinical population (e.g., unselected students). Somewhat in contrast with the findings from the student population, general IBs were found to have a unique contributions in predicting both measures of paranoia, while specific IBs uniquely predicted social reference, but not persecution.

The findings concerning the relative unique contribution of general and specific irrationality of beliefs are somewhat in line with previous studies (see Study 1), suggesting that the content of the IBs might be relevant for the functionality of related cognitive outcomes. Thus, it would appear that the theme/content of the IBs might impact on the associations between IBs and paranoia. Still, it is unclear which pattern applies for paranoid thoughts in the presence of an activating event (i.e., state paranoid thoughts). Thus, future empirical work is needed to determine whether specific IBs (e.g., related to vulnerability and social rejection) are equally relevant for the occurrence of paranoia as compared to non-specific IBs and to delineate the contents of IBs that are the most relevant for paranoia/ paranoid thoughts.

Concerning the comparisons between individuals with high and low levels of trait paranoia, the moderation analyses indicated mixed results concerning the predictive value of general and specific IBs and unconditional acceptance for paranoia. The results of Study 2a showed that general IBs were a better predictor for both measures of paranoia, and specific IBs better predicted social reference among individuals with higher levels of social reference than among those with lower levels. Still, the predictive value of specific IBs for persecution and of unconditional acceptance for both social reference and persecution did not significantly differ between individuals with high/ low levels of social reference. Somewhat similarly, the predictive values of the three factors for paranoia did not differ between individuals with higher/lower levels of persecution, except for the prediction of general IBs for social reference that was better among individuals with higher levels of persecution. Thus, while it would appear that general IBs tend to be to some extent more relevant among individuals with high trait paranoia than among those with low levels of paranoia, specific IBs and unconditional acceptance appear to be generally equally relevant for paranoia among individuals with high/low trait paranoia. Interestingly, the results of Study 2b somewhat mirror the findings from the student sample, with generally similar predictive values among individuals with high/low levels of paranoia and a few significant moderations suggesting that beliefs' irrationality is a better predictor among individuals with higher levels of paranoia. To a point, these findings are consistent with the continuum perspective (Myin-Germeys et al., 2003) and with the previous studies that found paranoia to be associated with similar factors in individuals holding different levels of paranoid delusions (Valmaggia et al., 2007; Van Os et al., 2009). Therefore, it might be appropriate to test the role of IBs in the occurrence of paranoia among non-selected individuals, as this might also contribute to the theoretical understanding of the links between IBs and paranoia among individuals holding more intense paranoid delusions. Still, more studies on general and clinical populations are needed to test this hypothesis.

To sum up, this study contributes to the literature assessing the role of IBs and unconditional acceptance in health and psychopathology. Results provide preliminary support for the relevance of these factors in the etiology of paranoia, suggesting that general and specific IBs might constitute a vulnerability factor for developing paranoia, while unconditional acceptance might represent a protective factor. These findings mirror the results of previous studies that applied the ABC model to emotional disturbance.

Study 3. The Use of Virtual Reality in the Assessment of Paranoid Thoughts: a Comparison with Desktop-based Tools

3.3.1. Introduction

VR systems have been successfully used in mental health assessment (e.g., Ferrer-García & Gutiérrez-Maldonado, 2012; Riva, 1998) and intervention in psychopathology (see Opriş et al., 2012; Powers & Emmelkamp, 2008). Although most of these studies focused on affective disorders, particularly on anxiety disorders/symptoms, more recently VR has been used in more severe psychopathologies as well (e.g., Fornels-Ambrojo et al., 2008; Freeman et al., 2010; Kim et al., 2006; Kurtz, Baker, Pearlson, & Astur, 2007).

Since paranoid delusions are unfounded thoughts related to others' intention to cause you harm (Freeman, 2007), there is a need for assessment tools that isolate the possibility of these thoughts being grounded in reality. Given that self-report instruments focused on real-life experiences are unable to identify "paranoid" thoughts that are empirically supported (Freeman, 2008), accurate VR assessment tools for paranoid thoughts could be especially useful. VR has the advantage of providing a more controlled environment for evaluation, allowing the investigator to set the exact parameters he is interested in for the specific assessment aims (Rizzo & Kim, 2005). Thus, VR enables the assessor to deliver identical experiences to every participant, ensuring that the paranoid thoughts that occur are unfounded. This feature is especially important in clinical and research settings. The use of technology-based laboratory tools, such as VR, might facilitate the investigation of predictors and etiological factors involved in pathology (e.g., paranoid thinking, psychosis), as well as the clarification of the mechanisms of change involved in evidence-based treatments (David, Matu, & David, 2013) for psychosis.

Although VR has been used for evaluation purposes in multiple studies (see Valmaggia, Day, & Rus-Calafell, 2016; Neguț, Matu, Sava, & David, 2016), little is known about the relative usefulness and appropriateness of VR as an assessment tool for paranoia. There are some studies showing that VR is a secure and acceptable environment for evaluating paranoia in people with persecutory delusions (e.g., Fornells et al., 2008; Valmaggia et al., 2007). In addition, studies outline that people who report paranoid thoughts in VR tend to have higher levels of trait paranoia and are also more likely to report paranoid thoughts in real life settings (Valmaggia et al., 2008; Freeman et al., 2008). However, although it has been argued that a major advantage of VR refers to its potential to approach issues that otherwise would be expensive to address in real-life situations or less effectively addressed in other environments (e.g., David, Matu, & David, 2013), virtually no data exist concerning the usefulness of VR for assessing paranoid thoughts relative to more affordable environments (e.g., desktop). Moreover, the few studies that compared the utility of VR and desktop-based environments in different application areas (i.e., on tasks unrelated to paranoia) offered mixed results (see Santos et al., 2009). Thus, more studies are needed in order to determine the relative usefulness of VR/ desktop-based tools in general, and for the assessment of paranoid thoughts in particular.

3.3.1.1. Overview of the present study

The primary goal of this study was to investigate comparatively the relative usefulness of VR/ desktop environments for assessing paranoid thoughts. Thus, we first analyzed how the human avatars were perceived at the sample level and explored potential differences on people's perceptions of others between the two environments. Starting from the premise that a useful

assessment environment would be expected to trigger more intense paranoid thoughts among people presenting high levels of trait paranoia than among those with low levels of trait paranoia (Valmaggia et al., 2007), we evaluated whether the type of assessment environment (i.e., VR vs. desktop) moderated the relationship between the levels of trait paranoia and paranoid thoughts. In addition, we sought to explore whether the associations between different theoretical predictors of paranoid thinking and paranoid thoughts differ as a function of the type of evaluation environment. As predictors, we examined the central factor of the ABC trans-diagnostic model of psychopathology (i.e., irrational beliefs; Ellis, 1994) and a number of variables that have been linked to paranoia (i.e., negative self/others evaluations; interpersonal sensitivity; self-esteem and its alternative – unconditional self-acceptance; and social anxiety; see Freeman, 2007). The second goal was to compare the levels of cognitive absorption induced by the two types of assessment environments. We predicted that people immersed in VR would have higher levels of cognitive absorption than those assessed with desktop-based visualization scenarios. Finally, since some of the previous studies have found an association between the sense of presence and the level of symptomatology activated in VR (e.g., Schuemie et al., 2000; Renaud, Bouchard, & Proulx, 2002; Robillard, Bouchard, Renaud, & Fournier, 2003), we aimed to investigate whether sense of presence in linked to the intensity of paranoid thoughts among individuals immersed in VR.

3.3.2. Method

3.3.2.1. Participants

Individuals with no self-reported history of mental illness were recruited through online advertising within the Babes-Bolyai University. Participants were undergraduate students (N = 126; 81.8 % F), with a mean age *m* = 21.42 (*SD* = 4.38; range = 18, 47). No participant reported having a history of psychosis or neurological problems. They received course credits for participation at the end of the experiment.

3.3.2.2. Measures

3.3.2.2.1. Baseline measurements.

Green Paranoia Thoughts Scale (G-PTS; Green et al., 2008) was developed to assess trait paranoia. Items are grouped to form two subscales: social reference (16 items), and ideas of persecution (16 items).

The Attitude and Beliefs Scale II (ABS-II; DiGiuseppe et al., 1988) contains 72 items that evaluate IBs. The scale assesses four cognitive processes (i.e., demandingness (DEM), awfulizing (AWF), low frustration tolerance (LFT), and global evaluation (GE)). All items were combined to obtain a global score of irrationality.

Paranoia Rational and Irrational Beliefs Scale (Paranoia-RIBS). The Paranoia-RIBS was developed in Study 2 in order to measure RBs and IBs related to paranoia on the basis of the general format proposed by Montgomery and colleagues (Montgomery et al., 2007b).

*Brief Core Schema Scales (*BCSS; Fowler et al., 2006). The BCSS consists of 24 items developed to assess self- and other-evaluations. The items are grouped in four subscales of 6 items each: negative-self, negative-others, positive-self, positive-others.

Interpersonal Sensitivity Measure (IPSM; Boyce & Parker, 1989). The scale consists of 36 items that assess 5 dimensions: interpersonal awareness (7 items), need for approval (8 items), separation anxiety (8 items), timidity (8 items), and fragile inner-self (5 items). A global score is computed by adding all items, with scores ranging from 36 to 144.

Unconditional Acceptance Questionnaire (UAQ; David, Cotet, et al., 2013). The UAQ evaluates unconditional acceptance.

Rosenberg Self-Esteem Scale (*SES*). SES was developed (Rosenberg, 1965) and used in the present study to assess global self-esteem.

Liebowitz Social Anxiety Scale (*LSAS*; Liebowitz, 1987). LSAS is a 24 items scale assessing symptoms of social anxiety on four-point Likert-type scale (0 – 3).

3.3.2.2.2. Process measurements.

Cognitive Absorption Scale (CA). The original CA scale was developed by Agarwal & Karahanna (2000) to assess an individual's experience with a software. Higher scores indicate higher levels of cognitive absorption.

Presence Questionnaire (*PQ*; Witmer, & Singer, 1994). PQ was designed to measure the degree to which participants experience presence in virtual environments.

3.3.2.2.3. Outcome variables.

Visual Analogue Scales for Perceptions (VAS-Pe). In order to evaluate how the human avatars were perceived, participants were asked to evaluate to what extent the people present in the room were "friendly", "hostile", and "neutral", on three separate 10 cm lines. A "0" ("not at all") and a "10" ("very") were marked at the extremities of each line. Higher scores imply greater levels of the associated perceived characteristic.

State Social Paranoia Scale (SSPS; Freeman et al. 2007) measures paranoid thinking in a social situation.

Paranoid Thoughts Visual Analogue Scales (PT-VAS; Author & Author, in progress) were built in a previous study to additionally assess paranoid thoughts. We chose to combine the six affirmations that were initially designed to independently assess specific paranoid thoughts, in order to reduce the number of dependent variables from the analyses, given that a good internal consistency (α Cronbach = .81) was observed for the scale comprising the six items combined.

3.3.2.3. Materials

VR. For the aims of this study, we decided to use a head mounted display (HMD), which is a relatively less expensive VR environment that could be more easily implemented in clinical settings. Thus, an eMagin Z800 3D Visor device (SVGA – 800 x 600 triad pixels per display; > 16.7 million colors; brightness > 50 cd/m2; contrast ratio > 200:1; view angle of around 40 deg diagonal FOV) was used in the VR condition. The HMD was equipped with a head tracking device (360° horizontal, > 60° vertical) that allowed a natural movement. The VR scenario depicted an indoor setting that was populated with human avatars displaying neutral behaviors. Avatars (men and women) were seated in front of the participants and were relatively static (i.e., realized only a few slight body movements and negligible changes in facial expressions, while remaining seated throughout the immersion; see Appendix C). The scenario was created by Virtually Better, Inc. (http://www.virtuallybetter.com/).

Desktop. A desktop with a screen resolution of 1600 x 900 at a refresh rate of 60 Hz was used. Participants that were randomly assigned to the desktop environment received the same scenario as the participants allotted to the VR environment.

3.3.2.4. Design and procedure

All participants completed the baseline assessments after signing the informed consent. Next, participants were randomized to one of the two conditions: VR or desktop-based assessment. Participants from both conditions were exposed to the exact same scenarios populated by neutral

human avatars, for four minutes. The only difference between the two experimental groups was the type of environment in which the scenario was visualized, participants being seated in front of a 2D desktop or immersed in the VR environment. In line with previous studies (e.g., Isnanda, Brinkman, Veling, van der Gaag, & Neerincx, 2013), participants from both groups were asked to focus on how they perceived and experienced the scenario. Right after the exposure period, participants from both conditions completed the SSPS and the VAS scales, referring to the thoughts they had while being immersed in the VR/ visualizing the desktop-based scenario. Subsequently, all participants filled in the Cognitive Absorption Scale. Additionally, participants allotted to the VR condition also completed the Presence Scale at the end of the experiment.

3.3.3. Results

There were no significant differences between the two groups on baseline variables ($F(12, 113) = 0.84$, $p = .611$, Wilk's $\lambda = .92$, partial $\eta^2 = .08$). Pearson correlations between baseline variables are provided in Table 1. Groups differed significantly on outcome variables ($F(5, 108) = 2.89$, $p = .017$, Wilk's $\lambda = .88$, partial $\eta^2 = .12$), but only concerning the extent to which avatars were perceived as hostile ($F(1, 108) = 4.42$, $p = .038$, partial $\eta^2 = .04$) and friendly ($F(1, 108) = 4.72$, $p = .032$, partial $\eta^2 = .04$). Overall, there were also differences in how avatars were perceived ($F(2, 246) = 75.754$, $p < .001$). Post-hoc test using Bonferroni correction showed that individuals from both groups perceived human avatars as more neutral than positive ($p = .029$), more neutral than hostile ($p < .001$), and more friendly than hostile ($p < .001$).

The residuals of the two-way ANOVA were normally distributed ($p > .05$) and the assumption of homogeneity of variances was met ($F(3, 68) = 1.90$, $p = .136$ for SSPS; $F(3, 68) = 0.51$, $p = .671$ for PT-VAS). Evaluation environments did not moderate the effect of the level of trait paranoia on paranoid thoughts, given that there was no statistically significant interaction between the two independent variables ($F(1, 68) = 1.18$, $p = .281$ for SSPS; $F(1, 68) = 0.89$, $p = .347$ for PT-VAS). The exploratory analyses that were run removing outliers, indicated somewhat different results, with a significant interaction effect on paranoid thoughts, as assessed by SSPS ($F(1, 64) = 7.15$, $p = .009$), but no significant interaction effect on PT-VAS $F(1, 65) = 3.57$, $p = .052$). Thus, simple main effects were computed only for SSPS. The simple main effect of paranoia trait was significant for those assessed in VR ($F(1, 64) = 5.49$, $p = .022$, partial $\eta 2 = .08$), with higher levels of paranoid thought reported by individuals with high levels of trait paranoia ($m = 17.25$, $SD = 6.71$) than by people with low levels of trait paranoia ($m = 11.77$, $SD = 3.49$). In contrast, it was not significant for those assessed in the desktop environment ($F(1, 64) = 2.01$, $p = .161$, partial $\eta 2 = .03$).

Pearson correlation coefficients between paranoid thoughts and their theoretically derived predictors for each type of environment are summarized in Table 1. As it can be seen in Table 1, in the desktop group, only one measure of paranoid thoughts was significantly associated with trait paranoia and LFT is the only theoretically derived predictor that was significantly correlated with a measure of paranoid thoughts. In contrast, when assessed in VR both measures of paranoid thoughts were linked to trait paranoia and multiple baseline variables (see Table 1). The significant increase in the total variance explained by the regression model at the addition of the interaction term indicated that the type of environment moderated the associations between paranoid thoughts as assessed by SSPS and the irrationality of beliefs (ABS-II; R^2 change = .05, $F(1, 107) = 5.95$, $p = .016$), GE (R^2 change = .05, $F(1, 107) = 5.21$, $p = .024$), AWF (R^2 change = .07, $F(1, 107) = 8.09$, $p = .005$), but not the associations with LFT (R^2 change = .02, $F(1, 107) = 2.26$, $p = .136$) and DEM (R^2 change = .04, $F(1, 107) = 3.92$, $p = .050$). Of the significant associations between

paranoid thoughts assessed by PT-VAS and theoretically derived predictors, only the association with AWF was significantly moderated by the type of environment (R^2 change = .04. $F(1, 107) = 4.52$, $p = .036$). The relationships with irrational beliefs (R^2 change = .22, $F(1, 107) = 2.68$, $p = .104$), LFT (R^2 change = .003, $F(1, 107) = 0.37$, $p = .544$), GE (R^2 change = .03, $F(1, 107) = 3.11$, $p = .08$), DEM (R^2 change = .01, $F(1, 107) = 1.61$, $p = .207$), negative beliefs about others (R^2 change = .01, $F(1, 107) = 1.46$, $p = .228$), and unconditional acceptance (R^2 change = .02, $F(1, 107) = 2.36$, $p = .127$) were not significantly moderated by the type of assessment environment.

