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## **ANGER REGULATION AND PSYCHOSIS: MECHANISMS OF IMPACT AND IMPLICATIONS FOR THERAPY**

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**ANGER REGULATION AND PSYCHOSIS: MECHANISMS OF IMPACT AND  
IMPLICATIONS FOR THERAPY**

A dissertation submitted in partial fulfillment  
of the requirements for the degree of

**DOCTOR OF PHILOSOPHY**

to the faculty of the department of

**PSYCHOLOGY**

of

**ST. JOHN'S COLLEGE OF LIBERAL ARTS AND SCIENCES**

at

**ST. JOHN'S UNIVERSITY**

**New York**

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## ABSTRACT

### ANGER REGULATION AND PSYCHOSIS: MECHANISMS OF IMPACT AND IMPLICATIONS FOR THERAPY

Naama Hofman

Paranoia is strongly associated with anger. This relationship is found across the psychosis spectrum, including individuals at high risk of developing psychosis. The relationship is commonly addressed in the measurement of anger but is rarely addressed in clinical studies.

This study explored the relationship between anger regulation and paranoid ideation as well as factors that mediate and moderate this relationship. Specifically, the study examined whether the influence of anger regulation cognitive-behavioral interventions on paranoid ideation changed as aspects of emotional awareness changed. It also examined whether interventions for anger regulation that target different phases of anger generation impacted paranoid ideation through different mechanisms - of either experiential avoidance or irrational beliefs about the need to habitually feel comfortable.

Participants were undergraduate students and young adults in the general population. They completed the study through an online survey platform – Qualtrics, which randomly assigned participants to view one of three interventions: a Rational Emotive Behavior Therapy (REBT) *a-priori* intervention – that targets beliefs that occur prior to anger arousal, an Acceptance and Commitment Therapy (ACT) *post-hoc* intervention – that targets actions after anger is aroused, or a control condition –

suggesting experiencing anger naturally. Participants completed a computerized anger-induction interview and attempted to regulate their anger using the technique they learned in the intervention video.

Results showed a strong positive association between levels of state anger and conviction in paranoid ideation, both at baseline and at the end of the study, following two anger regulation attempts. Furthermore, individuals with high levels of state anger and conviction in paranoid ideation were less attentive to their emotions, had less clarity of their emotions, were more likely to be experientially avoidant, and to have irrational beliefs about having to be comfortable. Despite these strong associations, the hypothesized moderation and mediation models failed to predict the outcomes of state anger and conviction in paranoid ideation, which were predicted only by clarity of emotions. Higher levels of clarity of emotions were predictive of lower state anger and less conviction in paranoid ideation.

Limitations, future research, and implications for treatment are discussed.

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## INTRODUCTION

The following provides a review of the literature regarding psychosis, anger, and their relationship. First, the topic of psychosis will be discussed, followed by a discussion regarding negative emotions in individuals with psychosis and anger in individuals with psychosis. Next, aspects that relate to the lingering presences of anger will be reviewed, including emotional awareness in individuals with psychosis, awareness of anger in individuals with psychosis, emotion regulation in individuals with psychosis, and anger regulation in individuals with psychosis. Finally, psychotherapy for individuals with both anger and psychosis will be discussed.

### **Psychosis**

Psychosis is a mental state characterized by the “presence of hallucinations, delusions, or a limited number of severe abnormalities of behavior, such as gross excitement and overactivity, marked psychomotor retardation, and catatonic behavior” (World Health Organization, 1992, p.10). This definition appears in the *International Classification of Diseases, Tenth Revision* (ICD-10). It was recently derived following approximately 170 years during which the term psychosis referred to a broader range of experiences (McCarthy-Jones, 2014). Prior definitions of psychosis included a psychiatric meaning of a grave mental disorder, as well as a psychological meaning of ‘any mental state or process’ (Sommer, 2011).

There is currently no formal definition for psychosis in the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition* (DSM-5; American Psychiatric Association, 2013). However, the DSM-5 implies that psychosis consists of two domains: hallucinations and delusions or what is commonly labeled ‘positive symptoms.’

Hallucinations, according to the *DSM-5* are “perception-like experiences that occur without an external stimulus. They are vivid and clear, with the full force and impact of normal perceptions, and not under voluntary control” (p.87). Hallucinations can occur in any sensory modality, including visual, auditory, tactile, olfactory, and gustatory.

Delusions, according to the *DSM-5*, are “fixed beliefs that are not amenable to change in light of conflicting evidence.” (p.87). Delusions can include a variety of themes, such as persecutory delusions (i.e., the belief one is being harmed or harassed), referential delusions (i.e., the belief that gestures and environmental cues are directed at oneself), grandiose delusions (i.e., the belief the one has exceptional abilities, wealth, or fame), erotomanic delusions (i.e., the false belief that another person is in love with them), nihilistic delusions (i.e., the belief that a major catastrophe will occur) and somatic delusions (i.e., false belief or preoccupations with health and organ function). Motions to change the *DSM-5* definition of delusions from “fixed beliefs” have been made as delusions were found to be impacted by factors as emotional states and amenable to change by cognitive-behavioral therapy for psychosis (CBTp; Freeman & Garety, 2003; Mehl, Werner, & Lincoln, 2015). This concept will be discussed in the following sections.

A meta-synthesis of the experience of psychosis suggests that it is dominated by highly heterogeneous and confusing, unshared, perceptions, and/or paranoia (McCarthy-Jones, Marriott, Knowles, Rowse, & Thompson, 2013). Psychosis often leads to a feeling of being in a different reality, feelings of confusion and fear, and a loss of the sense of having a coherent self. These experiences are often internalized resulting in the judgment of oneself as useless, incapable, or insane. However, these accounts suggest

that individuals who experienced psychosis also often succeed in regaining a sense of a stable reality and self, although this reality might still involve hearing voices (McCarthy-Jones et al., 2013).

Psychosis is associated with the 'Schizophrenia Spectrum and Other Psychotic Disorders' category of the *DSM-5*, which consists of Schizotypal (Personality) Disorder, Delusional Disorder, Brief Psychotic Disorder, Schizophreniform Disorder, Schizophrenia, Schizoaffective Disorder, and Catatonia or Psychotic Disorders that are associated with another medical condition or mental disorder (American Psychiatric Association, 2013).

The diagnosis that is most commonly associated with symptoms of psychosis is schizophrenia. It is usually given to patients when other causes of psychosis have been excluded. The 12-month prevalence of schizophrenia is approximately 0.26%–0.51% and the lifetime prevalence of schizophrenia is 0.3%-0.85% (American Psychiatric Association, 2013; Simeone, Ward, Rotella, Collins, & Windisch, 2015). The societal price associated with schizophrenia is high. Approximately \$22.7 billion are spent yearly in the US on direct patient health care, \$9.3 billion spent on non-health care costs such as law enforcement and homeless shelters, and \$32.3 billion spent on indirect costs, such as productivity loss of individuals with schizophrenia and their caregivers, summing up to \$62.7 billion spent yearly on Schizophrenia in the US (McEvoy, 2007).

Schizophrenia is also associated with considerable personal losses, such as low quality of life (Rocca et al., 2009; Sum, Ho, & Sim, 2015). The disorder is also associated with occupational impairment, impaired interpersonal relations, financial dependence on

others, impaired ability to enjoy recreational activities, and lower global functioning (American Psychiatric Association, 2013; Ho et al., 1998).

High mortality rates are also associated with schizophrenia, with a 2.58 standardized mortality ratio, indicating that people with schizophrenia are more than twice as likely to die compared with the general population from all causes (Saha, Chant, & McGrath, 2007). In this systematic review, suicide had the highest standardized mortality ratio in schizophrenia, but most of the major causes of death categories were elevated in people with schizophrenia as well.

The recovery rates of schizophrenia remain low, with only one in seven people meeting recovery criteria (Jääskeläinen et al., 2012), and recovery is characterized by improvements in both clinical and social domains, with improvements in at least one of these domains persisting for at least two years. There is a more hopeful prognosis of schizophrenia when assessing the process of *recovering*, which prepares one for *recovery*. In implementing this dimensional definition, over 50% of patients are estimated to be in the process of recovery from schizophrenia and experience some symptomatic remission (Lieberman & Kopelowicz, 2005). Furthermore, long-term outcomes suggest that more than half of the individuals with schizophrenia live satisfying and productive lives (Harding, Brooks, Ashikaga, Strauss, & Breier, 1987).

Earlier studies found accessible mental health services key in predicting the favorable long-term outcomes (DeSisto, Harding, McCormick, Ashikaga, & Brooks, 1995). Current studies regarding evidence-based treatments provide an optimistic point of view about the prognosis of schizophrenia as well. In the pharmacotherapy front, Clozapine was found to be effective for individuals who failed to improve with atypical

antipsychotic medication (McEvoy et al., 2006), providing help to those who were viewed as resistant to treatment. Other available evidence-based treatments include cognitive remediation therapy, which is associated with both neurobiological and cognitive improvement (Thorsen, Johansson, & Løberg, 2014); social skills training, which is related to improvements in performance-based measures of social and daily living skills, community functioning, negative symptoms, and less relapse (Kurtz & Mueser, 2008); acceptance and commitment therapy (ACT), which is associated with reduced hospitalization (Bach, Hayes, & Gallop, 2012); CBTp, which is associated with symptom change and 10-20% increases in remission rates as compared to pharmacotherapy alone (Mehl et al., 2015; Thase, Kingdon, & Turkington, 2014).

Although these effects are significant, they have modest effect sizes, which suggest that there is work to be done in improving interventions for psychotic disorders.

Additionally, CBTp was shown to have only a small therapeutic effect on one's functioning and little to no effect on one's distress and quality of life (Laws, Darlington, Kondel, McKenna & Jauhar, 2018).

### **Negative emotions in individuals with psychosis**

Emotions are changes in one's subjective experience that unfold quickly, over seconds to minutes. They are typically elicited by identifiable situations and give rise to experiential, behavioral, and physiological response systems (Gross, 2015). Emotions may provide information regarding the best course of action but can be obstructive when the information they provide is based on emotions of a wrong intensity, duration, frequency, or type in the context of a particular event.

A major clinical characteristics of psychotic illness is negative feelings. A dysphoric mood, such as depression, anxiety, or anger, is recognized in the *DSM-5* as an associated feature of schizophrenia (American Psychiatric Association, 2013). People with schizophrenia spectrum disorders report experiencing more negative and less positive emotions in their daily lives than non-patient controls (Cho et al., 2017; Lincoln, Hartmann, Köther, & Moritz, 2015; Livingstone, Harper, & Gillanders, 2009; Trémeau et al., 2009). This pattern is stable through the course of the illness, starting with at-risk individuals, among whom this pattern predicts the development of psychosis (Horan, Blanchard, Clark, & Green, 2008).

Negative emotions accompany psychotic symptoms (Bentall et al., 2009; Freeman & Garety, 2003; Johns et al., 2004) and correlate positively with aspects of psychotic symptoms, such as the content of delusions (Freeman, Garety, & Kuipers, 2001), delusional conviction (Garety et al., 2005), the believability of hallucination (Gaudio & Herbert; 2006), and a classification of voices as malevolent or omnipotent (Chadwick & Birchwood, 1994; Close & Garety, 1998; Mawson, Cohen, & Berry, 2010; Peters, Williams, Cooke, & Kuipers, 2012). Furthermore, negative emotions were found to positively correlate with positive symptom severity (Smeets et al., 2010; Smith et al., 2006) and with the onset of a psychotic disorder (Krabbendam et al., 2005). In a moment to moment measurement, negative affect was found to precede psychotic symptoms both among psychiatric patients and in the general population (Delepaul & van Os, 2002; Kramer et al., 2013).

The quality of life of patients with schizophrenia spectrum disorders is negatively associated with depression (Alessandrini et al., 2016; Margariti, Ploumpidis, Economou,



Christodoulou, & Papadimitriou, 2015), and particularly during the early 3-year course of the psychotic illness (Rocca et al., 2009). Additionally, poor outcomes were associated with increased experiences of negative emotions among individuals with schizophrenia (Aguilar et al. 1997; Birchwood & Iqbal, 1998). Poor social functioning was also associated with depressive symptoms among young individuals who were at clinical high risk for psychosis (Corcoran et al., 2011), indicating that the relationship between negative emotions and worse outcomes exists across a wide range of symptom severity in the psychosis continuum.

Individuals with schizophrenia might have the disposition to experience these emotional states (Horan, Blanchard, Clark, & Green, 2008). Indeed, people with schizophrenia have strong negative emotions when they were processing laboratory stimuli that were considered pleasant or neutral by healthy controls (Cohen & Minor, 2008). This pattern may also be related to differences in the processing of situations that stimulate emotions between those with and without schizophrenia, which were indeed found (Huang et al., 2009; Trémeau et al., 2009). Other factors that are related to the disposition to experience negative emotional states among people with psychosis include mechanisms of emotional processing (i.e., emotional awareness and emotional regulation), which will be addressed in the following sections.

The studies reviewed above usually address negative emotionality as a single construct, with anxiety and depression being measured most frequently. One negative emotion that has rarely been measured along with psychosis is anger. However, anger was found to correlate positively with other negative emotions among individuals with

psychotic disorders (Freeman, Garety, & Kuipers, 2001). Therefore, anger might be as relevant for psychotic illness as other negative emotions.

### **Anger in individuals with psychosis**

Anger is a universal and frequently experienced unpleasant emotion. It is characterized by high sympathetic and low parasympathetic arousal and lasts longer than most other affective states (DiGiuseppe & Tafrate, 2007). Anger frequently leads to a verbal expression and is associated with a tendency to approach the stimuli that elicited it. However, anger may be associated with a wide variety of behavioral expressions, both adjustive and maladjustive. Functional behavior may result from a *state* of anger, which could signal to engage in conflict resolution. However, poor coping and negative consequences are often observed among those with *trait* anger, that is, those who frequently and intensely experience anger states (DiGiuseppe & Tafrate, 2007).

Higher levels of both state and trait anger were found among inpatients with psychotic disorders, as compared to healthy controls (Cullari, 1994). State and trait anger were also associated with specific psychotic symptoms. For example, trait anger was positively associated with paranoia in a sample of individuals across different phases of psychotic illness, including individuals at ultra-high risk of developing psychosis, individuals at their first episode of psychosis, and individuals with an established psychosis (Darrell-Berry et al., 2017). Outpatients with schizophrenia and schizoaffective disorder reported experiencing negative emotions, including anger, that were provoked by malevolent voices (i.e., voices that were believed to be a punishment for a past misdemeanor or undeserved persecution) (Chadwick & Birchwood, 1994; Close, & Garety, 1998). Furthermore, when anger was operationalized as a construct consisting of

irritability and resentment, it was associated with positive symptoms (i.e., psychosis) in a sample of outpatients and inpatients with schizophrenia (Song & Min, 2009). Likewise, increased hostility was found in outpatients with psychosis who were more symptomatic (Bartels, Drake, Wallach, & Freeman, 1991).

One study found patients with psychotic illness had similar levels of anger as healthy controls but that they attempt to regulate anger more than the healthy controls and more than attempting to regulate other emotions (Lincoln et al., 2015), suggesting that they might experience anger as more problematic than other emotions.

Anger was associated with poor functional outcomes for individuals with psychosis. For example, hostility negatively related to social integration among individuals with schizophrenia who live in the community, so that those with less hostility had more social contact (Sörgaard et al., 2001). Agitation and hostility among individuals with schizophrenia were also associated with housing instability, rehospitalization, and increased suicide risk (Bartels, Drake, Wallach, & Freeman, 1991; Pompili et al., 2007). Individuals with command hallucinations who experience anger were found to be more likely to comply with auditory hallucinations to do harm (Bucci et al., 2013).

The outcome of anger is often aggression. In a review of the topic, anger was found to be predictive of violence among psychiatric patients, prior, during, and after hospitalization (Novaco & Whittington, 2013). For example, patients with delusional (paranoid) disorder who committed violent offenses experienced defensive anger in the month before- and at the time of their offense (Kennedy, Kemp, & Dyer, 1992). This study regarded anger as a mood dimension. Anger was also related to psychosis and

violence when it was treated as a cognitive domain that is characterized by suspicion and a hostile attitude (McNiel, Eisner, & Binder, 2003). In this study, anger was the strongest predictor of aggression after controlling for age and psychiatric symptoms, including psychotic symptoms, among patients in a short-term psychiatric unit. When facets of anger were measured, trait anger, but not state anger, predicted aggression among patients with psychosis who were hospitalized (Nederlof, Muris, & Hovens, 2011). In a study using structural equation modeling to predict aggression (Song & Min, 2009), the pathway with the best fit consisted of a composite of positive and negative symptoms of schizophrenia that related to anger, which in turn related to aggression. Finally, a meta-analysis regarding anger, aggression, and psychosis concluded that higher levels of anger were found among violent groups of participants with a primary diagnosis of a psychotic disorder as compared to non-violent groups of participants with similar diagnoses (Reagu, Jones, Kumari, & Taylor, 2013).

Aggression among individuals with psychosis can be understood as a safety behavior.. An aggressive safety behavior can allow one to discard evidence that would refute their persecutory delusions. For example, an individual who confronts another will believe that it helped him avert persecution from the other person. In other words, the confrontation was used as a preventative action to obtain safety. Indeed, individuals with persecutory delusions who used aggressive safety behaviors were found to have higher anger scores as compared to individuals with persecutory delusions who used other safety behaviors (Freeman, Garety, & Kuipers, 2001).

Recent research has attempted to elucidate factors that correlate with anger among individuals with schizophrenia. Panic attacks, impulsivity, and higher doses of

neuroleptics were positively associated with hostility and anger among individuals with psychotic disorders (Bucci et al., 2013; Chen, Liu, & Yang, 2001). Factors that predicted anger were exposure to external dangers (i.e., news coverage of the 9/11 terrorist attack; Stout & Farooque, 2003) and reactions to limit-setting by authority figures (i.e., nurses in an inpatient unit; Gallop & Toner, 1995). Additionally, deficit schizophrenia was negatively associated with hostility in one study (Galderisi et al., 2002), although another study found levels of anger to be similar among individuals with different psychotic disorders (Bucci et al., 2013). Finally, there is literature regarding specific psychotic symptoms that are associated with anger and aggression, with delusions receiving the most attention.

One type of delusions that is often associated with anger and aggression is threat/control-override (TCO; i.e., the belief that one is threatened by or losing control to an external force). Self-reported TCO symptoms were positively correlated with both anger and violence in samples of patients that were in short-term psychiatric inpatient units (McNiel, Eisner, & Binder, 2003; Nederlof et al., 2011). Trait anger and TCO each explained unique variance of aggression in this model (Nederlof et al., 2011). TCO delusions also positively correlated with anger, future violence, and past violence among discharged psychiatric patients (Appelbaum, Robbins, & Monahan, 2000). When anger and impulsivity were controlled for, the significant association between self-reported TCO symptoms and violence was eliminated.

Types of paranoia are also frequently studied with anger and aggression. Trower and Chadwick (1995) identified two subtypes of paranoia: 'bad me' and 'poor me,' which are characterized by different beliefs concerning oneself and others, and by a different

emotional response to a threat. Individuals with ‘poor me’ paranoia tend to blame others for plotting to harm them and to see themselves as victims, whereas individuals with ‘bad me’ paranoia tend to blame themselves and to believe others as punishing them.

Individuals with the ‘poor me’ subtype of paranoia were found to experience higher levels of anger (Fornells-Ambrojo & Garety, 2009). In this study, higher levels of anger were also associated with an attributional bias to blame others instead of oneself. These findings were not replicated in other studies, that did not find a difference in the level of anger between individuals with the different paranoia subtypes (Chadwick, Trower, Juusti-Butler, & Maguire, 2005; Freeman, Garety, & Kuipers, 2001). The discrepancy in these findings may result from an instability of these subtypes, which may represent phases of an unstable phenomenon rather than subtypes (Melo, Taylor, & Bentall, 2006).

As reviewed above, paranoid ideation is the psychotic symptom that is most commonly associated with anger. The relation between anger and suspiciousness has long been included in the measurement of anger. Starting with the MMPI-based Cook and Medley Hostility (Ho) scale (Cook & Medley 1954), there has been a discussion regarding the psychological domain of hostility and its measurement. Validity studies suggested that the Ho scale measures constructs such as paranoid alienation, anger, hostility, and more (Barefoot, Dodge, Peterson, Dahlstrom, & Williams, 1989). Suspiciousness remained a key theme that is assessed within hostility and anger scales. For example, the Buss and Durkee (1957) Hostility Inventory examines a variety of *hostilities*, including aggression, irritability, and suspicion; The Hostile Outlook Dimension of the Multidimensional Anger Inventory (Siegel, 1986) was validated by a suspicion scale; The items in the Cognitive Domain of the Novaco Anger Scale and

Provocation Inventory (NAS-PI; Novaco, 2003) represent the dimensions of justification, suspiciousness, rumination, and hostile attitude; The Anger-In factor of the Anger Disorders Scale (DiGiuseppe & Tafrate, 2004) includes the subscales of Hurt/Social Rejection, Episode Length, Suspiciousness, Resentment, Tension Reduction, and Brooding. Despite this long tradition of conceptualizing suspiciousness as part of anger, there is a lack of literature regarding when suspiciousness crosses over to the domain of paranoia.

Taken together, these findings suggest that anger is associated with psychosis and with negative outcomes among individuals with psychosis. Different delusions might be associated with different levels of anger, and paranoia is likely most strongly related to anger among delusional themes. To our knowledge, there is no research associating different characteristics of hallucinations with levels of anger.

Given the above mentioned relationship between anger and psychosis and between anger and poor functional outcomes among individuals with psychosis, it is important to consider causes of persisting anger among this population as well as approaches to decrease it. To this end, the following sections will review emotional awareness, awareness of anger, emotion regulation, and anger regulation among individuals with psychosis.

### **Emotional awareness in individuals with psychosis**

Research regarding individual differences in understanding emotions has traditionally focused on three facets: emotional intelligence (EI), alexithymia, and mood awareness (Coffey, Berenbaum, & Kerns, 2003; Mayer & Salovey, 1995; Palmieri, Boden, & Berenbaum, 2009). EI, alexithymia, and mood awareness are all broad and

multidimensional constructs. Alexithymia is composed of a diminished ability to identify one's own emotions and communicate them to others , and a concrete and externally oriented cognitive style (Taylor, Bagby, & Parker, 1996). Mood awareness is composed of mood labeling - the ability to identify and categorize one's mood, and of mood monitoring- the inclination to focus on or to scrutinize one's moods (Swinkels & Giuliano, 1995); EI, in its ability-based conceptualization, is composed of the ability to perceive accurately, appraise and express emotion, the ability to access or generate feelings when they facilitate thought, the ability to understand emotion and emotional knowledge, and the ability to regulate emotions to promote emotional and intellectual growth (Mayer & Salovey, 1997).

These constructs have been associated with increased negative emotions, low life satisfaction, and low well-being in the general population. Specifically, alexithymia was associated positively with depression and negatively with life satisfaction (Honkalampi, Hintikka, Tanskanen, Lehtonen, & Viinamäki, 2000), whereas ability EI had a negative association with depression and a positive association with well-being (Fernández-Berrocá & Extremera, 2016). Different aspects of mood awareness were also associated with these constructs, with some facets relating to negative emotions and other facets relating to positive emotions and greater satisfaction (Swinkels & Giuliano, 1995).