Table 1

Pearson (r) correlations between paranoid thoughts and theoretically derived predictors

		G-PTS	ABS-II	LFT	GE	AWF	DEM	RIBS	N-Self	N-Others
Desktop	SSPS	.177	-.032	.077	-.105	-.043	-.030	.115	-.045	.091
	PT-VAS	.306*	.172	.262*	.104	.118	.138	-.070	.117	.081
VR	SSPS	.274*	.417**	.373**	.319*	.467**	.339*	-.188	.101	.261
	PT-VAS	.407**	.418**	.344*	.379**	.446**	.331*	-.181	.197	.276*

Note: SSPS - State Social Paranoia Scale (Freeman et al. 2007); PT-VAS - Paranoid Thoughts Visual Analogue Scales; G-PTS - Green Paranoia Thoughts Scale (Green et al. 2008); ABS-II - global score of The Attitude and Beliefs Scale II (ABS-II; DiGiuseppe, Leaf, Exner, & Robin, 1988); LFT - Low Frustration Tolerance Subscale; GE - Global Evaluation Subscale; AWF - Awfulizing Subscale; DEM - Demandingness Subscale; P-RIBS - Paranoia Rational and Irrational Beliefs Scale (Soflau & David, in progress); N-Self - Negative Beliefs about Self (Subscale of the Brief Core Schema Scales - BCSS; Fowler et al., 2006); N-Others - Negative Beliefs about Others (Subscale of the Brief Core Schema Scales - BCSS; Fowler et al., 2006); IPSM - Interpersonal Sensitivity Measure (Boyce & Parker, 1989); UAQ - Unconditional Acceptance Questionnaire (David, Cotet, Szentagotai, McMahon, & Digiuseppe, 2013); SES - Rosenberg Self-Esteem Scale (Rosenberg, 1965); LSAS - Liebowitz Social Anxiety Scale (LSAS; Liebowitz, 1987);
* $p < .05$;
** $p < .01$

The independent samples t test indicated a significant difference between groups on cognitive absorption ($t(51) = 2.65$, $p = .011$; $d = 0.73$), with higher levels of cognitive absorption in the VR environment ($m = 19.96$, $SD = 15.90$) than in the desktop condition ($m = 8.33$, $SD = 16.05$).

Concerning the last goal of this study, the two linear regressions found that the level of presence in VR did not significantly predict paranoid thoughts, regardless of the assessment tool ($R^2 = .03$, $F(1,51) = 1.41$, $p = .24$ for SSPS; $R^2 = .008$, $F(1,51) = .39$, $p = .536$ for PT-VAS).

3.3.4. Discussions

The human avatars were designed/projected to be neutral and overall were perceived as more neutral than positive or hostile by the individuals from our sample. Therefore, the results of the comparisons between the two environments on perceptions of avatars suggest that VR scenarios are somewhat more accurately perceived by individuals (i.e., less positive and less negative) than desktop-based scenarios. Also, although individuals reported similar levels of paranoid thoughts in the two environments, VR and desktop-based assessments of paranoid thoughts do not appear to be equally useful for discriminating between individuals with high/low

levels of trait paranoia. Hence, after removing outliers results indicated that VR, but not desktop-based assessments, revealed more intense paranoid thoughts for individuals holding high levels of trait paranoia than for those holding low levels of trait paranoia. However, these differences appear to be observed only when paranoid thoughts are assessed with SSPS. When PT-VAS is used for assessing paranoid thoughts the findings follow a similar pattern, but the interaction effect is slightly above the significance level. The results are somewhat in line with those of previous studies showing that individuals who report more intense paranoid thoughts in VR also tend to have higher levels of trait paranoia (e.g., Valmaggia et al., 2007). Moreover, our findings suggest that even though overall VR and desktop-based assessments register similar levels of paranoid thoughts, when trait paranoia is taken into account VR appears to be more successful in priming levels of paranoid thoughts that are consistent with individuals' levels of trait paranoia than desktop-based tools.

The findings concerning the utility of VR/ desktop for identifying psychological factors related to paranoia are somewhat similar. In the desktop environment only one measure of paranoid thoughts was associated with trait paranoia and with one of the tested psychological variables. In contrast, both measures of paranoid thoughts implemented in a VR environment were significantly associated with trait paranoia and a number of theoretical predictors. Moreover, the moderation analyses indicated that some of these associations were significantly moderated by the type of environment. These results are somewhat in line with those of previous studies that managed to identify predictors of paranoia using VR assessment tasks (e.g., Freeman et al., 2008a; Freeman et al., 2008b), thus providing additional support for the claims that VR has the potential to facilitate the investigation of predictors and etiological factors involved in paranoia (Freeman, Pugh, Vorontsova, Antley, & Slater, 2010) and pathology in general (David, Matu, & David, 2013). It is worth noting that although all theoretical predictors were significantly associated with trait paranoia, irrational beliefs measurements were the only predictors that were consistently related to both measurements of paranoid thoughts in the VR group. Future studies may need to examine more closely the role of irrational beliefs in the development and maintenance of paranoia.

The result of the comparison on cognitive absorption suggests that VR assessment tasks may have an additional advantage. Individuals immersed in a VR environment reported higher levels of cognitive absorption than individuals assessed using a desktop-based task, with a large magnitude of the difference ($d = 0.73$). These results differ from those of Negut, Jurma and David (2016) who found no differences on cognitive absorption between the two environments. A possible explanation for the different findings may be related to the particularities of the samples recruited in the two studies. While the findings of Negut, Jurma and David (2016) were based on a sample involving children diagnosed with ADHD, the results of the current study involved an adult sample. A second explanation may be derived from the type of tasks used in the two studies. Negut, Jurma, and David (2016) asked participants to complete a numeric task (i.e., inhibition), while participants in this study were asked to freely explore the environment. The processes involved in an inhibition task (i.e., individuals are asked to focus on just one type of stimulus, while ignoring most of the other stimuli from the environment) may interfere with obtaining high levels of cognitive absorption (i.e., a state of deep involvement with the technological environment). Given that cognitive absorption has been linked to perceived usefulness, ease of use and intention to use (Agarwal & Karahanna, 2000), the findings of the present study suggest that VR assessment tools may be more easily accepted by individuals than less immersive environments. Although our results cannot be readily generalized to clinical populations suffering

from delusions, the preliminary data concerning the acceptability of VR among people with persecutory delusions are also promising (Fornells, Barker, Swapp et al., 2008). Still, further studies are needed to replicate the findings on both general population and people suffering from paranoid delusions.

Finally, the exploratory analysis indicated that the level of presence in VR was not significantly associated with the intensity of the reported paranoid thoughts. These results are somewhat different from those of studies showing positive associations between sense of presence and levels of symptomatology activated in VR (e.g., Schuemie et al., 2000; Renaud, Bouchard, & Proulx, 2002; Robillard, Bouchard, Renaud, & Fournier, 2003), but in line with previous research that found no link between presence and symptomatology in non-stressful environments (e.g., Alsina-Jurnet, Gutiérrez-Maldonado, & Rangel-Gómez, 2011; Kim, Kim, Cha, 2008; Krijn, Emmelkamp, Biemond et al., 2004). It has been argued (Ling, Nefs, Morina, Heynderickx, & Brinkman, 2014) that the available assessment tools for presence might be unfit for capturing dimensions that are relevant for social contexts, being focused on spatial dimensions (i.e., *place illusion*) and less interested in the *plausibility* dimension (see Slatter, 2009). Thus, presence questionnaires may need to incorporate items that assess the plausibility of these cues in social VR scenarios.

To sum up, to the best of our knowledge, this is the first study to provide data on the usefulness of VR for assessing paranoid thoughts, relative to less immersive environments. The findings of the present study suggest that VR may be better suited for the assessment of paranoid thoughts than desktop-based tools. Also, VR appears to be a more useful tool for advancing the theoretical understanding of paranoia than desktop assessments, given that a larger number of theoretical predictors that were associated with trait paranoia in this study were also found to be related with paranoid thoughts assessed in VR than with desktop-based tools. Moreover, individuals assessed in VR reported higher levels of cognitive absorption than individuals evaluated with desktop-based tools. Overall, this study contributes to the literature concerning the use of VR for assessment purposes, providing additional support for the appropriateness of VR for evaluating paranoid thoughts.

Study 4. The Impact of Irrational Beliefs on Paranoid Thoughts

3.4.1. Introduction

Cognitive Behavioral Therapy (CBT) was proved to be effective in reducing positive symptoms and might facilitate recovery in psychotic individuals (Gould et al., 2001). However, although it is recommended by NICE guidelines for psychosis (NICE, 2014), the effect sizes favoring CBT are small to medium. Moreover, with regard to changes in delusions, CBT appears to be effective only as compared to treatment at usual (and with a small effect size), but not superior to other interventions, according to a recent meta-analysis (Mehl et al., 2015). Nevertheless, the findings from the study of Mehl and her colleagues (2015) indicate that newer studies evaluating interventions that specifically address causal factors of delusions obtain significantly larger effect sizes than the non-specific CBT interventions. However, the difference in mean effect sizes between the two types of interventions is still small (d = 0.33). These results suggest the importance of further exploring potential causal factors for delusions that need to be targeted by future CBT interventions.

There is an increasing number of empirical studies investigating different predictors of paranoia within the CBT framework (see Freeman, 2007 for a review). However, to date, little attention has been paid to testing the ABC trans-diagnostic model (Ellis, 1962, 1977, 1994) in paranoia, despite the fact that cognitive behavioral therapies are based on this model (David & Szentagotai, 2006).

Although the ABC model has been previously proposed in paranoia, earlier attempts have predominantly conceptualized paranoid inferences as activating events (A) for IBs (B) that subsequently lead to dysfunctional consequences (C) (e.g., anxiety/depression, hostile behaviors, and other psychotic symptoms) (Trower, 2003). Thus, less attention has been paid to the REBT hypothesis that IBs also result in dysfunctional automatic thoughts/inferences (e.g., paranoid thoughts) in the CBT explanatory models of paranoia. Applying the ABC model to paranoid thoughts, paranoid inferences (e.g., "Someone has it in for me") can be conceptualized as dysfunctional cognitive consequences (C) of the IBs (e.g., "I should show no sign of weakness in front of others. People are bad and hostile.") (B) that are activated by certain events (e.g., a social interaction). Even though the ABC model and REBT techniques have been used to elaborate clinical interventions for paranoia and other psychotic symptoms (Bennett & Pearson, 2015; Hansen, 2006; Trower, 2003), little is known about the etiological role of IBs in the occurrence of paranoid thoughts. This is not very surprising considering that CBT research was less focused on the causal relationship between IBs and other cognitive variables (e.g., inferences/automatic thoughts) in other psychopathologies as well, and more concerned with the impact of IBs on the emotional level.

Even though little is known about the role of IBs in the occurrence of paranoid automatic thoughts, there are some findings that indirectly support the hypothesis of a potential link between these variables. First, the results of the recent meta-analysis (see Study 1) synthetizing a series of both experimental and correlational studies reporting data for the relationship between IBs and automatic thoughts (i.e., including inferences) found a significant medium to high magnitude for the association. Although none of the studies included in this meta-analysis focused on paranoid inferences/thoughts, the consistency of this relationship across different psychological problems (e.g., depression, anxiety) and populations might suggest that these findings could generalize to

paranoid ideation as well. Second, in Study 2 and Study 3 it was shown that beliefs' irrationality is linked to the level of paranoid thoughts reported by individuals in a neutral VR generated social scenario. Still, to the best of our knowledge, to date little experimental work has been done on IBs potentially lending vulnerability to paranoid psychosis or paranoid thoughts.

3.4.1.1. Overview of the present study

The present study aimed to evaluate the impact of IBs on paranoid thoughts and people's perceptions of others. Based on the REBT theory, we hypothesized that IBs would determine higher levels of paranoid inferences than RBs. In addition, we aimed to analyze whether participants' initial irrationality, paranoid traits or other variables that have been previously related to paranoid thoughts (i.e., positive and negative self/others evaluations; self-esteem and its alternative – unconditional self-acceptance; depression; and anxiety; see Freeman, 2007) are associated with the study outcomes. Finally, this study sought to investigate whether the impact of IBs on paranoid thoughts depends on the level of trait paranoia and perceptions of others.

3.4.2. Material and methods

3.4.2.1. Participants

Eighty-one participants (mean age = 21.21 years, SD = 2.72, range = 18, 33, 83.95% female) were randomly assigned to one of the two groups (i.e., RBs vs. IBs). Participants were recruited from a Faculty of Psychology, through internet-based outlets. No participant reported having neurological problems. Participants who completed the entire protocol received course credits for participation.

3.4.2.2. Measures

The Attitude and Beliefs Scale II (ABS-II; DiGiuseppe et al., 1988) contains 72 items that evaluate RBs and IBs. Only a global score of irrationality was calculated for the aims of this study.

Paranoia Rational and Irrational Beliefs Scale (Paranoia-RIBS). The Paranoia-RIBS was developed in Study 2 to measure RBs and IBs related to paranoia, on the basis of the general format proposed by Montgomery and colleagues (Montgomery et al., 2007b).

Green Paranoia Thoughts Scale (G-PTS; Green et al., 2008) is a measure of trait paranoia. It comprises two 16-item subscales: social reference, and ideas of persecution.

Brief Core Schema Scales (BSCC; Fowler et al., 2006*).* The BCSS consists of 24 items developed to assess self- and other-evaluations. The items are grouped in four subscales of 6 items each: negative-self, negative-others, positive-self, positive-others.

Rosenberg Self-Esteem Scale (RSE; Rosenberg, 1965*)*. The RSE consists of 10 statements assessing self-esteem.

Unconditional Acceptance Questionnaire (*UAQ*; David, Cotet, et al., 2013). The UAQ was used to assess unconditional acceptance.

Depression Anxiety Stress Scales 21 (DASS-21). DASS-21 is the short form developed by Lovibond and Lovibond (1995) from their 42-items self-report measure of depression, anxiety, and stress (DASS). Only scores for the depression and anxiety subscales were computed in the present study.

State Social Paranoia Scale (SSPS; Freeman, Pugh, et al., 2007) is a ten items scale that measures paranoid thinking in a social situation.

Paranoid Thoughts Visual Analogue Scales (PT-VAS) were built to additionally assess paranoid thoughts. The six affirmations were initially designed to independently assess specific paranoid thoughts. However, given that a very good internal consistency (α Cronbach = .92) was

observed for the six items combined, we chose to merge the six VASs into a single scale, in order to reduce the number of dependent variables from the analyses.

Visual Analogue Scales for Perceptions (P-VAS). Participants were asked to evaluate to what extent people present in the room were "friendly", "hostile", and "neutral", on separate 10 cm lines.

3.4.2.3. Procedure

Following consent, participants completed the battery of initial self-report measures approximately two weeks prior to participating in the experimental tasks. The battery included all the reported scales, except SSPS and the VAS scales. The latter were completed at the end of the experiment. All participants were randomized in experimental groups using a random number generator.

The current study used a role-playing methodology similar to that used by Bond & Dryden (Bond & Dryden, 1997). However, unlike these authors, we chose to immerse the participants in a virtual reality (VR) generated scenario instead of asking them to imagine themselves in a certain scenario.