A vast literature supports heightened levels of alexithymia among individuals with psychotic disorders, across different facets of alexithymia, and at various points of the psychosis continuum (Kimhy et al., 2016; O'Driscoll, Laing, & Mason, 2014; van der Velde, 2015). There is limited research regarding mood awareness and EI among



individuals with psychosis, though the available literature indicates possible deficits in these emotional domains as well (Tabak et al., 2015).

Lately, researchers have raised the possibility that these three constructs are composed of two distinct underlying dimensions: first the attention to emotions and second the clarity of emotions (Coffey, Berenbaum, & Kerns, 2003; Gohm & Clore, 2000, 2002; Palmieri, Boden, & Berenbaum, 2009). Attention to emotions is defined as the extent to which people attend to their emotional experience and use this information, whereas clarity of emotions is the extent to which people can identify, discriminate between, label, and understand what they are feeling and why. Clarity of emotions and attention to emotions together comprise the construct of emotional awareness (EA).

Mixed findings were found regarding EA among individuals with psychosis. Some findings point to a deficit in EA. For example, patients with psychotic disorders were found to pay less attention to their emotions, to be less clear about which emotions they are feeling, and to have less understanding of their source, as compared to healthy controls (Kimhy et al. 2012; Lincoln et al., 2015). In contrast, college students with psychotic-prone ideation reported less emotional clarity but greater attention to emotions than healthy peers (Kerns, 2005). Attention to feelings correlated positively with greater psychiatric symptoms among outpatients with schizophrenia (Tabak et al., 2015). An additional study failed to find a difference in emotion clarity between outpatients with schizophrenia spectrum disorders and healthy controls (Baslet, Termini, & Herbener, 2009). This study used a task to measure EA, rather than self-report questionnaires, which provides a possible explanation for the discrepancy in the findings regarding emotional clarity. Most of the studies reviewed above used self-report measures, and

particularly the Toronto Alexithymia Scale (TAS; Bagby, Taylor, & Parker, 1994), to measure EA among individuals with psychosis and have found deficits in EA in this group (O'Driscoll, Laing, & Mason, 2014).

Specific psychotic symptoms were also found to relate to aspects of EA. For example, more severe hallucinations were associated with lower attention to emotions and emotional clarity among inpatients with schizophrenia spectrum disorders (Serper & Berenbaum, 2008). Likewise, the frequency and conviction of paranoid thoughts among a community sample was associated with greater difficulty in emotional clarity (Westermann & Lincoln, 2011). In contrast, higher EA and was positively correlated with general symptomology among outpatients with schizophrenia spectrum disorders, including somatic concerns, anxiety, and negative emotions (Baslet et al., 2009).

Finally, worse functioning was associated with EA deficits among individuals with psychosis. Specifically, the ability to identify and to describe emotions was associated with enhanced social functioning in individuals with schizophrenia spectrum disorders (Kimhy et al. 2012). Likewise, emotional awareness problems were related to social inadequacy among adolescents at ultra-high risk for psychosis (van Rijn, 2010).

### **Awareness of anger in individuals with psychosis**

There is limited research regarding awareness of anger among individuals with psychotic illness. One study measured different aspects of emotional awareness and their use when anger is experienced but did not report these results (Lincoln et al., 2015). Another study measured the ability of blind raters to recognize which emotion was experienced in a situation described by individuals with psychosis. Participants were asked to describe a past event that caused the highest level of a given emotion for two

minutes (Trémeau et al., 2009). Raters had more difficulty in identifying the emotions that were related by participants in the schizophrenia group than emotions related by the non-patient controls. Raters had a 50% accuracy rate in identifying anger in anger-provoking events, signifying a similar level of difficulty in recognizing anger and other emotions, though this hypothesis was not tested directly. One possible explanation for these findings is that a deficit in the awareness of anger that is similar to a deficit in the awareness of other emotions among the schizophrenia group. Although there are other alternative explanations for these findings, such as a lack in descriptions by the schizophrenia group that is based on a verbal deficit, rather than an emotional deficit.

### **Emotion Regulation in individuals with psychosis**

Once people become aware of their negative emotions, they are more likely to attempt to shape them, particularly at the higher levels of emotional intensity (Barrett, Gross, Christensen, & Benvenuto, 2001). Emotion regulation (ER) is defined as the attempt to influence which emotions one experiences, when they are experienced, and how they are experienced and expressed (Gross, 1998). ER may be beneficial in instances in which the intensity, type, duration, or frequency of the experienced emotions do not fit the situation and could lead one to maladaptive behavior (Gross, 2015). An essential feature of ER is the goal of influencing one's emotional trajectory. However, people can engage in ER both deliberately and outside of conscious awareness (e.g., willfully turning away from disturbing images vs. quickly and unintentionally doing so). Additionally, although people commonly attempt to "down-regulate" negative emotions, they might also attempt to "up-regulate" positive emotions and to engage in counter-hedonic

regulation of “up-regulating” negative emotions or “down-regulating” positive emotions (Gross, 2015).

The Process Model of ER (Gross, 1998; Gross 2015) is the most widely used model of ER (Webb, Miles, & Sheeran, 2012). It assumes that one can regulate their emotions at five time points in the process of generating emotions. First, people can select situations according to their emotional impact and approach or avoid them as desired. Second, people can modify situations to alter their emotional impact. Third, people can direct their attention to specific aspects of the situation (i.e., attentional deployment). Fourth, people can choose which emotional meaning to attach to the situation (i.e., cognitive change). Fifth, one may alter the response tendencies that were elicited (i.e., response modulation). Each of these steps might be a potential target for emotion regulation and is associated with different regulation strategies.

The first two steps (i.e., situation selection and modification) are contextual antecedents, whereas the last three steps (i.e., attentional deployment, cognitive change, and response modulation) come into place when it is not possible to change or modify the situation. The last three steps can be further divided into *a-priori* strategies, which precede the full emotional response and are antecedent focused (i.e., attentional deployment and cognitive change), and to *post-hoc* strategies, which are response focused, and initiated after the emotion was activated (i.e., response modulation).

Among non-clinical populations, cognitive change ER strategies were found to be most effective, with an average small to medium effect size on emotional outcomes (Webb et al., 2012). Response modulation strategies were found to be second best in this

meta-analysis, with an average of a small effect size on emotional outcomes. Attentional deployment strategies had no reliable effect on emotional outcomes in this study.

Use of ineffective ER strategies and limited ability to engage in ER have been associated with different forms of psychopathology, including depression, anxiety, substance related disorders, eating disorders, borderline personality disorder, and somatoform disorders (Berking & Wupperman, 2012). Specifically, avoidance, rumination, and suppression were positively associated with psychopathology, whereas problem-solving and reappraisal were negatively associated with psychopathology. Acceptance was also negatively associated with psychopathology but not significantly (Aldao, Nolen-Hoeksema, & Schweizer, 2010).

Patients with psychotic disorders did not habitually modify their emotions more or less than healthy individuals (Lincoln et al., 2015). However, they were found to be worse at emotion management, as compared to healthy controls, as measured by both self-report and neurophysiological measures (O'Driscoll, Laing, & Mason, 2014; Strauss et al., 2013; Strauss et al., 2015). This pattern was also found across the psychosis continuum. Reports of college students with psychotic-prone ideation indicated that they are more emotionally overwhelmed than their healthy peers (Kerns, 2005).

One possibility for the deficiency in ER among individuals with psychosis is that they habitually use non-effective ER means. A meta-analysis found that individuals with psychotic disorders engage more in non-effective ER strategies such as suppression, distraction, attentional deployment, rumination, and worry, and engaged less frequently in effective ER strategies, such as cognitive reappraisal (O'Driscoll et al., 2014). Additionally, ineffective ER strategies have been associated with positive symptoms

among individuals with schizophrenia. Specifically, greater use of expressive suppression was associated with an increase in the severity of auditory hallucinations and greater disruption in daily life (Badcock, Paulik, & Maybery, 2011). Also, rumination was positively correlated with the distress associated with auditory hallucinations (Badcock et al., 2011). Finally, the limited access to ER strategies was associated with the frequency and conviction of paranoid thoughts in a community sample (Westermann & Lincoln, 2011).

Two ER strategies that are commonly studied among individuals with psychosis and the general population are suppression and cognitive reappraisal. Cognitive reappraisal represents a type of cognitive change. It occurs during the early appraisal phase of emotion generation and serves to influence affective experience and behavioral expression. Cognitive reappraisal is considered an effective ER strategy that is associated with a healthy pattern of affect, social functioning, and well-being (John & Gross, 2004). Suppression is a type of response modulation. It occurs late in the process of emotion generation and influences only the behavioral expression. Suppression is considered an ineffective ER strategy that is associated with worse outcomes (John & Gross, 2004). Suppression can also cause a paradoxical increase in the level of negative emotions when it is used to regulate high levels of negative emotions (Daggleish, Yiend, Schweizer, & Dunn, 2009).

Individuals with schizophrenia spectrum disorders tend to use more suppression strategies and fewer cognitive reappraisal strategies than non-patient controls (Horan, Hajcak, Wynn, & Green, 2013; Livingstone et al., 2009; van der Meer, van't Wout, & Aleman, 2009). These findings were replicated with individuals who were at clinical

high risk for psychosis (Kimhy et al., 2016), suggesting that these ER strategies predate the onset of psychosis. One study failed to find these results among individuals with schizophrenia (Henry, Rendell, Green, McDonald, & O'donnell, 2008). This study found a positive association between the use of reappraisal and social functioning among the group with schizophrenia, but no significant association between suppression and reduced social functioning. These results are contrary to the literature showing that suppression is associated with psychopathology and deficits in social functioning (Kimhy et al., 2016), and indicates a need for further research.

The findings mentioned above regarding suppression dovetail with literature concerning the tendency of individuals with psychosis to engage in experiential avoidance. Experiential avoidance is defined as steps that one takes to alter the form, frequency, or context of internal events (e.g., emotions, thoughts, behavioral predispositions, bodily sensations), as they are unwilling to remain in contact with those experiences (Hayes et al., 1996). Experiential avoidance constricts one's freedom to be in situations that could otherwise be valuable. This behavior also contradicts the desired outcome of the avoidance, as the verbal process that accompanies experiential avoidance includes the avoided item (Hayes et al., 1996).

A meta-analysis regarding emotion regulation among individuals with psychotic disorders found that they engaged in more strategies that are associated with experiential avoidance (e.g., suppression and distraction) than healthy controls (O'Driscoll et al., 2014). Furthermore, an attenuated willingness to experience negative emotions was found among individuals with schizophrenia spectrum disorders regardless of the regulatory strategy that they implemented to regulate it (Perry et al., 2012). Experimental studies

using laboratory emotion induction tasks in patients with schizophrenia support these findings. A meta-analysis of such studies found that patients report experiencing a relatively strong aversion to both positive and neutral stimuli despite a preserved ability to experience hedonic emotions (Cohen & Minor, 2008).

Engagement in experiential avoidance was associated with more symptom distress among individuals with psychosis. For example, voice-related distress was positively associated with a general tendency to engage in experiential avoidance (Varese et al., 2016). Likewise, non-acceptance of emotional responses in a community sample was associated with the frequency of paranoid thoughts, the conviction in them, and the distress associated with them (Westermann & Lincoln, 2011).

Psychological acceptance is the converse of experiential avoidance (Hayes et al., 1996). Acceptance involves an active embrace of internal events without attempts to change their frequency or form (Hayes, Luoma, Bond, Masuda, & Lillis, 2006). In the Process Model of ER (Gross, 1998; Gross 2015), acceptance may fall under the time point of response modulation in the process of emotion generation. Response modulation aims to influence experiential, behavioral, or physiological reactions associated with emotion generation once they have been elicited. Acceptance is viewed as an adaptive response that allows people to engage in actions that align with their values (Hayes et al., 2006). Acceptance is therefore taught in some forms of psychotherapy, which will be discussed in the following sections. Patients with psychotic disorders were found to engage less in acceptance of emotions as an ER strategy as compared to healthy controls (Lincoln et al., 2015). Individuals with schizophrenia spectrum disorders reported having a greater ability to implement acceptance, as compared to suppression when they



attempted to regulate sadness. However, their use of acceptance was less effective than their use of reappraisal when attempting to regulate sadness (Perry, Henry, Nangle, & Grisham, 2012).