First, applying the role-play paradigm, the rationality of beliefs was manipulated by asking participants to imagine holding a list of RBs or IBs, depending on their group allocation. All subjects from both groups received five minutes for reading and adopting the allotted beliefs. Second, participants were immersed in a VR environment (HMD) and asked to explore the surroundings while imagining they are holding the beliefs they received. The VR environment consisted of a social scenario, participants being sited in front of a neutral audience for four minutes. Next, as a first manipulation check, subjects had to evaluate the extent to which they have managed to imagine holding the beliefs they received, during the VR exposure, on a 10-point scale (from 0 – "not at all" to 9 – "to a great extent"). Then, participants had to complete the SSPS and the VAS scales, referring to the thoughts they had during the VR immersion. Finally, participants were asked to estimate the extent to which they imagined themselves in the VR environment and managed to hold the beliefs they previously received while completing the questionnaires (from 0 – "not at all" to 9 – "to a great extent"), as a second manipulation check.

3.4.3. Results

Results showed no significant differences between the two conditions on the baseline variables ($F(12, 68) = .57$, $p = .855$, Wilk's $\lambda = .91$, partial $\eta^2 = .09$), and none of the baseline variables were significantly related with the outcome variables ($p > .05$).

MANCOVA revealed a significant effect of the irrationality of beliefs on the dependent variables, controlling for manipulation check scores ($F(5, 71) = 10.61$, $p < .001$, Wilk's $\lambda = .57$, partial $\eta^2 = .43$). IBs led to higher levels of state paranoia thoughts, as assessed by both SPSS ($F(1, 75) = 39.38$; $p < .001$; partial $\eta^2 = .34$) and PT-VAS ($F(1, 75) = 36.58$; $p < .001$; partial $\eta^2 = .33$). Furthermore, participants holding IBs perceived the people/avatars from the VR environment as more hostile ($F(1, 75) = 36.53$; $p < .001$; partial $\eta^2 = .33$), less friendly ($F(1, 75) = 26.11$; $p < .001$; partial $\eta^2 = .26$) and less neutral ($F(1, 75) = 7.63$; $p = .007$; partial $\eta^2 = .09$) than those holding RBs. The results pattern was replicated after controlling for participants' levels of irrationality and trait paranoia ($F(5, 68) = 11.24$, $p < .001$, Wilk's $\lambda = .55$, partial $\eta^2 = .45$).

Similar results were obtained after including data exclusively from subjects scoring seven or higher on both manipulation checks in the analyses ($F(5, 41) = 6.13$, $p < .001$, Wilk's $\lambda = .57$,

partial η^2 = .43). People holding IBs reported significantly higher levels of paranoid thinking (F (1, 45) = 25.78; p < .001; partial η^2 = .35 – SSPQ; (F (1, 45) = 25.38; p < .001; partial η^2 = .36 – PT-VAS) than those holding RBs. Similarly, people holding IBs perceived avatars as more hostile (F (1, 45) = 26.81; p < .001; partial η^2 = .37), less friendly (F (1, 45) = 9.41; p = .004; partial η^2 = .17), but equally neutral (F (1, 45) = 3.95; p = .053; partial η^2 = .08) as compared to people holding RBs.

Trait paranoia did not moderate the effect of beliefs' irrationality on outcome variables, given that there was no statistically significant interaction between the two independent factors (F (5, 40) = 0.13, p = .986; Wilk's λ = .98).

3.4.4. Discussions

This is the first study to examine the impact of IBs and RBs on paranoid thoughts and on people's perceptions of others, using an experimental design. As expected based on REBT trans-diagnostic model, IBs induced higher levels of paranoid thoughts and more negative perceptions of others than RBs. These findings are unlikely to be explained by people's irrationality or paranoia traits, since there was no difference between groups on these variables at baseline and none of these variables were significantly related to the study outcomes. Moreover, the differences between people holding IBs and those holding RBs matched the REBT model's hypothesis even after controlling for the aforementioned variables.

These results add further support to the REBT hypothesis (Ellis, 1977) concerning the relationship between beliefs and automatic thoughts, indicating that IBs might play a role in the occurrence of paranoid thoughts and matching the general REBT assumption that IBs determine the functionality of other cognitions, such as automatic thoughts (Dryden & David, 2008).

In line with the continuum perspective (Chapman & Chapman, 1980; Van Os et al., 2009), this study showed that the impact of the beliefs' irrationality is similar among individuals with high/ low levels of trait paranoia. Thus, these findings support the idea of an etiologic continuity (Freeman, Garety, Bebbington, Slater, et al., 2005a; Poulton et al., 2000) in paranoia.

Given that in this study participants received all four types of IBs/RBs to suit the purpose of the current study, it is unclear which, if any, of the IBs (i.e., DEM, SD/OD, AWF, LFT) might play a more important role in generating paranoid thoughts. Following studies should address this research question. Some studies have already shown that negative beliefs about the self and others are linked to paranoia (Fowler et al., 2006; Smith et al., 2006). However, virtually no empirical data exist concerning the impact of each of the other three IBs (i.e., DEM, AWF, LFT) from the REBT model on paranoid thoughts.

Study 5. An Experimental Investigation of the Impact of the Type of Irrational Beliefs on Paranoid Thoughts

3.5.1. Introduction

According to the ABC model o psychopathology, IBs constitute a vulnerability factor that in the presence of an activating event leads to dysfunctional emotional, behavioral and cognitive consequences, while RBs have functional outcomes (Dryden & David, 2008). In the second study of this thesis, in one of the first investigations of the relationship between IBs and paranoia, significant associations between the irrationality of general and specific beliefs and trait paranoia were found in both healthy participants and individuals with a diagnostic of psychosis. Subsequently, in the third study of this thesis, it was found that only the irrationality of general (but not specific) beliefs significantly predicted the occurrence of paranoid thoughts (i.e., state) in a social situation. The fourth study provided the first empirical evidence of a potential causal link between the irrationality of beliefs and paranoid thoughts. Thus, in a randomized experimental study, it was shown that holding IBs lead to higher levels of paranoid beliefs and more negative perceptions of others than holding RBs. However, in the fourth study, individuals from both groups received all four types of IBs/RBs: a primary belief - demandingness (DEM) and three secondary IBs - awfulizing (AWF), low frustration tolerance (LFT), and global evaluation (GE) (i.e., of self (SD) and others (OD); see Ellis, 1994). Therefore, from the data of the previous study it is yet unclear whether a certain type of IB (i.e., DEM, AWF, LFT, or GE) could impact alone on the intensity of paranoid thoughts and whether the four types of IBs have a different effect on paranoid thoughts.

According to some authors (e.g., Dryden, 1994; Palmer et al., 1995), the primary IBs might be sufficient to lead to dysfunctional consequences, without being accompanied by secondary IBs. To the best of our knowledge, there are two studies (Bond & Dryden, 2000; Bond et al., 1999) that compared the impact of the one type of IBs with the impact of evaluative IBs (i.e., primary and secondary IBs combined) on dysfunctional thoughts (i.e., inferences). The studies found that GE/SD (Bond & Dryden, 2000), but not DEM alone (Bond et al., 1999) resulted in more intense dysfunctional inferences. Still, it is unclear whether this pattern of results can be replicated and applies to paranoid thoughts as well.

3.5.1.1. Overview of the current study

Unlike Study 4, the current study employed a priming procedure. Priming has been extensively used to investigate social cognition (see Higgins, 1996) and has been successfully implemented in a previous study to prime IBs/ RBs (Davies, 2008). Moreover, priming procedures (for danger) were employed to trigger paranoid thoughts in a virtual reality (VR) based scenario (Isnanda, Brinkman, Veling, van der GAAG, & Neerincx, 2013).

The present study primarily aimed to investigate whether the type of IBs can impact on paranoid thoughts and individuals' perceptions of others. Before meeting this goal, potential differences between completers and dropouts and between the experimental groups were scrutinized and the relationships between potential predictors and paranoid thoughts were explored. A final goal of the current study was to assess whether the impact of the type of IBs on paranoid thoughts differ between individuals with high and low levels of paranoia.

3.5.2. Method

3.5.2.1. Participants

A hundred and eighty-eight participants (*m* age = 21.39, *SD* = 4.32; range = 18, 46; 82.4% female) were recruited for this study through internet-based outlets. Of those, one hundred and forty-three attended the laboratory meeting (*m* age = 20.93, *SD* = 3.40; range = 18, 46; 83.9% female) and completed the entire protocol. Participants were first and second-year students at the Faculty of Psychology of the Babes Bolyai University. Course credits were awarded to participants completing the entire protocol.

3.5.2.2. Measurement

3.5.2.2.1. Baseline variables.

Green Paranoia Thoughts Scale (*G-PTS*; Green et al. 2008) is used to assess trait paranoia. The 32 items are grouped to form two subscales: social reference (16 items), and ideas of persecution (16 items).

The Attitude and Beliefs Scale II (*ABS-II*; DiGiuseppe et al., 1988) contains 72 items assessing four cognitive processes (i.e., demandingness (DEM), awfulizing (AWF), low frustration tolerance (LFT), and global evaluation (GE)). All items are combined in a global measure of irrationality.

Paranoia Rational and Irrational Beliefs Scale (*Paranoia-RIBS*). The Paranoia-RIBS was developed in the second study of this thesis to measure RBs and IBs related to paranoia on the basis of the general format proposed by Montgomery and colleagues (Montgomery et al., 2007b).

Unconditional Acceptance Questionnaire (*UAQ*; David, Cotet et al., 2013). The scale evaluates unconditional acceptance. The total score of unconditional acceptance is computed by summing the coded answers of the 35 statements.

Brief Core Schema Scales (*BCSS*; Fowler et al., 2006). The scale comprises 24 items developed to evaluate evaluations of self and others. Scores on four subscales can be computed by adding up the scores corresponding to each subscale: negative-self, negative-others, positive-self, positive-others.

Interpersonal Sensitivity Measure (*IPSM*; Boyce & Parker, 1989). The scale was developed to evaluate 5 dimensions of interpersonal sensitivity: interpersonal awareness (7 items), need for approval (8 items), separation anxiety (8 items), timidity (8 items), and fragile inner-self (5 items).

Depression Anxiety Stress Scales 21 (*DASS-21)*. This is the short version of the scale developed by Lovibond & Lovibond (1995). The items assess symptoms of depression, anxiety, and stress.

Social Comparison Scale (*SCS*; Allan & Gilbert, 1995). SCS aims to assess perceived social rank and relative social status by asking individuals to evaluate themselves in relation to other people on eleven bipolar dimensions.

Penn State Worry Questionnaire (*PSWQ*; Meyer, Miller, Metzger, & Borkovec, 1990). The scale contains 16 items that assess trait worry, on a five-point scale.

Rosenberg Self-Esteem Scale (*SES*; Rosenberg, 1965). SES was designed to assess global self-esteem.

Liebowitz Social Anxiety Scale (*LSAS*; Liebowitz, 1987). *LSAS* comprises 24 items that assess symptoms of social anxiety on four-point Likert-type scale (0 – 3).

3.5.2.2.2. Process variables.

Presence Questionnaire (*PQ*; Witmer, & Singer, 1994). *PQ* evaluates the extent to which participants experience presence in VR.

Simulator Sickness Questionnaire (*SSQ*; Kennedy, Lane, Berbaum, & Lilienthal, 1993) was used to assess symptoms experienced while using VR.

3.5.2.2.3. Outcome variables.

Visual Analogue Scales for Perceptions (*VAS-Pe)*. Participants were asked to assess the extent to which people present in the room appeared to be "friendly", "hostile", and "neutral".

State Social Paranoia Scale (*SSPS*; Freeman et al. 2007). The scale comprises ten items designed to evaluate paranoid thoughts in a social situation.

Paranoid Thoughts Visual Analogue Scales (*PT-VAS*). The scale was built in a previous study from this study to assess paranoid thoughts. Like in the previous studies, we chose to combine the six affirmations (α Cronbach = .74).

3.5.2.3. Procedure

Participants completed the baseline questionnaires online. After approximately three to four weeks, participants attended to a laboratory sessions. Individuals were randomly assigned to one of the five priming conditions: DEM, AWF, LFT, GE, or neutral affirmations.

In each of the four active groups (i.e., DEM, AWF, LFT, GE) individuals received a list of nine affirmations representing IBs that were in accordance to the condition they were allotted to (e.g., participants allotted to the LFT condition received a list of nine affirmations indicating low frustration tolerance beliefs). The statements for the active conditions were extracted from *The Attitude and Beliefs Scale II (ABS-II*; DiGiuseppe, Leaf, Exner, & Robin, 1988; see Appendix D). In the neutral-priming condition, individuals received a list of nine non-belief affirmations that were phrased in a similar "if – then" structure in order to approximate the conditional structure of the IBs. For each condition, the order of the statements was randomly determined.

Similar to the study of Davies (2007), in the present study participants were told that the study aimed to investigate variables that are associated with memory performance during distracting tasks. They were given three minutes to memorize the allotted affirmations and were told that a memory test will be applied at the end of the experiment, after a series of distracting tasks. After the three minutes, participants from all conditions were immersed in VR, in a social scenario, for four minutes. Next, individuals completed the outcome measures and the process questionnaires. At the end, they received the memory task that comprised the nine affirmations they initially received and other nine affirmations from the other experimental conditions, presented in a random order. Participants were asked to select the nine statements they were asked to memorize. The memory task performance was used as a manipulation check.

3.5.3. Results

3.5.3.1. Baseline, process variables and associations with outcomes

There were significant differences on baseline variables between individuals who did not attend the experimental session and those who completed the entire protocol ($F(16, 170) = 1.72$, $p = .047$; Wilks' $\Lambda = .861$), but only for one variable (i.e., persecution ideation) and with a small effect size ($F(1, 185) = 6.17$, $p = .014$; partial $\eta^2 = .032$).

Concerning completers, the groups did not significantly differ on the combined baseline variables, ($F(68, 477.16) = 1.12$, $p = .249$; Wilks' $\Lambda = .559$; partial $\eta^2 = .135$). As it can be seen in Table 1, unlike trait paranoia, a number of theoretical predictors (irrationality of beliefs, unconditional acceptance, negative beliefs about others, depression, anxiety, stress, self-esteem)

and cybersickness were significantly associated with one or two measures of paranoid thoughts ($p < .05$).

Table 1

Correlations between baseline, process and outcome variables

	SSPQ	PT-VAS	Hostile	Friendly	Neutral
SSPQ	-	.710**	.578**	.015	-.243**
PT-VAS	.710**	-	.567**	.086	-.253**
Hostile	.578**	.567**	-	.051	-.200*
Friendly	.015	.086	.051	-	-.434**
Neutral	-.243**	-.253**	-.200*	-.434**	-
Green-SR	.067	.137	.092	-.051	-.067
Green-P	.084	.099	.043	-.050	-.099
ABS-II	.117	.188*	.213*	.028	-.054
RIBS	-.028	-.014	-.134	-.091	.001
UAQ	-.167*	-.156	-.240**	-.045	.087
BSCS-NS	.058	.036	.029	-.085	-.002
BSCS-PS	-.083	-.099	-.191*	.174*	.055
BSCS-NO	.168*	.093	.118	-.040	.031
BSCS-PO	-.117	-.030	-.092	.196*	.105
ISQ	.168	.147	.221	.102	.049
DASS-D	.217**	.293**	.142	.081	-.151
DASS-A	.162	.223**	.168*	.091	-.051
DASS-S	.162	.198*	.128	.103	-.042
SCS	-.048	-.073	-.080	.096	-.024
PSWQ	.042	.053	.096	-.025	-.024
R-SES	-.146	-.220**	-.211*	-.053	.117
LSAS	.145	.152	.158	-.004	.012
Presence	-.080	.085	-.092	.296**	-.134
Cybersickness	.302**	.272**	.288**	-.001	.041

Note: SSPS = State Social Paranoia Scale (Freeman et al. 2007); PT-VAS = Paranoid Thoughts Visual Analogue Scales; Green-SR = Social Reference Subscale of Green Paranoia Thoughts Scale (Green et al. 2008); Green-P = Persecution Subscale of Green Paranoia Thoughts Scale (Green et al. 2008); ABS-II = The Attitude and Beliefs Scale II (DiGiuseppe et al., 1988); RIBS = Paranoia Rational and Irrational Beliefs Scale; UAQ = Unconditional Acceptance Questionnaire (David, Cotet, et al., 2013);BSCS = Brief Core Schema Scales (Fowler et al., 2006); N-S = Negative Self; P-S = Positive Self N-O = Negative Others; P-O = Positive Others; ISQ = ; DASS-D = Depression Subscale of the Depression Anxiety Stress Scales (Lovibond, 1995); DASS-A = Anxiety Subscale of the Depression Anxiety Stress Scales (Lovibond, 1995); DASS-S = Stress Subscale of the Depression Anxiety Stress Scales (Lovibond, 1995); SCS = Social Comparison Scale (Allan & Gilbert, 1995); PSWQ = Penn State Worry Questionnaire (Meyer et al., 1990); R-SES = Rosenberg Self-Esteem Scale (Rosenberg, 1965); LSAS = Liebowitz Social Anxiety Scale (Liebowitz, 1987); Presence = Presence Questionnaire (Witmer & Singer, 1994); Cybersickness = Simulator Sickness Questionnaire (Kennedy et al., 1993).