### **Anger regulation in individuals with psychosis**

Most of the studies reviewed in the previous section addressed the regulation of emotions generally or the regulation of a composite of positive or negative emotions. The literature on ER and psychosis rarely addresses particular emotions, and only a few studies have addressed the effectiveness of ER strategies for anger regulation among this population. The first of these studies (Lincoln et al., 2015) found that individuals with psychotic illness habitually attempt to regulate anger less than healthy controls do. Their results suggest that individuals with psychosis attempt to regulate anger more than they attempt to regulate other negative emotions, though this hypothesis was not directly tested. The ER skills that were assessed in this study were not fine-tuned and included a combination of different aspects of EA, subject's belief that they could cope with intense emotions, their ability to support themselves when feeling intense emotions, and their willingness to confront situations that cue undesired emotions. Modification of emotions was addressed generally, without an account of specific modification strategies. The only ER strategy that was explicitly measured in this study was the acceptance of emotions, but its effectivity in regulating anger was not tested.

Other literature suggests that individuals with psychotic illness do not adequately regulate state anger. A study of inpatients with psychotic disorders (Bucci et al., 2013) found their state anger scores to be stable, with a stronger positive correlation between state and trait anger than among healthy controls, suggesting that the inpatients' state

anger was more frequent and severe, perhaps because they are not regulated. Another study with outpatients with psychotic illness (Ringer & Lysaker, 2014), found the expression of anger without regulation to be positively associated with greater levels of both state and trait anger, whereas anger control was negatively associated with state and trait anger. This finding suggests that regulation of anger can have a beneficial impact on the levels of experienced anger among individuals with psychotic illness.

Anger dysregulation is also related to psychotic symptom severity. For example, anger regulation was found to negatively correlate with compliance with harmful command hallucinations among individuals with psychotic disorders (Bucci et al., 2013), suggesting that the better those who hear voices are at regulating anger, the less likely they are to comply with the voices' commands. In contrast, those who heard voices who had poor anger regulation skills were at higher risk of complying with command hallucinations to do harm. Likewise, suspiciousness was positively associated with a tendency to express anger rather than control it and with less outward anger control among a sample of outpatients with schizophrenia or schizoaffective Disorders (Ringer & Lysaker, 2014).

Worse psychosocial outcomes are associated with anger dysregulation among individuals with psychosis. Specifically, non-controlled anger expression was correlated with worse social adaptation, lower self-esteem, and greater anxiety, whereas anger control correlated with social adaptation, lower anxiety, and higher self-esteem in samples of outpatients with psychotic illness (Fassino et al., 2009; Ringer & Lysaker, 2014). Finally, anger dysregulation was found to be related with poorer treatment outcomes and course of illness among individuals with other forms of psychopathologies

(Berenbaum, Raghavan, Le, Vernon, & Gomez, 2003; Erwin, Heimberg, Schneier, & Liebowitz, 2003; Rizvi, Vogt, & Resick, 2009).

### **Psychotherapy for individuals with both anger and psychosis**

Cognitive Behavioral Therapy (CBT) could be a particularly good fit for individuals with psychosis who experience anger, as cognitions and maladaptive behaviors have been found to play a crucial role in both phenomena. Specifically, anger was associated with the cognitive tendency to blame others (Meier & Robinson, 2004). Likewise, delusions were associated with an externalizing attributional bias as well as a jumping to conclusions data-gathering bias (Garety & Freeman, 1999). Regarding behaviors, anger and psychosis are both frequently associated with similar maladjusted behavioral outcomes, including aggression (Reagu et al., 2103). The clinical relationship between anger and psychosis, as well as the theoretical relationship that was reviewed above, suggests that treating the cognitions and behaviors of these experiences could impact the cognitions and behaviors that are associated with the other.

CBT has been found to be effective for treating anger and psychosis separately (Kulesza & Copeland, 2009; Turner, van der Gaag, Karyotaki, & Cuijpers, 2014). However, there is limited research on CBT for treating anger with individuals who also have psychosis (Novaco & Whittington, 2013). Addressing both anger and psychosis in one treatment package may be particularly beneficial for individuals who struggle with both issues. A meta-analysis concluded that studies of CBTp that addressed factors that are causally involved in the formation and maintenance of delusions had larger effect sizes compared to CBTp studies that provided a standard treatment (Mehl et al., 2015).

The factors that were addressed in the studies of the meta-analysis included worrying, self-esteem, and reasoning bias, but not anger.

The first pilot study treating anger with CBT among patients with psychosis was conducted with four male forensic patients at a maximum security facility who had histories of severe violence (Renwick, Black, Ramm, & Novaco, 1997). These patients participated in over 20 sessions of anger control treatment, using the Stress Inoculation procedure (Novaco, 1975). This cognitive-behavioral intervention includes the following tasks: the monitoring of anger; the construction of an anger provocation hierarchy; arousal reduction techniques (e.g., progressive muscle relaxation, breathing-focused relaxation, guided imagery training); cognitive restructuring using alteration of the focus of attention, modifying appraisals, and using self-instruction; adaptive behavioral coping using role-plays; practicing the new anger coping skills by visualizing and role-playing progressively more intense anger-provoking situations from the anger provocation hierarchy. Results showed an improvement in anger control, as measured by ratings of clinicians, and increased discharge rates from the facility. Despite these benefits, the authors emphasized the continuation of the rigidity of the patients' cognitive styles and stated that the cognitive distortions associated with anger proved resistant to change.

Another case series design study was conducted with three young adult males who had histories of psychoses and violence, and were hospitalized in a low-security, high-dependency psychiatric inpatient unit (Haddock, Lowens, Brosnan, Barrowclough, & Novaco, 2004). Participants completed more than 30 sessions of CBT for psychosis and anger. The interventions for psychosis included symptom monitoring, belief modification and reality testing, distraction, focusing and exposure work, medication

compliance and schema work. The interventions for anger included psychoeducation, self-monitoring, cognitive restructuring, arousal reduction strategies, the examination of appraisals and meaning of anger, role-play and imaginal exposure, and consolidation of coping strategies for anger. A different combination of these strategies was used for each patient based on a collaborative agreement about treatment goals and priorities. The results showed a significant decline in psychotic symptoms and anger as measured by self-reported and staff-report assessments among two of the three participants. As in the previous case-study, some distorted cognitions remained after the termination of the treatment, but in this study, these were in the form of delusions. Most changes remained significant at follow-up and two patients were discharged into supportive housing in the community.

The above case series was followed by a randomized controlled trial by the same research group with 73 patients with schizophrenia spectrum disorders and a history of violence that were recruited from inpatient and outpatient settings (Haddock et al., 2009). Participants were randomly assigned to 25 sessions of either Social Activity Therapy (SAT) or CBT for psychosis and anger in addition to treatment as usual. The SAT intervention helped participants identify and participate in activities they enjoyed. The CBT interventions included strategies to increase motivation and to decrease distress and severity of psychotic symptoms and anger, as described in the pilot study (Haddock et al., 2004). The results showed that the CBT group had slightly less physical aggression incidents than did the SAT group. However, self-reported and staff-rated anger declined similarly among the two groups. Likewise, one measure of delusion severity showed more favorable results for the CBT group, whereas another measure of psychotic

symptoms did not. The CBT group also had a significantly greater decrease in security risk management scores, and both groups had similar improvements in functioning.

Another trial of CBT for anger among patients with psychosis was conducted at a daycare ward in Taiwan (Chan, Lu, Tseng, & Chou, 2003). In this study, 78 patients completed 10 group-based, bi-weekly, sessions of anger control, or a control treatment with individual health education and consultation. The anger control program conducted Novaco's protocol (1975) which focuses on the perception of anger and coping with it through training in self-instruction, relaxation, social skills, and problem-solving. The participants who received the anger treatment had a decrease in anger and an increase in anger control as compared to the control group. This study provided evidence of the ability to positively impact anger within a short-term group intervention, which is easier and more efficiently conducted than the long-term individual interventions described above. It is likely that the efficiency in the administration was possible as the participants had less chronic and severe forms of anger than those in the previous studies, reflected by the lack of aggressive histories and long-term inpatient care. Short-term interventions might therefore be an effective means to reach a larger population of patients in need of these services.

A gap in the literature regarding CBT for anger and psychosis is the minimum required length of treatment for effective outcomes. Low-intensity CBT is defined as a cost-effective way to use 'specialist therapist time' (Bennett-Levy, Richards, & Farrand, 2010). It requires fewer resources and has been successfully implemented as a solution for limited access to evidence-based services (Clark et al., 2009). A meta-analysis concluded that low-intensity CBTp, with an average treatment length of nine sessions,

has comparable effect sizes to those found in meta-analyses of CBTp more broadly (Hazell, Hayward, Cavanagh, & Strauss, 2016). Furthermore, the contact time with the therapist and the format of therapy (i.e., individual versus group) did not moderate the psychosis outcomes. Further research is needed regarding the impact of shorter interventions for symptoms of psychosis, especially for those at the low end of the psychosis continuum. To this end, the relative efficacy of various ER strategies should be studied to guide the choice of specific interventions to incorporate into treatment packages to regulate anger among individuals with psychosis most effectively.

In the studies reviewed above, arousal reduction techniques are frequently used, including progressive muscle relaxation, breathing-focused relaxation, and guided imagery training. These strategies can be categorized as response modulation strategies of the Process Model of ER (Gross, 1998; Gross 2015). Additionally, cognitive restructuring is frequently used, including techniques such as modifying appraisals, which can be categorized into the cognitive change step of the Process Model of ER. The results of the studies reviewed show an improvement in anger control but little change in cognitive distortions associated with anger and in delusions. Therefore, it might be helpful to refine how the cognitive reappraisal is conducted to increase its effectiveness.

Different forms of cognitive therapy conduct cognitive reappraisal in different ways. Rational Emotive Behavior Therapy (REBT) is a form of CBT that attempts to challenge one's irrational beliefs and replace them with rational beliefs as means to cultivate *new* emotional and behavioral consequences following an unpleasant activating event. This goal is different than frequently used CBT techniques that attempt to decrease the intensity of the *same* emotional consequence (Diguiuseppe, Doyle, Dryden, & Backx,

2014). REBT has been found to be effective in treating anger, with medium to high effect sizes (David, Cotet, Matu, Mogoase, & Stefan, 2018; Fuller, DiGiuseppe, O'Leary, Fountain, & Lang, 2010). REBT was also to be effective in treating hallucinations and delusions to patients suffering from schizophrenia (Quintin, Bélanger, & Lamontagne, 2012).

In choosing ER strategies to incorporate into treatment packages to regulate anger, it is also possible that employing other response modulation ER strategies would be more effective. Specifically, acceptance may be a good fit, as described in previous sections. The effectiveness of acceptance as an ER strategy for anger among individuals with psychosis has yet to be studied. However, Acceptance and Commitment Therapy (ACT; Hayes, Strosahl, & Wilson, 2009), a form of CBT that aims to develop greater psychological openness to unwanted thoughts and feelings, has been found effective in separately treating both psychosis (Bach et al., 2012) and anger (Eifert & Forsyth, 2011). The effectivity of ACT for these experiences supports the possible effectivity of acceptance as an ER strategy of anger among individuals with psychosis that fits in the response modulation phase on Gross' Process Model of ER.

### **Hypotheses**

This study examined the possible impact of ER techniques of anger (i.e., acceptance and cognitive reappraisal) on paranoid ideation and whether their impact will differ based on levels of emotional awareness. Specifically, it was hypothesized that:

1. Anger and paranoid ideation will be positively correlated
2. The influence of *a-priori* anger ER interventions (i.e., interventions that target cognitions that are activated prior to the emotional response), such as



cognitive reappraisal, on paranoid ideation will increase as emotional clarity increases.

3. The influence of *post-hoc* interventions (i.e., interventions that target responses to emotions after they are activated), such as acceptance, on paranoid ideation will increase as attention to emotion increases.

Additionally, this study examined the possible mechanisms through which various ER techniques of anger (i.e., acceptance and cognitive reappraisal) impact paranoid ideation. Specifically, it was hypothesized that:

4. *A-priori* cognitive reappraisal interventions for anger regulation will impact paranoid ideation by changing irrational beliefs.
5. *Post-hoc* Acceptance interventions for anger regulation will impact paranoid ideation by changing experiential avoidance.

In other words, it was hypothesized that different anger regulation strategies would reduce paranoid ideation and that this relationship would be mediated and moderated by these continuous variables. The effectiveness of an *a-priori* anger ER intervention, such as cognitive reappraisal, was hypothesized to be moderated by emotional clarity and mediated by changing irrational beliefs (hypotheses 2 and 4). This model can be viewed in Figure 1. The effectiveness of a *post-hoc* anger ER intervention, such as acceptance, was hypothesized to be moderated by attention to emotions and mediated by experiential avoidance (hypotheses 3 and 5). This model can be viewed in Figure 2.

**Subject selection.** The study of psychotic-like experiences in non-clinical populations has been used increasingly to corroborate models of psychosis. This method

rests on a view of psychosis as a continuous phenotype that is measurable in both healthy and ill individuals who have varying levels of psychosis (Van Os, Linscott, Myin-Germeys, Delespaul, & Krabbendam, 2009). A meta-analysis of the psychosis continuum concluded that 75–90% of developmental psychotic experiences disappear over time, but that these experiences can also become persistent and of a clinical nature (Van Os et al., 2009). Studying psychosis among non-clinical populations capitalizes on the absence of confounding factors that typically affect the study of psychosis in clinical samples, such as cognitive deficits and negative symptoms. Furthermore, it is helpful to develop interventions for healthy individuals who experience psychotic-like experiences and are at risk of developing psychotic illnesses (Yung et al., 2008). For these reasons, the present study used a non-clinical sample.

## METHOD

### Participants

Two hundred and twenty-three young adults participated in the study. Because of evidence of a higher prevalence of psychotic-like experiences among emerging adults (Preti et al., 2014), the inclusion criterion was being between the ages of 18-30, Participants were undergraduate students at a religious metropolitan university and young adults from the general population in NYC.

The University students were recruited through the university subject pool system (SONA) and were compensated with one credit for participation. Young adults from the general population were recruited through a Qualtrics panel. Qualtrics participants are recruited from various sources, including website intercept recruitment, member referrals, targeted email lists, gaming sites, customer loyalty web portals, permission-based networks, and social media Panel members are sent an email invitation by Qualtrics or prompted on the respective survey platform to proceed with the study. Their typical survey invitation provides a hyperlink to the survey that mentions the incentive offered.

Two hundred and sixteen University students and seventy-four Qualtrics participants completed the study. The final sample included only participants whose anger levels increased following an anger induction (see procedure below) and consisted of 114 students and 32 Qualtrics participants.

Participants whose state anger increased in the anger induction did not differ in their baseline level of state anger from participants whose state anger did not increase in the anger induction ( $t_{263} = -1.67, p = .097$ ). State anger after the anger induction was significantly higher among those whose anger increased in the anger induction ( $M=$

25.56,  $SD = 9.80$ ) than among those whose anger did not increase in the anger induction ( $M = 19.15$ ,  $SD = 9.38$ ), ( $t_{287} = 6.69$ ,  $p < .001$ ).

Participants were 18 through 30 years old ( $M = 20.24$ ,  $SD = 2.79$ ). One hundred and nine participants (74.7%) were female, thirty-two participants (21.9%) were male, and five participants (3.4%) defined their gender as “other”. The sample was ethnically diverse and included individuals who self-identified as Caucasian (48.6%), African American (11.0%), Asian (20.5%), Hispanic (15.1%), or “Other” (4.8%).

## Measures

State Anger. State anger was assessed using the State Anger subscale (S-Ang) of the State-Trait Anger Expression Inventory, second edition (STAXI-2; Spielberger, 1999). The S-Ang subscale is a self-report questionnaire that pertains to the intensity of anger that participants feel at the moment. Participants responded to 15 items such as “I am furious”, which are followed by a 4-point Likert scale (e.g., 1 = not at all; 4 = very much so). Items are scored so that higher scores represented higher levels of anger. The S-Ang demonstrates excellent internal consistency, with alpha coefficients ranging from .92 to .95 for samples of both psychiatric and non-clinical individuals. The S-Ang demonstrates discriminant validity by a positive, moderately high correlation with anxiety, a small positive correlation with psychoticism and neuroticism, and a small negative correlation with curiosity. Cronbach’s alpha of this scale’s scores in our sample was .97, .96, .95, and .94 in times 1 (baseline), 2 (post anger induction), 3 (post anger regulation1), and 4 (post anger regulation 2), respectively.

Paranoid Ideation. Paranoid ideation was measured using the Conviction Subscale of the Paranoia Checklist (Freeman et al., 2005). Paranoia is the sole psychotic-

like experience measured in the study as there is most evidence to describe its relationship to anger among the different psychotic symptoms, as described in previous sections. The conviction subscale is the only subscale of the Paranoia Checklist that will be administered, as it is highly correlated to the other subscales in the paranoia checklist (i.e., frequency and distress) when administered to non-clinical populations. The Paranoia Checklist is a self-report questionnaire. In the conviction subscale, participants respond to 18 items such as “people deliberately try to irritate me,” which are followed by a 5-point Likert scale (e.g., 0 = Do not believe it; 4 = Absolutely believe it). The items are scored so that higher scores represented greater conviction in suspicious thoughts. The conviction subscale demonstrates excellent internal consistency, with an alpha coefficient of  $> .90$ . The scale showed convergent validity with the paranoia scale, a self-report measure that indicates paranoid ideation by one total score (Fenigstein & Venable, 1992). Cronbach’s alpha of this scale’s scores in our sample was .95, .96, .97, and .97 in times 1(baseline), 2(post anger induction), 3(post anger regulation1), and 4(post anger regulation 2), respectively.

Experiential avoidance. Experiential avoidance was measured using the Brief Experiential Avoidance Questionnaire (BEAQ; Gámez et al., 2014). This self-report questionnaire is a brief version of the Multidimensional Experiential Avoidance Questionnaire (MEAQ; Gámez, Chmielewski, Kotov, Ruggero, & Watson, 2011). The BEAQ and MEAQ have been found to have superior psychometric properties to the Acceptance and Action Questionnaire, second edition (AAQ-II; Bond et al., 2011), which is the most widely used questionnaire for experiential avoidance (Rocheftort, Baldwin, & Chmielewski, 2018). The BEAQ consists of 15 items such as “I would give up a lot not

to feel bad,” which are followed by a 6-point Likert scale regarding the extent to which participants agree with the statement (e.g., 1 = strongly disagree; 6 = strongly agree). Items are scored so that higher scores represented greater experiential avoidance. The BEAQ demonstrates good internal consistency, with alpha coefficients of .80-.86 in different samples. The scale shows discriminant validity with measures of negative emotionality and neuroticism, based on moderate positive correlations. It also shows convergent validity by having stronger positive correlations with measures of avoidance. Cronbach’s alpha of this scale’s scores in our sample was .88.

*Irrational beliefs.* Irrational beliefs were measured using the Irrational Beliefs of Comfort Subscale of the Attitudes and Belief Scale, second edition (ABS-2; DiGiuseppe, Leaf, Gorman, & Robin, 2018). The ABS-2 is a self-report measure that assesses irrational and rational beliefs. The comfort subscale stands on its own as a content scale, representing a life theme that one may be concerned about and on which one may have irrational beliefs. It consists of 24 items such as “it is unfortunate when I am frustrated by hassles in my life, but I realize it is only disappointing and not awful.”, which are followed by a 5-point Likert scale regarding one’s level of agreement with the sentence (e.g., 0 = if you strongly disagree; 4 = if you strongly agree). Items of the comfort scale are taken from the cognitive process dimensions, the irrationally worded items, and the reverse-scored rationally worded items of the ABS-2. Items are scored so that higher scores represent greater irrational beliefs regarding the need to habitually experience comfort. The comfort subscale of the ABS-2 demonstrates excellent internal consistency, with an alpha coefficient of .92. The scale shows discriminant validity by correlating moderately but significantly with other measures of disturbance, including those of

anxiety, depression, anger, and lower well-being. Cronbach's alpha of this scale's scores in our sample was .94.

*Positive and Negative Affect.* Positive and Negative Affect were measured by the Positive and Negative Affect Scale (PANAS; Watson, Clark, & Tellegen, 1988). The PANAS consists of two ten-item scales designed to provide brief measures of positive affect (PA) and negative affect (NA). PA and NA are construed as independent broad mood dimensions. The PANAS test items are single mood descriptors such as 'interested' and 'ashamed'. Respondents were asked to rate as quickly as possible the extent to which they have experienced these feelings within a specified time frame, using a five-point Likert scale ranging from 1 (Very slightly or not at all) to 5 (Very much). The specified period used in the present study was the present moment (i.e., to what extent do you feel right now...?). The scales are scored so that higher scores represent higher levels of negative affect or positive affect. The PANAS has been demonstrated to have good factorial (two affect dimension factors), construct and external validities, and good internal consistency and test-retest reliability (Watson et al., 1988; Crawford & Henry, 2004). Cronbach's alpha of the PA scale in our pilot sample was .88 at baseline and .91 post the anger-induction; Cronbach's alpha of the NA scale in our sample was .81 at baseline and .93 post the anger induction.

*Emotional Awareness (EA) -Attention to emotions.* Attention to emotions was measured by selected items from the Attention to Emotions subscale of the Trait Meta Mood Scale (TMMS; Salovey et al., 1995) and the Externally Oriented Thinking subscale of the Toronto Alexithymia Scale (TAS; Bagby, Parker, & Taylor, 1994). These items were identified by Palmieri, Boden, and Berenbaum (2009) as best representatives of the

attention to emotions domain of emotional awareness. Participants responded to 10 items such as “I often think about my feelings” which are followed by a 5-point Likert scale (1 = strongly disagree; 5 = strongly agree). Items are scored so that higher scores represent higher levels of attention to emotions. The total score of the scale is an average of item responses. The attention to emotions scale demonstrates good internal consistency, with an alpha coefficient of .87. The scale also demonstrates discriminant validity by a small positive correlation with clarity of emotions and with openness to experience. Cronbach’s alpha of this scale’s scores in our sample was .79.

*EA - Clarity of Emotions.* Clarity of emotions was measured by selected items from the clarity subscale of the Trait Meta Mood Scale (TMMS; Salovey et al., 1995) and from the identification subscale of the Toronto Alexithymia Scale (TAS; Bagby, Parker, & Taylor, 1994). These items were chosen as best representatives of this domain by Palmieri, Boden, and Berenbaum (2009). Participants responded to 13 items such as “I almost always know exactly how I am feeling” which were followed by a 5-point Likert scale (1 = strongly disagree; 5 = strongly agree). Items are scored so that higher scores represent higher levels of emotional clarity. The total score of the scale is an average of item responses. The emotional clarity scale demonstrates good internal consistency, with an alpha coefficient of .87. The scale shows discriminant validity by a small positive correlation with attention to emotions, and a moderate positive correlation with openness to experience. Cronbach’s alpha of this scale’s scores in our sample was .91.