3.5.3.2. Manipulation check

Results indicate that there were significant differences between groups concerning the memory task performance ($F(8,272) = 11.48$, $p < .001$; Wilks' $\Lambda = .559$; partial $\eta^2 = .252$). As the univariate one-way ANOVAs revealed groups significantly differed concerning the number of correct ($F(4,137) = 16.66$, $p < .001$; partial $\eta^2 = .327$) and incorrect answers ($F(4.137) = 12.56$, $p < .001$; partial $\eta^2 = .268$), Tukey post-hoc analyses were run for both indicators of memory performance. Participants from the control grouped outperformed participants from each other group on both measures ($p < .001$), while participants allotted to AWF underperformed on both measures when compared to individuals from any other group ($p < .05$). No other differences between groups reached statistical significance ($p > .05$). There were no significant associations between the performance at the memory task (i.e., number of correct answers and number of commission errors) and paranoid thought overall or within any experimental condition ($p > .05$).

3.5.3.3. Process variables

The one-way MANOVA indicated that there is no significant difference between conditions concerning presence and cybersickness ($F(8, 254) = 0.89$, $p = .528$; Wilks' $\Lambda = .946$; partial $\eta^2 = .027$).

3.5.3.4. Main outcomes

Although the inspection of boxplots indicated the presence of outliers for the main outcomes in both sets of analyses, the outliers were kept given that the results were not materially affected by outliers (i.e., there were no significant differences between the analyses run with and without outliers). Thus, only the results of the analyses including outliers will be presented here.

3.5.3.4.1. Results for all participants.

Paranoid thoughts.

The assumption of homogeneity of variances was met for both measures of paranoid thoughts, as shown by Levene's test for equality of variances ($p = .166$ for SSPS; $p = .255$ for PT-VAS). Data on paranoid thoughts were not normally distributed for any group, as indicated by Shapiro-Wilk's test ($p < .05$). However, given that one-way ANOVA is considered to be fairly robust to non-normality for nearly equal sample sizes (see Maxwell & Delaney, 2004; Lix, Keselman & Keselman, 1996), we decided to run the ANOVA analyses without transforming the data. Paranoid thoughts were not affected by the type of IBs ($F(4, 136) = 1.11$, $p = .355$ for SSPS; $F(4, 132) = 0.54$, $p = .710$ for PT-VAS).

Perceptions of others

Levene's test indicated scores on the three measures of perceptions of others met the assumption of homogeneity of variances ($p > .05$). Like in the case of paranoid thoughts, scores on individuals' perceptions of others were generally not normally distributed for any group ($p < .05$), except for scores of "friendly" in the DEM, LFT and GE groups and for scores of "neutral" perceptions in the DEM group ($p > .05$). There were no significant differences in how individuals perceived human avatars between conditions ($F(12, 357.47) = 1.51$, $p = .120$, Wilks' $\Lambda = .878$; partial $\eta^2 = .043$).

3.5.3.4.2. Results on participants meeting the inclusion criteria

Paranoid thoughts

The assumption of homogeneity of variances was met for paranoid thoughts, as indicated by Levene's test for equality of variances ($p = .161$ for SSPS; $p = .538$ for PT-VAS), but scores were not normally distributed for any group, as indicated by Shapiro-Wilk's test ($p < .05$). Results indicated no significant differences between the four types of IBs and neutral affirmations on paranoid thoughts ($F(4, 117) = 0.79$, $p = .528$ for SSPS; $F(4, 113) = 0.62$, $p = .651$ for PT-VAS).

Perceptions of others

Scores on perceptions of others met the homogeneity assumption ($p > .05$), but were not normally distributed for any group, as indicated by Shapiro-Wilk's test ($p < .05$). There were no significant differences between groups on perception of others combined ($F(12, 304.55) = 1.17$, $p = ..303$; Wilks' $\Lambda = .887$; partial $\eta^2 = .039$).

3.5.3.5. Differences between individuals with high/low trait paranoia

There was a significant interaction effect between the level of social reference and the type of priming on paranoid thoughts ($F(4, 130) = 2.52$, $p = .045$, partial $\eta^2 = .072$ for SSPS; $F(4, 126) = 2.86$, $p = .026$, partial $\eta^2 = .083$ for PT-VAS). The analysis of simple main effects revealed only one significant simple main effect of the level of social reference in the AWF group ($F(1, 130) = 7.84$, $p = .006$, partial $\eta^2 = .057$ for SSPS; $F(1, 126) = 11.78$, $p = .001$, partial $\eta^2 = .085$ for PT-VAS). No other significant simple main effect was found ($p > .05$).

In contrast, no significant interaction effect was found between the level of persecution ideation and the type of priming on paranoid thoughts, for any measure ($F(4, 130) = 1.21$, $p = .310$, partial $\eta^2 = .036$ on SSPS; $F(4, 126) = 0.57$, $p = .683$, partial $\eta^2 = .018$ on PT-VAS).

3.5.4. Discussions

This is the first study to experimentally investigate whether any of the four types of IBs could individually impact on the occurrence of paranoid thoughts and on individuals' perceptions of others. No practically relevant significant differences were found between individuals who did not attend the experimental session and completers on baseline variables. Similarly, there were no significant differences on baseline variables between individuals allotted to different experimental conditions. Unlike Study 3 that revealed significant medium sized associations between trait paranoia, irrationality of beliefs and paranoid thoughts in VR in the absence of a manipulation, in the present study the correlations were either non-significant or small (see Table 1). However, variables like unconditional acceptance, negative beliefs about others, depression, anxiety, stress, self-esteem, and cybersickness were significantly linked with at least one measure of paranoid thoughts. Interestingly, individuals experiencing higher levels of physiological symptoms in VR tended to report more intense paranoid thoughts. This might suggest that people experiencing

different negative physiological symptoms could be more inclined to have dysfunctional inferences about other peoples' intentions. These results are somewhat in line with the finding of studies indicating a link between negative emotional symptoms and paranoid thoughts (e.g., Ellett et al., 2003; Freeman et al., 2003; Freeman, Pugh, et al., 2008; Johns et al., 2004).

There were some significant differences between conditions concerning the extent to which participants were successful in memorizing the primed statements. Individuals receiving neutral statements outperformed, while those receiving AWF IBs underperformed all the other participants. In the case of the neutral condition, a possible explanation could be related to the dissimilarity of contents between neutral and IBs statements. Although the affirmations for the control group were phrased in a conditional form (i.e., "if – then") to increase the structural similarity with the IBs statements, in a recognition memory task the neutral affirmations might be easily spotted.

There were no differences between any of the four types of IBs and neutral statements on the occurrence of paranoid thoughts, nor concerning individuals' perceptions of others. Thus, unlike the previous study (see Study 4), the present study found no impact of IBs on paranoid thoughts. These differences in results between the present study and our previous study are somewhat in line with the findings of Bond et al. (1999). They similarly found that evaluative (i.e., primary and secondary beliefs combined), but not primary beliefs alone (DEM), significantly impacted on dysfunctional inferences. However, in contrast, Bond and Dryden (2000) found that GE of the self had the same impact on dysfunctional thoughts as evaluative IBs. There are some possible explanations for the somewhat different results. A first possible interpretation suggests that in the case of paranoid thoughts a single type of IBs might not suffice to determine dysfunctional inferences about other people's intentions. Another explanation could be related to the experimental procedure that was implemented in these studies. Although the priming procedure used in the current study tackles the demand characteristic issue of role-play designs, the downside of priming is the difficulty of providing a direct manipulation check. Thus, it is unclear whether the primed contents were activated during the VR exposure. The recognition memory test only provides information for the availability, but not the accessibility of the primed contents (Higgins, 1996; Higgins & Wells, 1986). Perhaps the use of a free recall test or of an unstructured interview using downward arrow techniques (i.e., to test whether the IBs activated in VR are congruent with the type of IBs previously primed) would represent a better manipulation check than the recognition task employed in the present study. A third explanation resides in the type of control used in this study. Unlike previous studies that used RBs (e.g., Bond and Dryden, 2000) or a mix between IBs and RBs (Davies, 2007) in the comparison group (i.e., active group), the current study compared IBs with neutral affirmations. Given that according to REBT, RBs serve as a protective factor against psychopathology (Ellis, 1994), it is possible for the results to be partially accounted for by the non-active comparison group.

The moderation analyses indicated that the lack of significant effects of the type of priming on paranoid thoughts were consistent across individuals with high/low levels of trait paranoia. However, there were differences between individuals with high and low social reference traits that were primed with AWF irrational beliefs. Thus, it appears that AWF triggers more intense paranoid thoughts among individuals with higher levels than among those with low levels of social reference. Except for GE, a similar trend can be observed for the other IBs but differences are not statistically significant. …

This study has several limitation. First, like in the previous studies from this thesis, males are underrepresented in this sample and it is unclear whether the results can be generalized to male population as well. Second, as discussed above, there are also some potential limitations concerning the manipulation procedure employed in this study. Third, although one-way (M)ANOVA is fairly robust to non-normality in respect to Type I error, it has been highlighted that deviations from normality might affect the power of the test (Shadish et al., 2002). Thus, the distribution of data from this study might have affected the tests' ability to detect potential true effects (i.e., increased odds of "false negative" results). Fourth, the exploratory nature of the analyses from the current study might represent another limitation.

To sum up, the present study found that primed IBs do not impact significantly on paranoid thoughts, as compared to neutral statements. Thus, these findings suggest that a single type of IBs (e.g., DEM) might not suffice in order to lead to paranoid thoughts. Moreover, the impact of the type of primed statements does not depend on individuals' levels of trait paranoia.

CHAPTER IV. GENERAL CONCLUSIONS AND DISCUSSIONS

This thesis aimed to empirically investigate relationships between IBs, a central etiological factor in the ABC trans-diagnostic model of psychopathology (Ellis, 1962, 1994), and paranoid delusions. A number of theoretical, methodological advances and practical implications of this thesis are outlined below.

4.1. Theoretical Advances and Implications

The findings of the present thesis have a number of theoretical implications. Although the ABC model stipulated that dysfunctional inferences can be both triggers (A) and consequences of IBs (Dryden & David, 2008; Ellis, 1994), this project is one of the first to conceptualize paranoid delusions as consequences of IBs, and not as activating event. Moreover, to our knowledge this thesis is the first empirical investigation of the relationships between the irrationality of beliefs and paranoia. Thus, the findings of this research project contribute to the theoretical understanding of paranoid delusions, as well as advance the empirical support for the role of beliefs' irrationality in psychopathology.

First, in Study 1, the literature concerning the relationships between beliefs' irrationality and the functionality of automatic thoughts/ inferences was systematically reviewed. This study added to the knowledge concerning the relationship between beliefs' irrationality and dysfunctional automatic thoughts, indicating a medium to high effect size of the association. Although this meta-analysis was primarily conducted to inform the subsequent studies from this thesis, it also has theoretical implications that go beyond the immediate goals of this thesis, being the first to quantitatively summarize the empirical data that linked the two cognitive factors that are central to the CBT approach (A. T. Beck, 2005; Browne et al., 2010; David, Freeman, et al., 2010). Also, the meta-analysis detected a number of variables that might influence the magnitude and/or direction of the relationship between the irrationality of beliefs and functionality of automatic thoughts, thus indicating a number of factors that should be taken in consideration in future studies.

Second, results of the Study 2 supported the theoretical claims of the ABC model (Ellis, 1992, 1994), suggesting that IBs might be a vulnerability factor, while unconditional acceptance might be a protective factor concerning the occurrence of paranoid delusions. Thus, the irrationality of general and specific beliefs were significantly associated with higher levels of paranoid delusions, while unconditional acceptance was significantly associated with lower levels of paranoid delusions. These findings mirror the results of previous studies that applied the ABC model to emotional disturbance (Chamberlain & Haaga, 2001b, 2001a; David, Cotet, et al., 2013; Flett et al., 2003), somewhat supporting the trans-diagnostic value of the ABC model (Ellis, 1962, 1994). The fact that in a predictive model with the three factors combined the irrationality of specific beliefs was the only factor that significantly predicted both measures of paranoid delusions (i.e., social reference and persecution) further supports the content specificity hypothesis (A. T. Beck, 1976; Barlow, 1988; David, 2015), being in line with the results of the meta-analysis. Notably, similar magnitude of the associations with those found in the meta-analysis, suggesting that IBs might be similarly relevant for paranoid delusions as for other dysfunctional automatic thoughts.

Third, Study 4 is the first to empirically investigate the impact of beliefs' irrationality on the intensity of paranoid thoughts and people's perceptions of others, using an experimental approach. As expected, IBs led to higher levels of paranoid thought and more negative perceptions of others than RBs. These results add further support to the REBT hypothesis (Dryden & David, 2008; Ellis, 1977) concerning a causal link between beliefs and dysfunctional inferences, indicating that IBs might play a causal role in the occurrence of paranoid thoughts.

Overall, the findings of this thesis somewhat support a possible causal link between IBs and paranoid delusions, being the first empirical investigation of the ABC model in paranoia. Thus, the results of this project generally suggest that the conceptualization of paranoid delusions (in the ABC model; Ellis, 1962, 1994) as dysfunctional consequences (C) of IBs (B) that are triggered by relevant events (A; e.g., a social situation) might be valid. Also, the results of the analyses concerning the links between IBs and paranoid delusions among individuals with high/ low levels of paranoia are somewhat in line with the continuum perspective (Myin-Germeys et al., 2003), suggesting that similar factors might be involved in less and more intense experiences of paranoia. Thus, these findings add to the evidence supporting the etiological continuum (Valmaggia et al., 2007; Van Os et al., 2009), indicating that the irrationality of beliefs is relevant for the occurrence of paranoid thought in individuals with both high and low levels of trait paranoia.

4.2. Methodological Advances and Practical Implications

The studies of this thesis also refined some methodological issues of the literature on the relationship between the irrationality of beliefs and dysfunctional automatic thoughts. Moreover, the findings of this thesis might have some implications for the clinical practice. The methodological advances and practical implications of this thesis are outlined below.

First, concerning the methodological advances of this thesis, an assessment toll for the irrationality of beliefs with themes/ contents that are specific to paranoia (*Paranoia Rational and Irrational Beliefs Scale*) was developed in Study 2. Although a number of questionnaires have been developed to assess beliefs' irrationality (e.g., Bernard, 1998; DiGiuseppe et al., 1988; Lindner et al., 1999), the available questionnaires are have either more general contents or specific to other issues. Thus, there was no readily available assessment tool for the irrationality of beliefs

that addressed contents that have been linked to paranoia. The good α Cronbach estimates of the *Paranoia Rational and Irrational Beliefs Scale* and the predictive values of this measure for paranoid thoughts across the studies of this thesis, as well as the strong positive correlations between general (*ABS-II*; DiGiuseppe et al., 1988) and specific IBs suggest that the two measures assess similar constructs and that *Paranoia Rational and Irrational Beliefs Scale* might be fit to evaluate paranoia-specific IBs. Thus, the scale might be a useful tool for future research on the role of IBs in the occurrence of paranoia.

Second, in Study 4, the role-play manipulation procedure was refined in order to improve the internal and external validity of the role-play procedure. Starting from the experimental studies of Bond, Dryden and colleagues (e.g., Bond & Dryden, 1997, 2000; Dryden, Ferguson, & Clark, 1989; McDuff & Dryden, 1998) that implemented a role-play procedure to investigate the impact of beliefs' irrationality on dysfunctional inferences, a number of methodological adjustments have been implemented. First, unlike the aforementioned studies, Study 4 did not ask participants to imagine themselves being in a certain situation, but exposed them to a VR scenario instead. Thus, all individuals were presented with a standardized controlled activating event. Second, unlike previous studies, a number of relevant variables (e.g., beliefs' irrationality, trait paranoia) were assessed at baseline in order to ensure that results are not better explained by differences in individual characteristics rather than by the experimental manipulation. Although VR has been previously used to assess paranoid thoughts and associations with different psychological factors (Freeman et al., 2003; Freeman, 2008; Veling, Brinkman, et al., 2014), Study 4 and Study 5 are among the first studies to implement a VR methodology in order to test a causal link between a psychological factor and paranoid thoughts in experimental settings.