*Credibility.* Credibility was measured by adapted items to Borkovec and Nau’s (1972) Credibility scale. Participants responded to four items: 1) How logical does this type of treatment seem to you? 2) How confident would you be that this treatment would



be successful in eliminating your anger? 3) How confident would you be in recommending this treatment to a friend who has extreme problems with anger? 4) If you were extremely angry, would you be willing to undergo such treatment? The items were followed by a 10-point Likert scale (e.g., 1 = not at all willing; 10 = very willing). Items are scored so that higher scores represent higher intervention credibility and expectancy for improvement. The total score of the scale is a sum of item responses. The scale was shown to differentiate between active treatment and control interventions (Borkovec & Nau, 1972) . Cronbach's alpha of this scale's scores in our sample was .94.

Confidence. Confidence in implementing the anger regulation technique that was taught in the intervention was assessed by a single item: "How confident are you in your ability to implement the ideas that were presented in the video?", which was followed by a 5-point Likert scale (1 = very unconfident, 5 = very confident).

### **Anger Induction**

Anger was induced by a 7-minute anger recall interview in which participants described a recent event that elicited anger for them. Follow-up questions are presented one at a time and participants type in their answers in the online platform. This procedure is based on a 16-minute semi-structured stress interview that was found to increase participants' blood pressure and to have good test-retest reliability (Dimsdale, Stern, & Dillon, 1988). Anger recall interviews using similar procedures were found to increase muscle tension, systolic blood pressure, diastolic blood pressure, heart rate, electrodermal activity, and self-reported anger (Burns, 2006; Lobbestael, Arntz, & Wiers, 2008). In comparison to other laboratory-based anger induction methods, the stress interview was found to be particularly effective in increasing physiological reactivity (Lobbestael et al.,

2008). The stress interview was administered in person whereas the anger induction interview in this study was administered online, through the Qualtrics web-based platform. Based on previous research, in which computer users in a laboratory setting experienced similar levels of anger as those experienced by video display operators in the workplace (Emurian, 1989).

### ***Pilot Study.***

A pilot study was conducted to ensure that the anger induction task induces anger and does not induce other emotions. Twenty-two undergraduate students recruited through the SJU undergraduate SONA system participated in the pilot study. Participants completed baseline measures of the Positive and Negative Affect Scale (PANAS; Watson, Clark, & Tellegen, 1988) and the S-Ang subscale of the STAXI-2 (Spielberger, 1999). Following the anger induction interview, these measures were administered a second time, to measure a possible change. The PANAS questionnaire asks participants to rate to the extent to which they felt 10 positive affects (e.g., excited, proud) and 10 negative affects (e.g., distressed, nervous) at the present moment. A series of paired-sample T-tests showed that participants reported significantly higher levels of state anger following the anger recall questionnaire, as compared to baseline state anger ( $t = 2.27, p = .03$ ), but did not report a significant change in 19 of the 20 positive and negative affects that are rated on the PANAS. Participants only reported that they felt significantly less excited after the anger induction interview ( $t = -3.50, p < .01$ ). The results of the pilot study indicated that the anger recall interview increases state anger but did not impact other emotions and can, therefore, be effectively used as an anger induction technique. The interview script can be viewed in Appendix 1.

## Anger Regulation Interventions

Participants watched one of two low-intensity CBT videos or a control video. These interventions were designed to target two separate processes of Gross' ER processes. One intervention targeted the cognitions that are thought to occur before anger is anger aroused. This is referred to as the *a-priori* treatment group. A second Low-intensity CBT video was designed to target response tendencies that occur after the emotions are aroused. This was referred to as the *post-hoc* treatment group. The *a-priori* treatment was based on REBT, and the *post-hoc* intervention was based on ACT.

Participants in the *a-priori* group saw a video with a psychologist presenting an intervention that targets the cognitions that precede the anger response. This intervention consists of cognitive reappraisal based on REBT cognitive change strategies (Diguseppe et al., 2014). The intervention includes teaching the difference between rational and irrational beliefs, identifying one's irrational beliefs regarding the story they recalled in the mood-induction procedure, disputing them, and teaching new alternative and rational beliefs. The script of this intervention can be viewed in Appendix 2.

Participants in the *post-hoc* group saw a video with a psychologist presenting an intervention that targets the response to the anger, after it was activated. This intervention consists of acceptance of negative internal experiences and is based on Acceptance and Commitment Therapy (ACT) acceptance-focused strategies. The intervention includes recognition of anger as a strategy for experiential avoidance, proposing acceptance as a better coping mechanism with the emotional pain that is associated with anger, and guidance on practicing acceptance (Eifert & Forsyth, 2011). The script of this intervention can be viewed in Appendix 3.

Participants in the control group saw a video with a psychologist asking them to experience their emotions in whatever way is natural and comfortable for them. Studies that gave this type of instructions (e.g., Schmeichel, Volokhov, & Demaree, 2008) found larger effect sizes, as compared to control groups that were given no instructions or instructions not to regulate their emotions in a specific manner (Webb et al., 2012). The script of this intervention can be viewed in appendix 4.

The length of the three videos and the complexity of their script was matched to control for a possible effect of length of the intervention on its effectiveness. Additionally, the same clinician delivered the three videos. Participants' ranks of confidence in using the learned anger regulation intervention did not differ between the different groups ( $F(2,141) = .533, p = .588$ ), nor did their ratings of the credibility of the anger regulation intervention ( $F(2,141) = .328, p = .721$ ).

#### ***Intervention Adherence-Integrity Check.***

A survey was conducted to ensure that the *a-priori* intervention is characteristic of REBT and was designed to change cognitions that lead to disturbed anger; that the *post-hoc* intervention is characteristic of ACT and is designed to change one's response to their disturbed anger after it is activated; that the control intervention is not designed to neither change the cognitions that lead to disturbed anger nor to the response to disturbed anger after it is activated, and that it is not characteristic of neither REBT nor ACT.

The participants who completed this survey were experienced REBT and ACT clinicians, recruited through the REBT professional listserv group of the Albert Ellis Institute and the Association for Contextual Behavioral Science (ACBS) mailing lists, respectively. All clinicians ranked the *a-priori*, *post-hoc*, and control interventions on

whether they were designed to change cognitions that lead to disturbed anger and to change one's response to disturbed anger after it is activated on a 5-point Likert scale (1=strongly disagree; 5=strongly agree). Additionally, the REBT clinicians ranked each intervention on how characteristic it is of REBT on a 5-point Likert scale (1=very uncharacteristic; 5=very characteristic), and the ACT clinicians ranked each intervention on how characteristic it is of ACT on the same scale.

Eight experienced ACT clinicians ranked the interventions. On average, they believed that the *post-hoc* intervention is *characteristic* of ACT, whereas the *a-priori* and the control interventions are *uncharacteristic* of ACT. Additionally, they *agreed* that the *post-hoc* intervention is designed to change one's response to disturbed anger after it is activated, they were *neutral* regarding whether the *a-priori* intervention is designed to change one's response to disturbed anger after it is activated, and *disagreed* that the control intervention is designed to change one's response to disturbed anger after it is activated. Finally, the ACT clinicians *disagreed* that the *post-hoc* and control interventions are designed to change cognitions that lead to disturbed anger but *agreed* that the *a-priori* intervention was designed to change cognitions that lead to disturbed anger. In short, they thought that the *post-hoc* intervention is characteristic of ACT and designed to change one's response to disturbed anger after it is activated, but that it is not designed to change cognitions that lead to the emotion of disturbed anger, and that this is not true for the *a-priori* and control interventions.

Seventeen experienced REBT clinicians ranked the interventions. On average, they believed that the *a-priori* intervention is *characteristic* of REBT, whereas they believed that the *post-hoc* intervention is *uncharacteristic* of REBT and that the control

intervention is *very uncharacteristic* of REBT. Additionally, they *agreed* that the *a-priori* intervention is designed to change cognitions that lead to disturbed anger, *disagreed* that the *post-hoc* intervention was designed to change cognitions that lead to disturbed anger, and *strongly disagreed* that the control intervention was designed to change cognitions that lead to disturbed anger. However, concerning their belief of whether the interventions were designed to change one's response to disturbed anger after it is activated, they *agreed* that both the *a-priori* and the *post-hoc* interventions are designed to change one's response to disturbed anger after it is activated and *disagreed* that the control intervention is designed to change one's response to disturbed anger after it is activated. In short, they thought that the *a-priori* intervention is characteristic of REBT and designed to both change cognitions that lead to disturbed anger and to change one's response to disturbed anger after it is activated. They thought that the *post-hoc* intervention is uncharacteristic of REBT and only designed to change one's response to disturbed anger after it is activated (but not designed to change the cognitions that lead to disturbed anger) and that the control intervention was not characteristic of REBT and was not designed to neither change cognitions that lead to disturbed anger nor to change one's response to disturbed anger after it was activated.

### **Procedure**

The experiment took approximately 45 minutes for participants to complete. Participants completed the study through *Qualtrics*, an online platform. *Qualtrics* randomly assigned participants to one of three groups: *a-priori* intervention, *post-hoc* intervention, or the control group. *Qualtrics* notified the participants about unanswered items in their questionnaires to minimize missing values.

At the beginning of the study, participants were asked to wear headphones. The sequence of tasks was as follows.

1. Participants signed an IRB-approved consent form, specifying that the study consisted of questionnaires and tasks regarding mood that will be administered online.
2. They completed a demographic questionnaire and self-report measures of attention to emotions, clarity of emotions, state anger, and conviction in paranoid ideation.
3. Participants completed a mood induction task, after which they completed another measurement of state anger and conviction in paranoid ideation, for a manipulation check.
4. Participants viewed a video of either an *a-priori* intervention based on REBT, a *post-hoc* intervention based on ACT, or a control video, as described above.
5. Participants were next asked to try and use this technique to regulate their anger, and their levels of state anger and conviction in paranoid ideation were measured.
6. Participants were asked to complete the anger induction for the second time, using the same anger-provoking experience, while keeping in mind the technique they have learned.
7. They were then asked to take another moment to try to regulate their anger using the strategy they learned in the video for the second time.
8. Following, participants completed the measures of state anger and conviction in paranoid ideation for the last time. Participants also completed at this point the

measures of confidence in implementing the anger regulation technique that was taught in the intervention, credibility, irrational beliefs and experiential avoidance.

9. Finally, participants were debriefed.

### **Analytic Plan**

The experiment consisted of one between-subject independent variable with three levels (intervention type: a-priori cognitive reappraisal / REBT, post-hoc acceptance / ACT, or control), two consecutive moderators (attention to emotions and clarity of emotions), and two consecutive mediators (irrational beliefs and experiential avoidance). The dependent variables were conviction in paranoid ideation and state anger. Levels of anger were measured pre- and post- the anger induction as the inclusion criterion of participants for which the induction successfully aroused a state of anger.



## RESULTS

### Missing Values

Little's (1988) MCAR test was completed for all items and was not significant, indicating that values were missing completely at random ( $p = .56$ ). Missing items in questionnaires were estimated using the participant's mean for the questionnaire. Missing questionnaires were not estimated, and participants were excluded from analyses for which they did not have all questionnaires.

### Baseline levels of sub-samples

A series of independent sample T-tests were conducted to examine differences in baseline levels of the dependent variables between the student sample and the Qualtrics sample. The samples were not significantly different in their baseline levels of attention to emotions ( $t_{144} = -.11, p = .913$ ), clarity of emotions ( $t_{144} = .76, p = .448$ ), state anger ( $t_{144} = .86, p = .394$ ), and conviction in paranoid ideation ( $t_{144} = 1.53, p = .129$ ). Therefore, the samples were merged for the analyses. Descriptive statistics of baseline levels can be found in Table 1.

### Preliminary analyses

Preliminary analyses examined the correlations between the dependent variables at baseline and at the end of the study, post the second anger regulation attempt. These Correlations appear in tables 2 and 3, respectively.

At baseline, state anger was positively correlated with conviction in paranoid ideation ( $r = .52, p < .001$ ), and was negatively correlated with attention to emotions ( $r = -.22, p < .001$ ) and clarity of emotions ( $r = -.32, p < .001$ ). Likewise, conviction in paranoid ideation was negatively correlated with attention to emotions ( $r = -.17, p = .003$ ) and clarity of emotions ( $r = -.34, p < .001$ ). Attention to emotions was positively correlated with clarity of emotions ( $r$

= .15,  $p = .010$ ). These findings reflect a close association between anger and conviction in paranoid ideation and the importance of both facets of emotional awareness for these experiences. See results in table 2.

At the end of the study, state anger still was positively correlated with conviction in paranoid ideation ( $r = .58, p < .001$ ). State anger was also positively correlated with experiential avoidance ( $r = .35, p < .001$ ), and irrational beliefs ( $r = .36, p < .001$ ). Likewise, conviction in paranoid ideation was positively correlated with experiential avoidance ( $r = .36, p < .001$ ), and irrational beliefs ( $r = .43, p < .001$ ), and experiential avoidance was positively correlated with and irrational beliefs ( $r = .64, p < .001$ ). These findings reflect a close association between anger and conviction in paranoid ideation and the importance of experiential avoidance and irrational beliefs for these experiences. See results in table 3.

### **Repeated Measures of Dependent Variables**

Mixed ANOVAs were conducted to evaluate changes in the level of state anger and conviction in paranoid ideation over time and by type of intervention. The between-subject variable, intervention, had three levels: (1) REBT/a-priori anger regulation intervention, (2) ACT/*post-hoc* anger regulation intervention, (3) control. The within-subject variable, time, had four levels: (1) baseline, (2) post anger induction, (3) post anger regulation video intervention, and (4) post second anger regulation attempt. A square root transformation was applied to levels of state anger and conviction in paranoid ideation at all time points due to high skewness and kurtosis levels.

As predicted, a mixed ANOVA with the dependent variable of state anger revealed a significant effect for time ( $F(2.5) = 100.04, p < .001$ ), for a quadratic time contrast ( $F(1) = 143.93, p < .001$ ), and for the time by intervention interaction ( $F(5) =$

2.235,  $p = .050$ ). However, the main effect for intervention ( $F(2) = .02, p = .977$ ) and the contrasts for the expected quadratic time by intervention interaction effect ( $F(2) = .04, p = .958$ ) were not significant. Rather, unexpectedly, a cubic time by intervention contrast was significant ( $F(2) = 4.38, p = .014$ ). See descriptive statistics in Table 4 and a graphic representation of results in Figure 3.

A mixed ANOVA with the dependent variable of conviction in paranoid ideation revealed a significant effect for time ( $F(2,4) = 115.10, p < .001$ ) and for a quadratic time contrast ( $F(1) = 5.38, p = .022$ ). However, the main effect for intervention ( $F(2) = .81, p = .447$ ), the time by intervention interaction ( $F(4,7) = .81, p = .531$ ), and the time by intervention quadratic contrast ( $F(2) = 1.08, p = .344$ ) were not significant. Additionally, unexpectedly, time also had a significant linear contrast ( $F(1) = 200.63, p < .001$ ). See descriptive statistics in Table 5 and a graphic representation of results in Figure 4.

Because the state anger and paranoia-like experiences did not appear to have similar change patterns over time, an exploratory correlation was conducted between the change score of these variables, calculated as the difference between the value post the anger induction and the value at the end of the study, post the second anger regulation. A significant positive correlation was found  $r = .174, p = .037$ , suggesting a trend of conviction in paranoid ideation decreasing as state anger decreases.

### **Moderation**

The differential impact of the anger regulation interventions on state anger and conviction in paranoid ideation for participants with different levels of emotional awareness was tested in moderation regression models.

The first model consisted of the dependent variable of state anger at the end of the study, post the second anger regulation attempt, the independent variable of intervention type, and moderators of awareness to emotions and clarity of emotions. Awareness to emotions and clarity of emotions were centered, a square root transformation was applied to state anger to normalize skewness and kurtosis, and intervention type was coded using the Helmert coding system - control vs. any intervention; REBT/a-priori anger regulation intervention vs. ACT/post-hoc anger regulation intervention. This model was useful at predicting state anger  $F(8,135) = 2.26, p = .03, R^2 = .12$  (all predictors to state anger). Clarity of emotions predicted state anger post the second anger regulation  $b = -.22, t(135) = -3.44, p < .001$ . However, other main effects and interaction effects did not predict state anger post the second anger regulation. Specifically, the main effect for attention to emotions was not significant  $b = -.14, t(135) = -1.68, p = .10$ . The contrast between the control intervention and any intervention was not significant  $b = -.06, t(135) = -.60, p = .55$ , nor were the interaction between this contrast and clarity of emotions  $b = .20, t(135) = 1.35, p = .18$ , or the interaction between this contrast and attention to emotions  $b = .00, t(135) = .02, p = .98$ . Likewise, the contrast between REBT/a-priori anger regulation intervention and ACT/post-hoc anger regulation intervention was not significant  $b = .03, t(135) = .29, p = .77$ , nor were the interaction between this contrast and clarity of emotions  $b = -.11, t(135) = -.82, p = .42$ , or the interaction between this contrast and attention to emotions  $b = .09, t(135) = .46, p = .65$ . Finally, the higher-order unconditional interaction between intervention type and attention to emotions was not significant  $F(2,135) = .11, p = .90, R^2 = .00$ , nor was the higher-order unconditional interaction between intervention type and clarity of emotions  $F(2,135) = 1.31, p = .60, R^2$

= .02, or the interaction including intervention type and both attention to emotions and clarity of emotions  $F(4,135) = .69, p = .60, R^2 = .02$ .

A similar model was conducted using a dependent variable of conviction in paranoid ideation at the end of the study, post the second anger regulation attempt. A square root transformation was applied to this variable to normalize skewness and kurtosis. This model was useful at predicting paranoid ideation  $F(8,135) = 2.87, p = .01, R^2 = .15$  (all predictors to conviction in paranoid ideation). Clarity of emotions predicted conviction in paranoid ideation post the second anger regulation  $b = -.79, t(135) = -3.68, p < .001$ .

However, other main effects and interaction effects did not predict conviction in paranoid ideation post the second anger regulation. Specifically, the main effect for attention to emotions was not significant  $b = -.39, t(135) = -1.38, p = .17$ . The contrast between the control intervention and any intervention was not significant  $b = .33, t(135) = .90, p = .37$ , nor were the interaction between this contrast and clarity of emotions  $b = .90, t(135) = 1.79, p = .08$ , or the interaction between this contrast and attention to emotions  $b = -.40, t(135) = -.66, p = .51$ . Likewise, the contrast between REBT/a-priori anger regulation intervention and ACT/post-hoc anger regulation intervention was not significant  $b = -.39, t(135) = -.98, p = .33$ , nor were the interaction between this contrast and clarity of emotions  $b = -.41, t(135) = -.87, p = .39$ , or the interaction between this contrast and attention to emotions  $b = -.83, t(135) = -1.23, p = .22$ . Finally, the higher-order unconditional interaction between intervention type and attention to emotions was not significant  $F(2,135) = .98, p = .38, R^2 = .01$ , nor was the higher-order unconditional interaction between intervention type and clarity of emotions  $F(2,135) = 2.08, p = .13, R^2$

= .03, or the interaction including intervention type and both attention to emotions and clarity of emotions  $F(4,135) = 1.58, p = .18, R^2 = .04$ . See descriptive statistics in table 6.

### **Mediation**

It was hypothesized that the relationship between intervention type and state anger, as well as the relationship between intervention type and conviction in paranoid ideation, are mediated by irrational beliefs about comfort among participants in the REBT/a-priori anger regulation intervention group or by experiential avoidance among participants in the ACT/post-hoc anger regulation intervention group. These mediation hypotheses were tested using Hayes and Preacher's (2014) general linear modeling approach to estimating direct and indirect effects when the independent variable (intervention type) is multi-categorical.

First, a one-way ANOVA on state anger and conviction in paranoid ideation at the end of the study, post the second anger regulation attempt, was carried, with the independent variable of intervention type (three levels: control, REBT/a-priori anger regulation intervention, and ACT/post-hoc anger regulation intervention). No significant differences were found between the groups on either measure. State anger:  $F(2,141) = .48, p = .622$ , with a non-significant trend of higher state anger among the control group as compared to the intervention groups. Conviction in paranoid ideation was also not significantly different between the intervention groups:  $F(2,141) = .70, p = .500$ . See the descriptive statistics in Table 7.

The hypothesized mediation models were carried despite the insignificant mean group differences, based on Hayes' (2018) recommendation, which relies on the notion that a correlation is "neither a necessary nor a sufficient condition of causality" (p. 80).

The first mediation model consisted of the dependent variable of state anger at the end of the study, post the second anger regulation attempt, the independent variable of intervention type, and a mediator of irrational beliefs about comfort. A square root transformation was applied to state anger to normalize skewness and kurtosis, and intervention type was coded using the Helmert coding system - control vs. any intervention; REBT/a-priori anger regulation intervention vs. ACT/post-hoc anger regulation intervention. Total effect: state anger was not significantly different between any intervention vs. control  $b = -.10$ ,  $t(141) = -.94$ ,  $p = .35$ . Likewise, state anger was not significantly different between the REBT/a-priori anger regulation intervention vs. the ACT/post-hoc anger regulation intervention  $b = .03$ ,  $t(141) = .25$ ,  $p = .81$ . Indirect effects: irrational beliefs about comfort were not significantly different between any intervention vs. control  $b = -.30$ ,  $t(141) = -.14$ ,  $p = .89$ . Likewise, irrational beliefs about comfort were not significantly different between the REBT/a-priori anger regulation intervention vs. the ACT/post-hoc anger regulation intervention  $b = .34$ ,  $t(141) = .14$ ,  $p = .89$ . Irrational beliefs about comfort were positively correlated with state anger  $b = .02$ ,  $t(140) = 4.55$ ,  $p < .01$ . Direct effects: state anger was not significantly different between any intervention vs. control  $b = -.10$ ,  $t(140) = -.95$ ,  $p = .34$ . Likewise, state anger was not significantly different between the REBT/a-priori anger regulation intervention vs. the ACT/post-hoc anger regulation intervention  $b = .02$ ,  $t(140) = .21$ ,  $p = .84$ . Mediation did not occur for the comparison between any intervention vs. control: indirect effect =  $-.01$ ,  $SE = .05$ , 95% CI $[-.11, .07]$ . Mediation also did not occur for the comparison between the REBT/a-priori anger regulation intervention vs. the ACT/post-hoc anger regulation intervention: indirect

effect = .01,  $SE = .04$ , 95% CI[-.08, .10]. See descriptive statistics in table 7 and a graphic representation of the mediation model in figure 5.