Third, the findings of this thesis might open future lines of study, not exclusively limited to paranoia. For example, the results of Study 2 and Study 3 suggest that somewhat different associations are obtained in the presence/ absence of an activating event. Given that IBs are expected to be linked to dysfunctional consequences only when triggered by an event (Ellis, 1995), it might be useful to assess the relationship between people's level of irrationality of beliefs and the dysfunctionality of (paranoid or non-paranoid) automatic thoughts in correlational studies that use stressful (i.e., negative) VR scenarios to activate IBs prior to evaluating automatic thoughts.

Fourth, Study 5 was one of the first studies to implement a priming procedure in order to induce IBs (adapting the procedure of Davies, 2007). Although the procedure has some limitations (see Chapter IV), it might have the advantage of providing a less demanding modality of altering the irrationality of beliefs for research purposes.

From a practical point of view, if the findings of this thesis are replicated, the identification of IBs as an etiological factor for paranoid ideation might stimulate the development of CBT intervention packages for paranoia that specifically target IBs. This could be an important step, considering that previous empirical findings (Mehl et al., 2015) suggested that the implementation of more targeted CBT interventions in psychosis might increase the effectiveness for delusions. Moreover, as it has been previously argued (Bennett & Pearson, 2015), tackling IBs instead of directly targeting paranoid inferences might offer a number of advantages. First, the process of restructuring IBs may be less threatening for the therapeutic relationship than the direct challenge of the patient's interpretations of events, especially for people with paranoid symptoms. Second, focusing on IBs might be particularly beneficial in cases where (some) inferences could be true. Next, since it is very plausible for patients with high levels of IBs to have faulty inferences in a

wide range of situations, the process of disputing specific paranoid inferences might be more time consuming than restructuring the more general IBs, given that inferential change could be less stable.

4.3. Limitations and Future Directions

This thesis has a number of limitations. The limitations specific to each study have been discussed already in the discussion section corresponding to each particular study. Still, a number of general limitations of the thesis need to be outlined.

The first general limitation concerns the specific of the samples from this thesis. Most of the participants to the research studies presented here were undergraduate young students, preponderantly women. Thus, the findings need to be replicated on samples with different demographic characteristics in order to be generalize. Still, although findings of this thesis clearly need to be replicated using psychotic patients in order to formulate firm empirically based conclusions about the clinical spectrum of paranoid delusions, considering the empirically supported (etiologic) continuum perspective in psychosis (Chapman & Chapman, 1980; Van Os et al., 2009), it is plausible for IBs to also be linked with clinically relevant symptoms of paranoia. This argument is also supported by the results of Study 2 that found similar results for the relationships between beliefs' irrationality and paranoid thoughts among students and psychotic individuals.

A second limitations of this thesis was that only self-report assessment tools were used. Future studies might also consider other measures (e.g., clinician-rated; behavioral, implicit tests) for stronger conclusions.

Third, given that this research project was the first empirical investigation of the links between the irrationality of beliefs and paranoia, a number of objectives and subsequent analyses were exploratory in nature. Thus, the results concerning these aims need to be replicated in confirmatory studies (i.e., with a priory formulated hypotheses).

Fourth, although the overall sample size was appropriate for all the studies, some analyses (i.e., moderation analysis) were run on a reduced number of subjects, given that not all participants were included in the analyses. This resulted in a reduced statistical power for these analyses.

Despite the inherent limitations of this thesis, this research project advances the knowledge concerning the psychological factors that are related to the occurrence of paranoid thoughts. Moreover, the findings of the current thesis add to the empirical data concerning the role of IBs in psychopathology (in general) and in paranoia, in particular.

REFERENCES

APA Presidential task force on evidence-based practice. (2006). Evidence-based practice in psychology. *American Psychologist, 61*, 271–285. doi:10.1037/0003-066X.61.4.271

Aderibigbe, Y. A., Theodoridis, D., Vieweg, W. V. R., & others. (1999). Dementia praecox to schizophrenia: The first 100 years. *Psychiatry and Clinical Neurosciences*, *53*(4), 437–448. doi:10.1046/j.1440-1819.1999.00584.x

Allan, S., & Gilbert, P. (1995). A social comparison scale: Psychometric properties and relationship to psychopathology. *Personality and Individual Differences*, *19*(3), 293–299. doi:10.1016/0191-8869(95)00086-L

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders (5th Ed.) (DSM-5®)*. Arlington, VA: American Psychiatric Association Publishing.

Appelbaum, P. S., Robbins, P. C., & Roth, L. H. (1999). Dimensional approach to delusions: Comparison across types and diagnoses. *American Journal of Psychiatry, 156*, 1938-1943. doi:10.1176/ajp.156.12.1938

Barlow, D.H. (1988). *Anxiety and its disorders*. New York, NY: Guilford Press.

Bebbington, P. E., McBride, O., Steel, C., Kuipers, E., Radovanovič, M., Brugha, T., … & Freeman, D. (2013). The structure of paranoia in the general population. *The British Journal of Psychiatry*, *202*(6), 419–427. doi:10.1192/bjp.bp.112.119032

Beck, A. T. (1976). *Cognitive therapy and the emotional disorders*. New York, NY: International Universities Press.

Beck, A. T. (2005). The current state of cognitive therapy: A 40-year retrospective. *Archives of General Psychiatry*, *62*(9), 953–959. doi:10.1001/archpsyc.62.9.953

Beck, A. T., & Dozois, D. J. A. (2011). Cognitive Therapy: Current status and future directions. *Annual Review of Medicine*, *62*(1), 397–409. doi:10.1146/annurev-med-052209-100032

Beck, J. S. (2011). *Cognitive behavior therapy: Basics and beyond (2nd Ed.)*. New York, NY: Guilford Press.

Bennett, R., & Pearson, L. (2015). Group Rational Emotive Behaviour Therapy for paranoia. In A. Meaden & A. Fox (Eds.), *Innovations in Psychosocial interventions for psychosis: Working with the hard to reach* (pp. 167–183). Hove: Routledge.

Bentall, R. P. (1994). Cognitive biases and abnormal beliefs: Towards a model of persecutory delusions. In A. S. David & J. C. Cutting (Eds.), *The neuropsychology of schizophrenia* (pp. 337–360). Hillsdale, NJ: Lawrence Erlbaum Associates.

Bentall, R. P., Corcoran, R., Howard, R., Blackwood, N., & Kinderman, P. (2001). Persecutory delusions: A review and theoretical integration. *Clinical Psychology Review*, *21*(8), 1143–1192. doi:10.1016/S0272-7358(01)00106-4

Bentall, R. P., Jackson, H. F., & Pilgrim, D. (1988). Abandoning the concept of "schizophrenia": Some implications of validity arguments for psychological research into psychotic phenomena. *British Journal of Clinical Psychology*, *27*(4), 303–324. doi:10.1111/j.2044-8260.1988.tb00795.x

Bentall, R. P., & Kaney, S. (1996). Abnormalities of self-representation and persecutory delusions: A test of a cognitive model of paranoia. *Psychological Medicine*, *26*(06), 1231–1237. doi: 10.1017/S0033291700035959

Bentall, R. P., Rowse, G., Shryane, N., Kinderman, P., Howard, R., Blackwood, N., … Corcoran, R. (2009). The cognitive and affective structure of paranoid delusions: A transdiagnostic

investigation of patients with schizophrenia spectrum disorders and depression. *Archives of General Psychiatry*, *66*(3), 236–247. doi:10.1001/archgenpsychiatry.2009.1

Ben-Zeev, D., Ellington, K., Swendsen, J., & Granholm, E. (2011). Examining a cognitive model of persecutory ideation in the daily life of people with schizophrenia: A computerized experience sampling study. *Schizophrenia Bulletin*, *37*(6), 1248–1256. doi:10.1093/schbul/sbq041

Bernard, M. E. (1998). Validation of the general attitude and belief scale. *Journal of Rational-Emotive and Cognitive-Behavior Therapy*, *16*(3), 183–196. doi:10.1023/A:1024911014579

Bhati, M. T. (2013). Defining psychosis: The evolution of DSM-5 schizophrenia spectrum disorders. *Current Psychiatry Reports*, *15*(11), 1–7. doi:10.1007/s11920-013-0409-9

Birchwood, M., Macmillan, F., & Smith, J. (1992). Early intervention. In M. J. Birchwood & N. Tarrier (Eds.), *Innovations in the psychological management of schizophrenia* (pp. 115–145). Oxford: John Wiley & Sons.

Birchwood, Max, & Chadwick, P. (1997). The omnipotence of voices: Testing the validity of a cognitive model. *Psychological Medicine*, *27*(06), 1345–1353. doi:10.1017/S0033291797005552

Bloom, D., Cafiero, E., Jané-Llopis, E., Abrahams-Gessel, S., Bloom, L., Fathima, S., … & Weiss, J. (2011). *The global economic burden of noncommunicable diseases*. Geneva: World Economic Forum

Bond, F. W., & Dryden, W. (1996). Modifying irrational control and certainty beliefs: Clinical recommendations based upon research. In W. Dryden (Ed.), *Research in counselling and psychotherapy: Practical applications* (pp. 162–183). London: Sage.

Bond, F. W., & Dryden, W. (1997). Testing A REBT theory: The effects of rational beliefs, irrational beliefs, and their control or certainty contents on the functionality of inferences: I. In a social context. *Journal of Rational-Emotive & Cognitive-Behavior Therapy*, *15*(2), 157–188. doi:10.1023/A:1025042522741

Bond, F. W., & Dryden, W. (2000). How rational beliefs and irrational beliefs affect people's inferences: An experimental investigation. *Behavioural and Cognitive Psychotherapy*, *28*(1), 33–43.

Bond, F. W., Dryden, W., & Briscoe, R. (1999). Testing two mechanisms by which rational and irrational beliefs may affect the functionality of inferences. *British Journal of Medical Psychology*, *72*(4), 557–566. doi:10.1348/000711299160121

Borenstein, M., Hedges, L., Higgins, J., & Rothstein, H. (2005). Comprehensive meta-analysis (version 2). Englewood, NJ: Biostat.

Borenstein, M., Hedges, L. V., Higgins, J., & Rothstein, H. R. (2009). *Introduction to meta-analysis*. Chichester: John Wiley & Sons.

Boyce, P., & Parker, G. (1989). Development of a scale to measure interpersonal sensitivity. *Australian and New Zealand Journal of Psychiatry*, *23*(3), 341–351. doi:10.3109/00048678909068291

Bridges, K. R., & Harnish, R. J. (2010). Role of irrational beliefs in depression and anxiety: A review. *Health*, *2*(8), 862–877. doi:10.4236/health.2010.28130

Browne, C. M., Dowd, E. T., & Freeman, A. (2010). Rational and irrational beliefs and psychopathology. In D. David, S. J. Lynn, & A. Ellis (Eds.), *Rational and irrational beliefs: Research, theory, and clinical practice* (pp. 149–172). New York, NY: Oxford University Press.

Carbon, M., & Correll, C. U. (2014). Clinical predictors of therapeutic response to antipsychotics in schizophrenia. *Dialogues in Clinical Neuroscience*, *16*(4), 505–524.

Castle, D. J., Phelan, M., Wessely, S., & Murray, R. M. (1994). Which patients with non-affective functional psychosis are not admitted at first psychiatric contact? *The British Journal of Psychiatry*, *165*(1), 101–106. doi:10.1192/bjp.165.1.101

Chadwick, P., & Birchwood, M. (1994). The omnipotence of voices: A cognitive approach to auditory hallucinations. *The British Journal of Psychiatry*, *164*(2), 190–201. doi: 10.1192/bjp.164.2.190

Chamberlain, J. M., & Haaga, D. A. (2001a). Unconditional self-acceptance and psychological health. *Journal of Rational-Emotive and Cognitive-Behavior Therapy*, *19*(3), 163–176. doi:10.1023/A:1011189416600

Chamberlain, J. M., & Haaga, D. A. (2001b). Unconditional self-acceptance and responses to negative feedback. *Journal of Rational-Emotive & Cognitive-Behavior Therapy*, *19*(3), 177–189. doi:10.1023/A:1011141500670

Chang, E. C., & D'Zurilla, T. J. (1996). Irrational beliefs as predictors of anxiety and depression in a college population. *Personality and Individual Differences*, *20*(2), 215–219. doi:10.1016/0191-8869(95)00166-2

Chapman, L. J., & Chapman, J. P. (1980). Scales for rating psychotic and psychotic-like experiences as continua. *Schizophrenia Bulletin*, *6*(3), 476–489. doi:10.1093/schbul/6.3.476

Chapman, L. J., Chapman, J. P., Kwapil, T. R., Eckblad, M., & Zinser, M. C. (1994). Putatively psychosis-prone subjects 10 years later. *Journal of Abnormal Psychology*, *103*(2), 171–183. doi:10.1037/0021-843X.103.2.171

Claridge, G. E. (1997). *Schizotypy: Implications for illness and health.* New York, NY: Oxford University Press.

Clark, D. M., Ehlers, A., Hackmann, A., McManus, F., Fennell, M., Grey, N., … Wild, J. (2006). Cognitive therapy versus exposure and applied relaxation in social phobia: A randomized controlled trial. *Journal of Consulting and Clinical Psychology*, *74*(3), 568–578. doi:10.1037/0022-006X.74.3.568

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences*. Hillsdale, NJ: Lawrence Erlbaum Associates.

Coid, J. W., Ullrich, S., Kallis, C., Keers, R., Barker, D., Cowden, F., & Stamps, R. (2013). The relationship between delusions and violence: Findings from the East London first episode psychosis study. *JAMA Psychiatry*, *70*(5), 465–471. doi:10.1001/jamapsychiatry.2013.12

Combs, D. R., Penn, D. L., Michael, C. O., Basso, M. R., Wiedeman, R., Siebenmorgan, M., … Chapman, D. (2009). Perceptions of hostility by persons with and without persecutory delusions. *Cognitive Neuropsychiatry*, *14*(1), 30–52. doi:10.1080/13546800902732970

Combs, D. R., Penn, D. L., Wicher, M., & Waldheter, E. (2007). The Ambiguous Intentions Hostility Questionnaire (AIHQ): A new measure for evaluating hostile social-cognitive biases in paranoia. *Cognitive Neuropsychiatry*, *12*(2), 128–143. doi:10.1080/13546800600787854

Cristea, I. A., Montgomery, G. H., Szamoskozi, Ş., & David, D. (2013). Key constructs in "classical" and "new wave" cognitive behavioral psychotherapies: Relationships among each other and with emotional distress. *Journal of Clinical Psychology*, *69*(6), 584–599. doi:10.1002/jclp.21976

David, D. (2015). Rational Emotive Behavior Therapy. In R. L. Cautin & S. O. Lilienfeld (Eds.), *Encyclopedia of clinical psychology*. Hoboken, NJ: Wiley-Blackwell.

David, D., Cotet, C. D., Szentagotai, A., McMahon, J., & Digiuseppe, R. (2013). Philosophical versus psychological unconditional acceptance: Implications for constructing the Unconditional Acceptance Questionnaire. *Journal of Cognitive and Behavioral Psychotherapies*, *13*(2A), 445–464.

David, D., Freeman, A., & DiGiuseppe, R. (2010). Rational and irrational beliefs: Implications for mechanisms of change and practice in psychotherapy. In D. David, S. J. Lynn, & A. Ellis (Eds.), *Rational and irrational beliefs: Research, theory, and clinical practice* (pp. 195–217). New York, NY: Oxford University Press.

David, D., Lynn, S., & Ellis, A. (2010). *Rational and irrational beliefs: Implications for research, theory, and practice*. New York, NY: Oxford University Press.

David, D., & Lynn, S. J. (2010). A summary and a new research agenda for Rational-Emotive and Cognitive-Behavior Therapy. In D. David, S. J. Lynn, & A. Ellis (Eds.), *Rational and irrational beliefs: Research, theory, and clinical practice* (pp. 339–348). New York, NY: Oxford University Press.

David, D., Matu, S.-A., & David, O. A. (2013). New directions in virtual reality-based therapy for Anxiety Disorders. *International Journal of Cognitive Therapy*, *6*(2), 114–137. doi:10.1521/ijct.2013.6.2.114

David, D., & Montgomery, G. H. (2011). The scientific status of psychotherapies: A new evaluative framework for evidence-based psychosocial interventions. *Clinical Psychology: Science and Practice*, *18*(2), 89–99. doi:10.1111/j.1468-2850.2011.01239.x

David, D., Schnur, J., & Belloiu, A. (2002a). Another search for the "hot" cognitions: Appraisal, irrational beliefs, attributions, and their relation to emotion. *Journal of Rational-Emotive and Cognitive-Behavior Therapy*, *20*(2), 93–131. doi:10.1023/A:1019876601693

David, D., Schnur, J., & Birk, J. (2004). Functional and dysfunctional feelings in Ellis' cognitive theory of emotion: An empirical analysis. *Cognition and Emotion*, *18*(6), 869–880. doi:10.1080/02699930341000185

David, D., & Szentagotai, A. (2006). Cognitions in cognitive-behavioral psychotherapies: Toward an integrative model. *Clinical Psychology Review*, *26*(3), 284–298. doi:10.1016/j.cpr.2005.09.003

David, D., Szentagotai, A., Eva, K., & Macavei, B. (2005). A synopsis of Rational-Emotive Behavior Therapy (REBT): Fundamental and applied research. *Journal of Rational-Emotive and Cognitive-Behavior Therapy*, *23*(3), 175–221. doi:10.1007/s10942-005-0011-0

Davies, M. F. (2008). Irrational beliefs and unconditional self-acceptance. II. Experimental evidence for a causal link between two key features of REBT. *Journal of Rational-Emotive & Cognitive-Behavior Therapy*, *26*(2), 89–101. doi:10.1007/s10942-007-0060-7

DiGiuseppe, R., Doyle, K., Dryden, W., & Backx, W. (2013). A practitioner's guide to Rational-Emotive Behavior Therapy (3rd ed.). New York, NY: Oxford University Press.

DiGiuseppe, R., Leaf, R., Exner, T., & Robin, M. (1988). The development of a measure of irrational/rational thinking. Paper presented at the World Congress of Behavior Therapy, Edinburgh, Scotland, 5–10 September.

Docherty, J. P., Van Kammen, D. P., Siris, S. G., & Marder, S. R. (1978). Stages of onset of schizophrenic psychosis. *The American Journal of Psychiatry*, *135*(4), 420–426. doi:10.1176/ajp.135.4.420

Drake, R. J., Pickles, A., Bentall, R. P., Kinderman, P., Haddock, G., Tarrier, N., & Lewis, S. W. (2004). The evolution of insight, paranoia and depression during early schizophrenia. *Psychological Medicine*, *34*(2), 285–292. doi:10.1017/S0033291703008821

Dryden, W. (1994). *Invitation to rational-emotive psychology*. London: Whurr.

Dryden, W., Ferguson, J., & Clark, T. (1989). Beliefs and inferences: A test of a rational-emotive hypothesis 1. Performing in an academic seminar. *Journal of Rational-Emotive & Cognitive-Behavior Therapy*, *7*(3), 119–129. doi:10.1007/BF01076184

Dryden, Windy. (2001). *Reason to change: A Rational Emotive Behaviour Therapy (REBT) workbook*. Hove: Routledge.

Dryden, Windy, & David, D. (2008). Rational Emotive Behavior Therapy: Current status. *Journal of Cognitive Psychotherapy*, *22*(3), 195–209. doi:10.1891/0889-8391.22.3.195

Dryden, Windy, Ferguson, J., & Hylton, B. (1989). Beliefs and inferences: A test of a rational-emotive hypothesis: III. On expectations about enjoying a party. *British Journal of Guidance & Counselling*, *17*(1), 68–75. doi:10.1080/03069888900760081

Dudley, R., Taylor, P., Wickham, S., & Hutton, P. (2016). Psychosis, delusions and the "jumping to conclusions" reasoning bias: A systematic review and meta-analysis. *Schizophrenia Bulletin*, *42*(3), 652–665. doi:10.1093/schbul/sbv150

Duval, S., & Tweedie, R. (2000). Trim and fill: A simple funnel-plot–based method of testing and adjusting for publication bias in meta-analysis. *Biometrics*, *56*(2), 455–463. doi:10.1111/j.0006-341X.2000.00455.x

Elahi, A., Algorta, G. P., Varese, F., McIntyre, J. C., & Bentall, R. P. (in press). Do paranoid delusions exist on a continuum with subclinical paranoia? A multi-method taxometric study. *Schizophrenia Research*. doi:10.1016/j.schres.2017.03.022

Ellett, L., Lopes, B., & Chadwick, P. (2003). Paranoia in a nonclinical population of college students. *Journal of Nervous and Mental Disease*, *191*(7), 425–430. doi:10.1097/01.NMD.0000081646.33030.EF

Ellis, A. (1962). *Reason and emotion in psychotherapy*. New York, NY: Lyle Stuart.

Ellis, A. (1977). The basic clinical theory of Rational-Emotive Therapy. In A. Ellis & R. Grieger (Eds.), *Handbook of Rational-Emotive Therapy*, (pp. 3–34). New York, NY: Springer.

Ellis, A. (1994a). *Reason and emotion in psychotherapy (2nd ed.).* Secaucus, NJ: Carol Publishing Group.

Ellis, A. (1995). Changing Rational-Emotive Therapy (RET) to Rational Emotive Behavior Therapy (REBT). *Journal of Rational-Emotive & Cognitive-Behavior Therapy*, *13*(2), 85–89. doi:10.1007/BF02354453

Ellis, A. (2003). Similarities and differences between Rational Emotive Behavior Therapy and Cognitive Therapy. *Journal of Cognitive Psychotherapy*, *17*(3), 225–240. doi:10.1891/jcop.17.3.225.52535

Ellis, A., David, D., & Lynn, S. J. (2010). Rational and irrational beliefs: A historical and conceptual perspective. In D. David, S. J. Lynn, & A. Ellis (Eds.), *Rational and Irrational Beliefs: Research, Theory, and Clinical Practice* (pp. 3–22). New York, NY: Oxford University Press.

Ellis, A., & DiGiuseppe, R. (1993). Are inappropriate or dysfunctional feelings in Rational-Emotive Therapy qualitative or quantitative? *Cognitive Therapy and Research*, *17*(5), 471–477. doi:10.1007/BF01173058

Engels, G. I., Garnefski, N., & Diekstra, R. F. (1993). Efficacy of Rational-Emotive Therapy: A quantitative analysis. *Journal of Consulting and Clinical Psychology*, *61*(6), 1083–1090. doi:10.1037/0022-006X.61.6.1083

Epp A, D. K., & Dobson, K. S. (2010). The evidence base for Cognitive-Behavioral Therapy. In Dobson (Ed.), *Handbook of Cognitive-Behavioral Therapies* (pp. 39–73). New York, NY: Guilford Press.

Ferrer-García, M., & Gutiérrez-Maldonado, J. (2012). The use of virtual reality in the study, assessment, and treatment of body image in eating disorders and nonclinical samples: A review of the literature. *Body Image*, *9*(1), 1–11. doi:10.1016/j.bodyim.2011.10.001

Fischer, C., Bozanovic-Sosic, R., & Norris, M. (2004). Review of delusions in dementia. *American Journal of Alzheimer's Disease and Other Dementias*, *19*(1), 19–23. doi:10.1177/153331750401900104

Flett, G. L., Besser, A., Davis, R. A., & Hewitt, P. L. (2003). Dimensions of perfectionism, unconditional self-acceptance, and depression. *Journal of Rational-Emotive and Cognitive-Behavior Therapy*, *21*(2), 119–138. doi:10.1023/A:1025051431957

Flint, A. J. (1991). Delusions in dementia: A review. *The Journal of Neuropsychiatry and Clinical Neurosciences, 3*(2), 121–130. doi:10.1176/jnp.3.2.121

Fornells-Ambrojo, M., & Garety, P. A. (2009). Understanding attributional biases, emotions and self-esteem in poor me paranoia: Findings from an early psychosis sample. *British Journal of Clinical Psychology*, *48*(2), 141–162. doi:10.1348/014466508X377135

Fornells-Ambrojo, Miriam, Barker, C., Swapp, D., Slater, M., Antley, A., & Freeman, D. (2008). Virtual reality and persecutory delusions: Safety and feasibility. *Schizophrenia Research*, *104*(1), 228–236. doi:10.1016/j.schres.2008.05.013

Fowler, D., Freeman, D., Smith, B. E. N., Kuipers, E., Bebbington, P., Bashforth, H., … & Garety, P. (2006). The Brief Core Schema Scales (BCSS): Psychometric properties and associations with paranoia and grandiosity in non-clinical and psychosis samples. *Psychological Medicine*, *36*(06), 749–759. doi:10.1017/S0033291706007355

Fowler, D., Hodgekins, J., Garety, P., Freeman, D., Kuipers, E., Dunn, G., … & Bebbington, P. E. (2012). Negative cognition, depressed mood, and paranoia: A longitudinal pathway analysis using structural equation modeling. *Schizophrenia Bulletin*, 38(5), 1063-1073. doi:10.1093/schbul/sbr019

Freeman, D. (2006). Delusions in the nonclinical population. *Current Psychiatry Reports*, *8*(3), 191–204. doi:10.1007/s11920-006-0023-1

Freeman, D. (2007). Suspicious minds: The psychology of persecutory delusions. *Clinical Psychology Review*, *27*(4), 425–457. doi:10.1016/j.cpr.2006.10.004

Freeman, D. (2008). Studying and treating schizophrenia using virtual reality: A new paradigm. *Schizophrenia Bulletin*, *34*(4), 605–610. doi:10.1093/schbul/sbn020

Freeman, D. (2011). Improving cognitive treatments for delusions. *Schizophrenia Research*, *132*(2), 135–139. doi:10.1016/j.schres.2011.08.012

Freeman, D. (2016). Persecutory delusions: A cognitive perspective on understanding and treatment. *The Lancet Psychiatry*, *3*(7), 685–692. doi:10.1016/S2215-0366(16)00066-3

Freeman, D., Dunn, G., Fowler, D., Bebbington, P., Kuipers, E., Emsley, R., … & Garety, P. (2013). Current paranoid thinking in patients with delusions: The presence of cognitive-affective biases. *Schizophrenia Bulletin*, *39*(6), 1281–1287. doi:10.1093/schbul/sbs145

Freeman, D., Dunn, G., Startup, H., Pugh, K., Cordwell, J., Mander, H., … & Kingdon, D. (2015). Effects of Cognitive Behaviour Therapy for worry on persecutory delusions in patients

with psychosis (WIT): A parallel, single-blind, randomised controlled trial with a mediation analysis. *The Lancet Psychiatry*, *2*(4), 305–313. doi:10.1016/S2215-0366(15)00039-5

Freeman, D., Evans, N., & Lister, R. (2012). Gut feelings, deliberative thought, and paranoid ideation: A study of experiential and rational reasoning. *Psychiatry Research*, *197*(1), 119–122. doi:10.1016/j.psychres.2011.12.031

Freeman, D., & Garety, P. (2014). Advances in understanding and treating persecutory delusions: A review. *Social Psychiatry and Psychiatric Epidemiology*, *49*(8), 1179–1189. doi:10.1007/s00127-014-0928-7

Freeman, D., & Garety, P. A. (1999). Worry, worry processes and dimensions of delusions: An exploratory investigation of a role for anxiety processes in the maintenance of delusional distress. *Behavioural and Cognitive Psychotherapy*, *27*(01), 47–62.

Freeman, D., & Garety, P. A. (2002). Cognitive therapy for an individual with a long-standing persecutory delusion. In A. P. Morrison (Ed.), *A casebook of Cognitive Therapy for psychosis* (pp. 173–196). Hove: Brunner-Routledge.

Freeman, D., & Garety, P. A. (2004). *Paranoia: The psychology of persecutory delusions*. Hove, UH: Psychology Press.

Freeman, D., Garety, P. A., Bebbington, P. E., Smith, B., Rollinson, R., Fowler, D., … & Dunn, G. (2005). Psychological investigation of the structure of paranoia in a non-clinical population. *The British Journal of Psychiatry*, *186*(5), 427–435. doi:10.1192/bjp.186.5.427

Freeman, D., Garety, P. A., Bebbington, P., Slater, M., Kuipers, E., Fowler, D., … & Dunn, G. (2005a). The psychology of persecutory ideation II: A virtual reality experimental study. *The Journal of Nervous and Mental Disease*, *193*(5), 309–315. doi:10.1097/01.nmd.0000161686.53245.70

Freeman, D., Garety, P. A., Fowler, D., Kuipers, E., Bebbington, P. E., & Dunn, G. (2004). Why do people with delusions fail to choose more realistic explanations for their experiences? An empirical investigation. *Journal of Consulting and Clinical Psychology*, *72*(4), 671–680. doi:10.1037/0022-006X.72.4.671

Freeman, D., Garety, P. A., Kuipers, E., Fowler, D., & Bebbington, P. E. (2002). A cognitive model of persecutory delusions. *British Journal of Clinical Psychology*, *41*(4), 331–347. doi:10.1348/014466502760387461

Freeman, D., Garety, P. A., Kuipers, E., Fowler, D., Bebbington, P. E., & Dunn, G. (2007). Acting on persecutory delusions: The importance of safety seeking. *Behaviour Research and Therapy*, *45*(1), 89–99. doi:10.1016/j.brat.2006.01.014

Freeman, D., Gittins, M., Pugh, K., Antley, A., Slater, M., & Dunn, G. (2008). What makes one person paranoid and another person anxious? The differential prediction of social anxiety and persecutory ideation in an experimental situation. *Psychological Medicine*, *38*(8), 1121–1132. doi:10.1017/S0033291708003589

Freeman, D., Lister, R., & Evans, N. (2014). The use of intuitive and analytic reasoning styles by patients with persecutory delusions. *Journal of Behavior Therapy and Experimental Psychiatry*, *45*(4), 454–458. doi:10.1016/j.jbtep.2014.06.005

Freeman, D., McManus, S., Brugha, T., Meltzer, H., Jenkins, R., & Bebbington, P. (2011). Concomitants of paranoia in the general population. *Psychological Medicine*, *41*(5), 923–936. doi:10.1017/S0033291710001546

Freeman, D., Pugh, K., Antley, A., Slater, M., Bebbington, P., Gittins, M., … & Garety, P. (2008). Virtual reality study of paranoid thinking in the general population. *The British Journal of Psychiatry*, *192*(4), 258–263. doi:10.1192/bjp.bp.107.044677

Freeman, D., Pugh, K., Dunn, G., Evans, N., Sheaves, B., Waite, F., … & Fowler, D. (2014). An early Phase II randomised controlled trial testing the effect on persecutory delusions of using CBT to reduce negative cognitions about the self: The potential benefits of enhancing self confidence. *Schizophrenia Research*, *160*(1), 186–192. doi:10.1016/j.schres.2014.10.038

Freeman, D., Pugh, K., Green, C., Valmaggia, L., Dunn, G., & Garety, P. (2007). A measure of state persecutory ideation for experimental studies. *The Journal of Nervous and Mental Disease*, *195*(9), 781–784. doi:10.1097/NMD.0b013e318145a0a9

Freeman, D., Pugh, K., Vorontsova, N., Antley, A., & Slater, M. (2010). Testing the continuum of delusional beliefs: An experimental study using virtual reality. *Journal of Abnormal Psychology*, *119*(1), 83–92. doi:10.1037/a0017514

Freeman, D., Slater, M., Bebbington, P. E., Garety, P. A., Kuipers, E., Fowler, D., … & Vinayagamoorthy, V. (2003). Can virtual reality be used to investigate persecutory ideation? *The Journal of Nervous and Mental Disease*, *191*(8), 509–514. doi:10.1097/01.nmd.0000082212.83842.fe

Freeman, D., Stahl, D., McManus, S., Meltzer, H., Brugha, T., Wiles, N., & Bebbington, P. (2012). Insomnia, worry, anxiety and depression as predictors of the occurrence and persistence of paranoid thinking. *Social Psychiatry and Psychiatric Epidemiology*, *47*(8), 1195–1203. doi:10.1007/s00127-011-0433-1

Freeman, D., Startup, H., Dunn, G., Wingham, G., Černis, E., Evans, N., … & Kingdon, D. (2014). Persecutory delusions and psychological well-being. *Social Psychiatry and Psychiatric Epidemiology*, *49*(7), 1045–1050. doi:10.1007/s00127-013-0803-y

Garety, P., & Freeman, D. (2013). The past and future of delusions research: From the inexplicable to the treatable. *The British Journal of Psychiatry*, *203*(5), 327–333. doi:10.1192/bjp.bp.113.126953

Garety, P., Freeman, D., Jolley, S., Dunn, G., Bebbington, P. E., Fowler, D. G., … & Dudley, R. (2005). Reasoning, emotions, and delusional conviction in psychosis. *Journal of Abnormal Psychology*, *114*(3), 373–384. doi:10.1037/0021-843X.114.3.373

Garety, P., Kuipers, E., Fowler, D., Freeman, D., & Bebbington, P. E. (2001). A cognitive model of the positive symptoms of psychosis. *Psychological Medicine*, *31*(02), 189–195. doi:10.1017/S0033291701003312

Garety, P., Waller, H., Emsley, R., Jolley, S., Kuipers, E., Bebbington, P., … & Freeman, D. (2015). Cognitive mechanisms of change in delusions: An experimental investigation targeting reasoning to effect change in paranoia. *Schizophrenia Bulletin*, *41*(2), 400–410. doi:10.1093/schbul/sbu103

Geer, J. H., & Maisel, E. (1972). Evaluating the effects of the prediction-control confound. *Journal of Personality and Social Psychology*, *23*(3), 314–319. doi:10.1037/h0033122

Goodwin, F. K., & Jamison, K. R. (2007). *Manic-depressive illness: Bipolar disorders and recurrent depression* (Vol. 1). New York, NY: Oxford University Press.

Gould, R. A., Mueser, K. T., Bolton, E., Mays, V., & Goff, D. (2001). Cognitive therapy for psychosis in schizophrenia: An effect size analysis. *Schizophrenia Research*, *48*(2), 335–342. doi:10.1016/S0920-9964(00)00145-6

Green, C. E. L., Freeman, D., Kuipers, E., Bebbington, P., Fowler, D., Dunn, G., & Garety, P. A. (2008). Measuring ideas of persecution and social reference: The Green et al. Paranoid Thought Scales (GPTS). *Psychological Medicine*, *38*(1), 101–111. doi:10.1017/S0033291707001638

Hamamci, Z., & Büyükoztürk, Ş. (2004). The Interpersonal Cognitive Distortions Scale: Development and psychometric characteristics. *Psychological Reports*, *95*(1), 291–303. doi:10.2466/PR0.95.5.291-303

Hamner, M. B., Frueh, B. C., Ulmer, H. G., & Arana, G. W. (1999). Psychotic features and illness severity in combat veterans with chronic Posttraumatic Stress Disorder. *Biological Psychiatry*, *45*(7), 846–852. doi:10.1016/S0006-3223(98)00301-1

Hansen, L. (2006). The ABCs of Cognitive-Behavioral Therapy for schizophrenia. *Psychiatric Times*, *23*(7), 49–49.

Hanssen, M., Peeters, F., Krabbendam, L., Radstake, S., Verdoux, H., & Van Os, J. (2003). How psychotic are individuals with non-psychotic disorders? *Social Psychiatry and Psychiatric Epidemiology*, *38*(3), 149–154. doi:10.1007/s00127-003-0622-7

Higgins, E. T. (1996). Knowledge activation: Accessibility, applicability and salience. In E. T. Higgins & A. W. Kruglanski (Eds.), *Social psychology: Handbook of basic principles* (pp. 133–168). New York, NY: Guilford Press.

Higgin, J. P., Thompson, S. G., Deeks, J. J., & Altman, D. G. (2003). Measuring inconsistency in meta-analyses. *British Medical Journal*, *327*, 557–560. doi:10.1136/bmj.327.7414.557

Huppert, J. D., & Smith, T. E. (2005). Anxiety and schizophrenia: The interaction of subtypes of anxiety and psychotic symptoms. *CNS Spectrums*, *10*(09), 721–731. doi:10.1017/S1092852900019714

Hyland, P., Shevlin, M., Adamson, G., & Boduszek, D. (2014). Modeling the structure of the Attitudes and Belief Scale 2 using CFA and Bifactor approaches: Toward the development of an abbreviated version. *Cognitive Behaviour Therapy*, *43*(1), 60–71. doi:10.1080/16506073.2013.777467

Isnanda, R. G., Brinkman, W.-P., Veling, W., van der GAAG, M., & Neerincx, M. (2013). Priming to induce paranoid thought in a non clinical population. *Annual Review of Cybertherapy and Telemedicine 2013*, 95–99. doi:10.3233/978-1-61499-282-0-95

Jacobson, N. S., Dobson, K. S., Truax, P. A., Addis, M. E., Koerner, K., Gollan, J. K., … & Prince, S. E. (1996). A component analysis of cognitive-behavioral treatment for depression. *Journal of Consulting and Clinical Psychology*, *64*(2), 295–304. doi:10.1037/0022-006X.64.2.295

Johns, L. C., Cannon, M., Singleton, N., Murray, R. M., Farrell, M., Brugha, T., … & Meltzer, H. (2004). Prevalence and correlates of self-reported psychotic symptoms in the British population. *The British Journal of Psychiatry*, *185*(4), 298–305. doi:10.1192/bjp.185.4.298

Jørgensen, P., & Jensen, J. (1994). Delusional beliefs in first admitters. *Psychopathology*, *27*(1–2), 100–112. doi:10.1159/000284854

Kane, J. M., Kishimoto, T., & Correll, C. U. (2013). Non-adherence to medication in patients with psychotic disorders: Epidemiology, contributing factors and management strategies. *World Psychiatry*, *12*(3), 216–226. doi:10.1002/wps.20060

Kawachi, I., Kennedy, B. P., Lochner, K., & Prothrow-Stith, D. (1997). Social capital, income inequality, and mortality. *American Journal of Public Health*, *87*(9), 1491–1498. doi:10.2105/AJPH.87.9.1491

Kaymaz, N., Drukker, M., Lieb, R., Wittchen, H.-U., Werbeloff, N., Weiser, M., … & Van Os, J. (2012). Do subthreshold psychotic experiences predict clinical outcomes in unselected non-help-seeking population-based samples? A systematic review and meta-analysis, enriched with new results. *Psychological Medicine*, *42*(11), 2239–2253. doi:10.1017/S0033291711002911

Kelleher, I., Keeley, H., Corcoran, P., Lynch, F., Fitzpatrick, C., Devlin, N., … & Cannon, M. (2012). Clinicopathological significance of psychotic experiences in non-psychotic young people: Evidence from four population-based studies. *The British Journal of Psychiatry*, *201*(1), 26–32. doi:10.1192/bjp.bp.111.101543

Kennedy, R. S., Lane, N. E., Berbaum, K. S., & Lilienthal, M. G. (1993). Simulator sickness questionnaire: An enhanced method for quantifying simulator sickness. *The International Journal of Aviation Psychology*, *3*(3), 203–220. doi:10.1207/s15327108ijap0303_3

Kessler, R. C., Aguilar-Gaxiola, S., Alonso, J., Chatterji, S., Lee, S., Ormel, J., … & Wang, P. S. (2009). The global burden of mental disorders: An update from the WHO World Mental Health (WMH) Surveys. *Epidemiologia E Psichiatria Sociale*, *18*(1), 23–33. doi:10.1017/S1121189X00001421

Kesting, M.-L., Bredenpohl, M., Klenke, J., Westermann, S., & Lincoln, T. M. (2013). The impact of social stress on self-esteem and paranoid ideation. *Journal of Behavior Therapy and Experimental Psychiatry*, *44*(1), 122–128. doi:10.1016/j.jbtep.2012.07.010

Kesting, M.-L., & Lincoln, T. M. (2013). The relevance of self-esteem and self-schemas to persecutory delusions: A systematic review. *Comprehensive Psychiatry*, *54*(7), 766–789. doi:10.1016/j.comppsych.2013.03.002

Kingdon, D. (2013). A golden age of discovery. *British Journal of Psychiatry, 202*, 394–395. doi:10.1192/bjp.bp.112.125039

Lamberton, A., & Oei, T. P. S. (2008). A test of the cognitive content specificity hypothesis in depression and anxiety. *Journal of Behavior Therapy and Experimental Psychiatry*, *39*(1), 23–31. doi:10.1016/j.jbtep.2006.11.001

Lazarus, R. S. (1994). *Emotion and Adaptation*. New York, NY: Oxford University Press.

Leucht, S., Cipriani, A., Spineli, L., Mavridis, D., Örey, D., Richter, F., … & Barbui, C. (2013). Comparative efficacy and tolerability of 15 antipsychotic drugs in schizophrenia: A multiple-treatments meta-analysis. *The Lancet*, *382*(9896), 951–962. doi:10.1016/S0140-6736(13)60733-3

Liebowitz, M. R. (1987). Social phobia. *Modern Problems of Pharmacopsychiatry*, *22*, 141–173. doi:10.1159/000414022

Lincoln, T. M., Peter, N., Schäfer, M., & Moritz, S. (2009). Impact of stress on paranoia: An experimental investigation of moderators and mediators. *Psychological Medicine*, *39*(7), 1129–1139. doi:10.1017/S0033291708004613

Lindner, H., Kirkby, R., Wertheim, E., & Birch, P. (1999). A brief assessment of irrational thinking: The Shortened General Attitude and Belief Scale. *Cognitive Therapy and Research*, *23*(6), 651–663. doi:10.1023/A:1018741009293

Linscott, R. J., & Van Os, J. (2013). An updated and conservative systematic review and meta-analysis of epidemiological evidence on psychotic experiences in children and adults: On the pathway from proneness to persistence to dimensional expression across mental disorders. *Psychological Medicine*, *43*(6), 1133–1149. doi:10.1017/S003329171200162 6Pu

Lix, L. M., Keselman, J. C., & Keselman, H. J. (1996). Consequences of assumption violations revisited: A quantitative review of alternatives to the one-way analysis of variance *F* test. *Review of Educational Research*, *66*, 579–619. doi:10.2307/1170654

Lovibond, P. F. (1995). *Manual for the depression anxiety stress scales*. Sydney, AU: Sydney Psychology Edition.

Lyons, L. C., & Woods, P. J. (1991). The efficacy of rational-emotive therapy: A quantitative review of the outcome research. *Clinical Psychology Review*, *11*(4), 357–369. doi:10.1016/0272-7358(91)90113-9

Macavei, B. (2005). The role of irrational beliefs in the rational emotive behavior theory of depression. *Journal of Cognitive and Behavioral Psychotherapies*, *5*(1), 73–81.

MacInnes, D. (2004). The theories underpinning Rational Emotive Behaviour Therapy: Where's the supportive evidence? *International Journal of Nursing Studies*, *41*(6), 685–695. doi:10.1016/j.ijnurstu.2004.02.004

Maier, S. F., & Warren, D. A. (1988). Controllability and safety signals exert dissimilar proactive effects on nociception and escape performance. *Journal of Experimental Psychology: Animal Behavior Processes*, *14*(1), doi:10.1037/0097-7403.14.1.18

Malouff, J. M., Schutte, N. S., & McClelland, T. (1992). Examination of the relationship between irrational beliefs and state anxiety. *Personality and Individual Differences*, *13*(4), 451–456. doi:10.1016/0191-8869(92)90074-Y

Martin, J. A., & Penn, D. L. (2001). Social cognition and subclinical paranoid ideation. *British Journal of Clinical Psychology*, *40*(3), 261–265. doi:10.1348/014466501163670

Maxwell, S. E., & Delaney, H. D. (2004). *Designing experiments and analyzing data: A model comparison perspective* (2nd ed.). New York, NY: Psychology Press.

McCulloch, Y., Clare, L., Howard, R., & Peters, E. (2006). Psychological processes underlying delusional thinking in late-onset psychosis: A preliminary investigation. *International Journal of Geriatric Psychiatry*, *21*(8), 768–777. doi:10.1002/gps.1561

McDuff, A. C., & Dryden, W. (1998). REBT and emotion: I. A role-play experiment using a shame/disappointment scenario to investigate the effects of rational, irrational and indifference beliefs on inferences and action tendencies. *Journal of Rational-Emotive & Cognitive-Behavior Therapy*, *16*(4), 235–254. doi:10.1023/A:1024912518928

Mehl, S., Werner, D., & Lincoln, T. M. (2015). Does Cognitive Behavior Therapy for psychosis (CBTp) show a sustainable effect on delusions? A meta-analysis. *Frontiers in Psychology*, *6,* 1450. doi:10.3389/fpsyg.2015.01450

Meyer, T. J., Miller, M. L., Metzger, R. L., & Borkovec, T. D. (1990). Development and validation of the Penn State Worry Questionnaire. *Behaviour Research and Therapy*, *28*(6), 487–495. doi:10.1016/0005-7967(90)90135-6

Mineka, S., Cook, M., & Miller, S. (1984). Fear conditioned with escapable and inescapable shock: Effects of a feedback stimulus. *Journal of Experimental Psychology: Animal Behavior Processes*, *10*(3), 307–323. doi:10.1037/0097-7403.10.3.307

Moldovan, R., Cobeanu, O., & David, D. (2013). Cognitive bibliotherapy for mild depressive symptomatology: Randomized clinical trial of efficacy and mechanisms of change. *Clinical Psychology & Psychotherapy*, *20*(6), 482–493. doi:10.1002/cpp.1814

Montgomery, G. H., David, D., DiLorenzo, T. A., & Schnur, J. B. (2007a). Response expectancies and irrational beliefs predict exam-related distress. *Journal of Rational-Emotive & Cognitive-Behavior Therapy*, *25*(1), 17–34. doi:10.1007/s10942-006-0029-y

Myin-Germeys, I., Krabbendam, L., & van Os, J. (2003). Continuity of psychotic symptoms in the community. *Current Opinion in Psychiatry*, *16*(4), 443–449. doi:10.1097/01.yco.0000079208.36371.cd

Naeem, F., Kingdon, D., & Turkington, D. (2006). Cognitive Behaviour Therapy for schizophrenia: Relationship between anxiety symptoms and therapy. *Psychology and Psychotherapy: Theory, Research and Practice*, *79*(2), 153–164. doi:10.1348/147608305X91538

National Institute of Clinical Excellence (NICE). (2009). Schizophrenia: Core interventions in the treatment and management of schizophrenia in primary and secondary care (update). British Psychological Society.

National Institute of Clinical Excellence (NICE). (2014). Psychosis and Schizophrenia in Adults: The Nice Guidelines on Treatment and Management. *Vol. National Clinical Guideline*, (178).

National Institute for Clinical Excellence. (2014). Psychosis and schizophrenia in adults: treatment and management. London: National Institute for Clinical Excellence.

Normann, N., Lønfeldt, N. N., Reinholdt-Dunne, M. L., & Esbjørn, B. H. (2015). Negative thoughts and metacognitions in anxious children following CBT. *Cognitive Therapy and Research*, *40*(2), 188–197. doi:10.1007/s10608-015-9740-2

Olfson, M., Lewis-Fernández, R., Weissman, M. M., Feder, A., Gameroff, M. J., Pilowsky, D., & Fuentes, M. (2002). Psychotic symptoms in an urban general medicine practice. *American Journal of Psychiatry*, *159*(8), 1412–1419. doi:10.1176/appi.ajp.159.8.1412

Opriş, D., Pintea, S., García-Palacios, A., Botella, C., Szamosközi, Ş., & David, D. (2012). Virtual reality exposure therapy in anxiety disorders: A quantitative meta-analysis. *Depression and Anxiety*, *29*(2), 85–93. doi:10.1002/da.20910

Padesky, C. A., & Beck, A. T. (2003). Science and philosophy: Comparison of Cognitive Therapy and Rational Emotive Behavior Therapy. *Journal of Cognitive Psychotherapy*, *17*(3), 211–224. doi:10.1891/jcop.17.3.211.52536

Palmer, S., Dryden, W., Ellis, A. & Yapp, R. (1995). *Rational interviews (Rational Emotive Behavior Therapy)*. London: Centre for Rational Emotive Behaviour Therapy.

Paolini, E., Moretti, P., & Compton, M. T. (2016). Delusions in first-episode psychosis: Principal component analysis of twelve types of delusions and demographic and clinical correlates of resulting domains. *Psychiatry Research, 243,* 5–13. doi:10.1016/j.psychres.2016.06.002

Peralta, V., & Cuesta, M. J. (1999). Dimensional structure of psychotic symptoms: An item-level analysis of SAPS and SANS symptoms in psychotic disorders. *Schizophrenia Research*, *38*(1), 13–26. doi:10.1016/S0920-9964(99)00003-1

Peralta, V., Moreno-Izco, L., Calvo-Barrena, L., & Cuesta, M. J. (2013). The low-and higher-order factor structure of symptoms in patients with a first episode of psychosis. *Schizophrenia Research*, *147*(1), 116–124. doi:10.1016/j.schres.2013.03.018

Phillips, M. L., Senior, C., & David, A. S. (2000). Perception of threat in schizophrenics with persecutory delusions: An investigation using visual scan paths. *Psychological Medicine*, *30*(01), 157–167. doi:10.1017/S0033291799001397

Pössel, P., & Knopf, K. (2008). An experimental test of the maintenance and vulnerability hypothesis of depression in consideration of the cognitive hierarchy. *Depression and Anxiety*, *25*(9), E47–E55. doi:10.1002/da.20313

Poulton, R., Caspi, A., Moffitt, T. E., Cannon, M., Murray, R., & Harrington, H. (2000). Children's self-reported psychotic symptoms and adult Schizophreniform Disorder: A 15-year longitudinal study. *Archives of General Psychiatry*, *57*(11), 1053–1058.

Powers, M. B., & Emmelkamp, P. M. (2008). Virtual reality exposure therapy for anxiety disorders: A meta-analysis. *Journal of Anxiety Disorders*, *22*(3), 561–569. doi:10.1001/archpsyc.57.11.1053

Reeve, S., Sheaves, B., & Freeman, D. (2015). The role of sleep dysfunction in the occurrence of delusions and hallucinations: A systematic review. *Clinical Psychology Review*, *42*, 96–115. doi:10.1016/j.cpr.2015.09.001

Riva, G. (1998). Virtual reality in psychological assessment: The Body Image Virtual Reality Scale. *CyberPsychology & Behavior*, *1*(1), 37–44. doi:10.1089/cpb.1998.1.37.

Robins, R. W., Hendin, H. M., & Trzesniewski, K. H. (2001). Measuring global self-esteem: Construct validation of a single-item measure and the Rosenberg Self-Esteem Scale. *Personality and Social Psychology Bulletin*, *27*(2), 151–161. doi:10.1177/0146167201272002

Rosenthal, R. (1979). The File drawer problem and tolerance for null results. *Psychological Bulletin, 86*, 638–641. doi:10.1037/0033-2909.86.3.638

Ross, R. M., McKay, R., Coltheart, M., & Langdon, R. (2015). Jumping to conclusions about the beads task? A meta-analysis of delusional ideation and data-gathering. *Schizophrenia Bulletin*, *41*(5), 1183–1191. doi:10.1093/schbul/sbu187

Rubin, E. H., Drevets, W. C., & Burke, W. J. (1988). The nature of psychotic symptoms in senile dementia of the Alzheimer type. *Journal of Geriatric Psychiatry and Neurology*, *1*(1), 16–20. doi:10.1177/089198878800100104

Rytwinski, N. K., Fresco, D. M., Heimberg, R. G., Coles, M. E., Liebowitz, M. R., Cissell, S., … & Hofmann, S. G. (2009). Screening for Social Anxiety Disorder with the self-report version of the Liebowitz Social Anxiety Scale. *Depression and Anxiety*, *26*(1), 34–38. doi:10.1002/da.20503

Shadish, W. R., Cook, T. D., & Campbell, D. T. (2002). *Experimental and quasi-experimental designs for generalized causal inference*. Belmont, CA: Wadsworth, Cengage Learning.

Schmitt, D. P., & Allik, J. (2005). Simultaneous administration of the Rosenberg Self-Esteem Scale in 53 nations: Exploring the universal and culture-specific features of global self-esteem. *Journal of Personality and Social Psychology*, *89*(4), 623–642. doi:10.1037/0022-3514.89.4.623

Schneider, K. (1959). *Clinical psychopathology*. Oxford: Grune & Stratton.

Smith, B., Fowler, D. G., Freeman, D., Bebbington, P., Bashforth, H., Garety, P., … & Kuipers, E. (2006). Emotion and psychosis: Links between depression, self-esteem, negative schematic beliefs and delusions and hallucinations. *Schizophrenia Research*, *86*(1), 181–188. doi:10.1016/j.schres.2006.06.018

Solomon, A., Haaga, D. A., Brody, C., Kirk, L., & Friedman, D. G. (1998). Priming irrational beliefs in recovered-depressed people. *Journal of Abnormal Psychology*, *107*(3), 440–449. doi:10.1037/0021-843X.107.3.440

Startup, H., Freeman, D., & Garety, P. A. (2007). Persecutory delusions and catastrophic worry in psychosis: Developing the understanding of delusion distress and persistence. *Behaviour Research and Therapy*, *45*(3), 523–537. doi:10.1016/j.brat.2006.04.006

Stompe, T., Friedman, A., Ortwein, G., Strobl, R., Chaudhry, H. R., Najam, N., & Chaudhry, M. R. (1999). Comparison of delusions among schizophrenics in Austria and in Pakistan. *Psychopathology*, *32*(5), 225–234. doi:10.1159/000029094

Szentagotai, A., David, D., Lupu, V., & Cosman, D. (2008). Rational Emotive Behavior Therapy versus Cognitive Therapy versus pharmacotherapy in the treatment of Major Depressive Disorder: Mechanisms of change analysis. *Psychotherapy: Theory, Research, Practice, Training*, *45*(4), 523–538. doi:10.1037/a0014332

Szentagotai, A., & Freeman, A. (2007). An analysis of the relationship between irrational beliefs and automatic thought in predicting distress. *Journal of Cognitive and Behavioral Psychotherapies*, *7*(1), 1–9.

Szentagotai, A., Schnur, J., DiGiuseppe, R., Macavei, B., Kallay, E., & David, D. (2005). The organization and the nature of irrational beliefs: Schemas or appraisal. *Journal of Cognitive and Behavioral Psychotherapies*, *5*, 139–158.

Thewissen, V., Bentall, R. P., Lecomte, T., van Os, J., & Myin-Germeys, I. (2008). Fluctuations in self-esteem and paranoia in the context of daily life. *Journal of Abnormal Psychology*, *117*(1), 143–153. doi:10.1037/0021-843X.117.1.143

Thewissen, V., Bentall, R. P., Oorschot, M., a Campo, J., van Lierop, T., van Os, J., & Myin-Germeys, I. (2011). Emotions, self-esteem, and paranoid episodes: An experience sampling study. *British Journal of Clinical Psychology*, *50*(2), 178–195. doi:10.1348/014466510X508677

Thewissen, V., Myin-Germeys, I., Bentall, R., de Graaf, R., Vollebergh, W., & van Os, J. (2007). Instability in self-esteem and paranoia in a general population sample. *Social Psychiatry and Psychiatric Epidemiology*, *42*(1), 1–5. doi:10.1007/s00127-006-0136-1

Tiernan, B., Tracey, R., & Shannon, C. (2014a). Paranoia and self-concepts in psychosis: A systematic review of the literature. *Psychiatry Research*, *216*(3), 303–313. doi:10.1016/j.psychres.2014.02.003

Trower, P. (2003). Theoretical developments in REBT as applied to schizophrenia. In W. Dryden (ed.), *Rational Emotive Behaviour Therapy: Theoretical Developments* (pp. 228–246). Hove: Brunner-Routledge.

Turner, D. T., van der Gaag, M., Karyotaki, E., & Cuijpers, P. (2014). Psychological interventions for psychosis: A meta-analysis of comparative outcome studies. *American Journal of Psychiatry*, *171*(5), 523–538. doi:10.1176/appi.ajp.2013.13081159

Udachina, A., Varese, F., Myin-Germeys, I., & Bentall, R. P. (2014). The role of experiential avoidance in paranoid delusions: An experience sampling study. *British Journal of Clinical Psychology*, *53*(4), 422–432. doi:10.1111/bjc.12054

Valmaggia, L. R., Freeman, D., Green, C., Garety, P., Swapp, D., Antley, A., … & McGuire, P. K.. (2007). Virtual reality and paranoid ideations in people with an “at-risk mental state”for psychosis. *The British Journal of Psychiatry*, *191*(51), s63–s68. doi:10.1192/bjp.191.51.s63

van der Gaag, M., Valmaggia, L. R., & Smit, F. (2014). The effects of individually tailored formulation-based Cognitive Behavioural Therapy in auditory hallucinations and delusions: A meta-analysis. *Schizophrenia Research*, *156*(1), 30–37. doi:10.1016/j.schres.2014.03.016

van Os, J., Hanssen, M., Bijl, R. V., & Ravelli, A. (2000). Strauss (1969) revisited: A psychosis continuum in the general population? *Schizophrenia Research*, *45*(1), 11–20. doi:10.1016/S0920-9964(99)00224-8

van Os, J., Linscott, R. J., Myin-Germeys, I., Delespaul, P., & Krabbendam, L. (2009). A systematic review and meta-analysis of the psychosis continuum: Evidence for a psychosis proneness–persistence–impairment model of psychotic disorder. *Psychological Medicine*, *39*(02), 179–195. doi:10.1017/S0033291708003814

van Os, J., & Murray, R. M. (2013). Can we identify and treat "schizophrenia light" to prevent true psychotic illness. *British Medical Journal*, *346*, f304. doi:10.1136/bmj.f304

van Os, J., & Reininghaus, U. (2016). Psychosis as a transdiagnostic and extended phenotype in the general population. *World Psychiatry*, *15*(2), 118–124. doi:10.1002/wps.20310

van Os, J., & Verdoux, H. (2003). Diagnosis and classification of schizophrenia: Categories versus dimensions, distributions versus disease. In R. M. Murray, P. B. Jones, E. Susser, J. Van Os, & M. Cannon (Eds.), *The Epidemiology of Schizophrenia* (pp. 364–410). Cambridge: Cambridge University Press.

van Os, J., Verdoux, H., Bijl, R., & Ravelli, A. (1999). Psychosis as an extreme of continuous variation in dimensions of psychopathology. In W. F. Hafner & H. Hafner (Eds.), *Search for the Causes of Schizophrenia* (pp. 59–79). Berlin: Springer.

van Os, J., Verdoux, H., Maurice-Tison, S., Gay, B., Liraud, F., Salamon, R., & Bourgeois, M. (1999). Self-reported psychosis-like symptoms and the continuum of psychosis. *Social Psychiatry and Psychiatric Epidemiology*, *34*(9), 459–463. doi:10.1007/s001270050220

Varghese, D., Scott, J., Welham, J., Bor, W., Najman, J., O'Callaghan, M., … & McGrath, J. (2011). Psychotic-like experiences in Major Depression and Anxiety Disorders: A population-based survey in young adults. *Schizophrenia Bulletin*, *37*(2), 389–393. doi:10.1093/schbul/sbp083

Veling, W., Brinkman, W.-P., Dorrestijn, E., & Van Der Gaag, M. (2014). Virtual reality experiments linking social environment and psychosis: A pilot study. *Cyberpsychology, Behavior, and Social Networking*, *17*(3), 191–195. doi:10.1089/cyber.2012.0497

Veling, W., Moritz, S., & van der Gaag, M. (2014). Brave New Worlds: Review and update on virtual reality assessment and treatment in psychosis. *Schizophrenia Bulletin*, *40*(6), 1194–1197. doi:10.1093/schbul/sbu125

Verdoux, Hélène, & van Os, J. (2002). Psychotic symptoms in non-clinical populations and the continuum of psychosis. *Schizophrenia Research*, *54*(1), 59–65. doi:10.1016/S0920-9964(01)00352-8

Verdoux, Hélnè, Van Os, J., Maurice-Tison, S., Gay, B., Salamon, R., & Bourgeois, M. L. (1999). Increased occurrence of depression in psychosis-prone subjects: A follow-up study in primary care settings. *Comprehensive Psychiatry*, *40*(6), 462–468. doi:10.1016/S0010-440X(99)90091-3

Vîslă, A., Cristea, I. A., Tătar, A. S., & David, D. (2013). Core beliefs, automatic thoughts and response expectancies in predicting public speaking anxiety. *Personality and Individual Differences*, *55*(7), 856–859. doi:10.1016/j.paid.2013.06.003

Vîslă, A., Flückiger, C., Grosse Holtforth, M., & David, D. (2016). Irrational beliefs and psychological distress: A meta-analysis. *Psychotherapy and Psychosomatics*, *85*(1), 8–15. doi:10.1159/000441231

Vorontsova, N., Garety, P., & Freeman, D. (2013). Cognitive factors maintaining persecutory delusions in psychosis: The contribution of depression. *Journal of Abnormal Psychology*, *122*(4), 1121–1131. doi:10.1037/a0034952

Waller, H., Emsley, R., Freeman, D., Bebbington, P., Dunn, G., Fowler, D., … & Garety, P. (2015). Thinking Well: A randomised controlled feasibility study of a new CBT therapy

targeting reasoning biases in people with distressing persecutory delusional beliefs. *Journal of Behavior Therapy and Experimental Psychiatry*, *48*, 82–89. doi:10.1016/j.jbtep.2015.02.007

Wampold, B. E., Minami, T., Baskin, T. W., & Callen Tierney, S. (2002). A meta-(re)analysis of the effects of cognitive therapy versus "other therapies" for depression. *Journal of Affective Disorders*, *68*(2–3), 159–165. doi:10.1016/S0165-0327(00)00287-1

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology*, *54*(6), 1063–1070. doi:10.1037/0022-3514.54.6.1063

Wessely, S., Buchanan, A., Reed, A., Cutting, J., Everitt, B., Garety, P., & Taylor, P. J. (1993). Acting on delusions. I: Prevalence. *The British Journal of Psychiatry*, *163*(1), 69–76. doi:10.1192/bjp.163.1.69

Wigman, J. T., van Nierop, M., Vollebergh, W. A., Lieb, R., Beesdo-Baum, K., Wittchen, H.-U., & van Os, J. (2012). Evidence that psychotic symptoms are prevalent in disorders of anxiety and depression, impacting on illness onset, risk, and severity: Implications for diagnosis and ultra–high risk research. *Schizophrenia Bulletin*, *38*(2), 247–257. doi:10.1093/schbul/sbr196

Witmer, B. G., & Singer, M. J. (1994). *Measuring immersion in virtual environments*. (Tech. Rep. 1014). Alexandria, VA: US Army Research Institute for the Behavioral and Social Sciences.

Wong, S. S. (2008). The relations of cognitive triad, dysfunctional attitudes, automatic thoughts, and irrational beliefs with test anxiety. *Current Psychology: A Journal for Diverse Perspectives on Diverse Psychological Issues*, *27*(3), 177–191. doi:10.1007/s12144-008-9033-y

Wykes, T., Steel, C., Everitt, B., & Tarrier, N. (2008). Cognitive Behavior Therapy for schizophrenia: Effect sizes, clinical models, and methodological rigor. *Schizophrenia Bulletin*, *34*(3), 523–537. doi:10.1093/schbul/sbm114

Zammit, S., Kounali, D., Cannon, M., David, A. S., Gunnell, D., Heron, J., … & Lewis, G. (2013). Psychotic experiences and psychotic disorders at age 18 in relation to psychotic experiences at age 12 in a longitudinal population-based cohort study. *American Journal of Psychiatry*, *170*(7), 742–750. doi:10.1176/appi.ajp.2013.12060768

Zavos, H. M., Freeman, D., Haworth, C. M., McGuire, P., Plomin, R., Cardno, A. G., & Ronald, A. (2014). Consistent etiology of severe, frequent psychotic experiences and milder, less frequent manifestations: A twin study of specific psychotic experiences in adolescence. *JAMA Psychiatry*, *71*(9), 1049–1057. doi:10.1001/jamapsychiatry.2014.994