The second model consisted of the dependent variable of state anger at the end of the study, post the second anger regulation attempt, the independent variable of intervention type, and a mediator of experiential avoidance. A square root transformation was applied to state anger to normalize skewness and kurtosis, and intervention type was coded using the Helmert coding system - control vs. any intervention; REBT/a-priori anger regulation intervention vs. ACT/post-hoc anger regulation intervention. Total effect: state anger was not significantly different between any intervention vs. control  $b = -.10$ ,  $t(141) = -.94$ ,  $p = .35$ . Likewise, state anger was not significantly different between the REBT/a-priori anger regulation intervention vs. the ACT/post-hoc anger regulation intervention  $b = .03$ ,  $t(141) = .25$ ,  $p = .81$ . Indirect effects: experiential avoidance was not significantly different between any intervention vs. control  $b = -2.19$ ,  $t(141) = -.98$ ,  $p = .33$ . Likewise, experiential avoidance was not significantly different between the REBT/a-priori anger regulation intervention vs. the ACT/post-hoc anger regulation intervention  $b = -1.08$ ,  $t(141) = -.44$ ,  $p = .66$ . Experiential avoidance was positively correlated with state anger  $b = .02$ ,  $t(140) = 4.35$ ,  $p < .001$ . Direct effects: state anger was not significantly different between any intervention vs. control  $b = -.07$ ,  $t(140) = -.64$ ,  $p = .52$ . Likewise, state anger was not significantly different between the REBT/a-priori anger regulation intervention vs. the ACT/post-hoc anger regulation intervention  $b = .05$ ,  $t(140) = .42$ ,  $p = .67$ . Mediation did not occur for the comparison between any intervention vs. control: indirect effect =  $-.04$ ,  $SE = .04$ , 95% CI[-.15, .03]. Mediation also did not occur for the comparison between the REBT/a-priori anger regulation



intervention vs. the ACT/post-hoc anger regulation intervention: indirect effect =  $-.02$ ,  $SE = .05$ , 95% CI $[-.11, .07]$ . See descriptive statistics in Table 7 and a graphic representation of the mediation model in Figure 6.

The third model consisted of the dependent variable of conviction in paranoid ideation at the end of the study, post the second anger regulation attempt, the independent variable of intervention type, and the mediator of irrational beliefs about comfort. A square root transformation was applied to conviction in paranoid ideation to normalize skewness and kurtosis, and intervention type was coded using the Helmert coding system - control vs. any intervention; REBT/a-priori anger regulation intervention vs. ACT/post-hoc anger regulation intervention. Total effect: conviction in paranoid ideation was not significantly different between any intervention vs. control  $b = .23$ ,  $t(141) = .61$ ,  $p = .54$ . Likewise, conviction in paranoid ideation was not significantly different between the REBT/a-priori anger regulation intervention vs. the ACT/post-hoc anger regulation intervention  $b = -.42$ ,  $t(141) = -1.01$ ,  $p = .32$ . Indirect effects: irrational beliefs about comfort were not significantly different between any intervention vs. control  $b = -.30$ ,  $t(141) = -.14$ ,  $p = .89$ . Likewise, irrational beliefs about comfort were not significantly different between the REBT/a-priori anger regulation intervention vs. the ACT/post-hoc anger regulation intervention  $b = .34$ ,  $t(141) = .14$ ,  $p = .89$ . Irrational beliefs about comfort were positively correlated with conviction in paranoid ideation  $b = .08$ ,  $t(140) = 5.75$ ,  $p < .001$ . Direct effects: conviction in paranoid ideation was not significantly different between any intervention vs. control  $b = .26$ ,  $t(140) = .74$ ,  $p = .46$ . Likewise, conviction in paranoid ideation was not significantly different between the REBT/a-priori anger regulation intervention vs. the ACT/post-hoc anger regulation intervention  $b = -.45$ ,

$t(140) = -1.19, p = .24$ . Mediation did not occur for the comparison between any intervention vs. control: indirect effect =  $-.02, SE = .18, 95\% CI[-.41, .31]$ . Mediation also did not occur for the comparison between the REBT/a-priori anger regulation intervention vs. the ACT/post-hoc anger regulation intervention: indirect effect =  $.03, SE = .18, 95\% CI[-.32, .38]$ . See descriptive statistics in Table 7 and a graphic representation of the mediation model in Figure 7.

The fourth model consisted of the dependent variable of conviction in paranoid ideation at the end of the study, post the second anger regulation attempt, the independent variable of intervention type, and a mediator of experiential avoidance. A square root transformation was applied to conviction in paranoid ideation to normalize skewness and kurtosis, and intervention type was coded using the Helmert coding system - control vs. any intervention; REBT/a-priori anger regulation intervention vs. ACT/post-hoc anger regulation intervention. Total effect: conviction in paranoid ideation was not significantly different between any intervention vs. control  $b = .23, t(141) = .61, p = .54$ . Likewise, conviction in paranoid ideation was not significantly different between the REBT/a-priori anger regulation intervention vs. the ACT/post-hoc anger regulation intervention  $b = -.42, t(141) = -1.01, p = .32$ . Indirect effects: experiential avoidance was not significantly different between any intervention vs. control  $b = -2.19, t(141) = -.98, p = .33$ . Likewise, experiential avoidance was not significantly different between the REBT/a-priori anger regulation intervention vs. the ACT/post-hoc anger regulation intervention  $b = -1.08, t(141) = .44, p = .66$ . Experiential avoidance was positively correlated with conviction in paranoid ideation  $b = .06, t(140) = 4.62, p < .001$ . Direct effects: conviction in paranoid ideation was not significantly different between any intervention vs. control  $b = .37,$

$t(140) = 1.03, p = .31$ . Likewise, conviction in paranoid ideation was not significantly different between the REBT/a-priori anger regulation intervention vs. the ACT/post-hoc anger regulation intervention  $b = -.36, t(140) = -.91, p = .37$ . Mediation did not occur for the comparison between any intervention vs. control: indirect effect =  $-.14, SE = .15, 95\% CI[-.48, .12]$ . Mediation also did not occur for the comparison between the REBT/a-priori anger regulation intervention vs. the ACT/post-hoc anger regulation intervention: indirect effect =  $-.07, SE = .16, 95\% CI[-.40, .24]$ . See descriptive statistics in Table 7 and a graphic representation of the mediation model in Figure 8.

Given that all mediation models were not significant, but all consisted of a significant positive relationship between the mediators (i.e., irrational beliefs about comfort and experiential avoidance) and between the outcome variables (i.e., state anger and conviction in paranoid ideation), these relationships were further investigated. Exploratory analyses examined the intercorrelations between these variables, separating between the intervention groups. The correlation between the outcome variables and the proposed mediators was strongest in the control group: irrational beliefs – state anger  $r = .514, p < .01$ , irrational beliefs – conviction in paranoid ideation  $r = .527, p < .01$ , experiential avoidance – state anger  $r = .508, p < .01$ , experiential avoidance - conviction in paranoid ideation  $r = .483, p < .01$ . In contrast, the associations were somewhat less significant in the intervention groups. Specifically, among the REBT/a-priori interventions: irrational beliefs – state anger  $r = .333, p = .017$ , irrational beliefs – conviction in paranoid ideation  $r = .544, p < .01$ , experiential avoidance – state anger  $r = .208, p = .142$ , experiential avoidance - conviction in paranoid ideation  $r = .412, p = .003$ . Among the ACT/post-hoc intervention group: irrational beliefs – state anger  $r$

= .210,  $p = .143$ , irrational beliefs – conviction in paranoid ideation  $r = .288$ ,  $p = .042$ , experiential avoidance – state anger  $r = .309$ ,  $p = .029$ , experiential avoidance - conviction in paranoid ideation  $r = .240$ ,  $p = .093$ . The different pattern of correlations among the intervention groups suggests that the interventions, and particularly the ACT/post-hoc intervention may have had a differential impact on some participants, impacting the strength of the relationship between the hypothesized mediation variables and the outcome variables.

## DISCUSSION

Individuals with schizophrenia experience more negative emotions and less positive emotions in their daily lives than healthy controls (Cho et al., 2017). This experience is stable through the course of the illness, starting with at-risk individuals, among whom this pattern predicts the development of psychosis (Horan et al., 2008). Negative affect also precedes psychotic symptoms in moment to moment measurements among psychiatric patients and in the general population (Delespaul & van Os, 2002; Kramer et al., 2013).

The available literature largely address negative emotionality as a single construct or measures aspects of it, with anxiety and depression being measured most frequently. Anger is rarely measured in relation to psychosis, although it correlates positively with other negative emotions among individuals with psychotic disorders (Freeman et al., 2001). Furthermore, patients with psychotic disorders have higher levels of both state and trait anger, as compared to healthy controls (Cullari, 1994). Additionally, anger is associated with poor functional outcomes among individuals with psychosis, including decreased social integration, housing instability, rehospitalization, and increased suicide risk (Bartels et al., 1991; Pompili et al., 2007; Sörgeard et al., 2001).

Among the psychotic symptoms, anger is most frequently associated with paranoid ideation (Fornells-Ambrojo & Garety, 2009; McNeil et al., 2003; Nederlof et al., 2011; Novaco & Whittington, 2013). Suspiciousness is frequently considered a characteristic of anger and is included in its measurement (Buss & Durkee, 1957; Cook & Medley 1954; DiGiuseppe & Tafrate, 2004; Novaco, 2003). However, there is little literature regarding when suspiciousness crosses over to the domain of paranoia. There is

also a gap in the literature regarding the clinical use of this relationship and the possible impact of anger regulation interventions on paranoid ideation, including the mechanisms through which this impact would occur, and personal characteristics that can moderate this impact.

The present study examined outcomes from two anger regulation interventions that targeted different phases of anger generation – REBT, which focused on cognitions that are activated *a-priori* to the experience of anger and ACT, which focused on acceptance *post-hoc* of the experience of anger. The interventions were presented by video via an online platform and followed a computerized anger-induction interview. Participants were young adults in the general population and undergraduate students. The study examined the impact of these interventions on state anger and conviction in paranoid ideation; whether the impact is mediated by irrational beliefs and experiential avoidance; and whether facets of emotional awareness (i.e., attention to emotions and clarity of emotions) moderate the impact.

As predicted, individuals with high levels of state anger had greater conviction in paranoid ideation, both at baseline and at the end of the study, following two anger regulation attempts. Furthermore, individuals with high levels of state anger and conviction in paranoid ideation were less attentive to their emotions, had less clarity of emotions, were more likely to be experientially avoidant, and to have irrational beliefs about needing to be comfortable. These findings reflect a close association between anger and paranoid ideation; indicate that facets of emotional awareness are related to lower levels of these experiences; suggest that both experiential avoidance and irrational beliefs

are associated with anger and paranoid ideation and may be helpful targets for psychological interventions.

Despite these strong associations, the hypothesized moderation and mediation models failed to predict the outcomes of state anger and conviction in paranoid ideation. Specifically, the mediation models failed to find mediation in the relationship between intervention type and state anger and in the relationship between intervention type and conviction in paranoid ideation. Exploratory analyses found a different pattern of correlations between the hypothesized mediators (i.e., irrational beliefs about comfort and experiential avoidance) and between the dependent variables among the various intervention groups, suggesting that the different interventions, and particularly the ACT/post-hoc intervention, may have had a different impact on some participants, lowering the strength of the relationship between the hypothesized mediation variables and the outcome variables.

Likewise, in models with the independent variable of intervention type and moderators of facets of emotional awareness, the outcomes of state anger and conviction in paranoid ideation were predicted only by the clarity of emotions. Higher levels of clarity of emotions were predictive of lower state anger and less conviction in paranoid ideation. However, attention to emotions, intervention type, and their interaction, as well as the interaction between clarity of emotions and intervention type, did not predict levels of neither state anger nor conviction in paranoid ideation post the second anger regulation attempt. Further research is needed to uncover external variables that moderate which participants benefit more from the various interventions.

Clarity of emotions predicted both state anger and paranoid ideation but did not moderate the relationship between intervention type and these outcomes. This may be related to the limitations of the method of the present study. It is possible that a difference between the impact of the various interventions existed but was not detectable because the anger induction strategy was not sufficiently strong. Although the anger recall interview immediately increased levels of state anger, the levels of anger decreased for all groups, including the control group. The decrease in anger levels for the control group suggests that the anger recall interview induced anger only for a short period of time, making it difficult for the interventions to have a significant impact on anger levels.

Another possible explanation for the lack of significant difference in anger levels at the end of the study between the active treatment groups and the control group is that participants did not have sufficient opportunities to practice the learned anger regulation techniques in order to use them successfully. Over-learning (i.e., frequent repetition of a learned skill) is advantageous in promoting a prompt activation of skills acquired in CBT among individuals with schizophrenia-spectrum disorders (van der Gaag, van Oosterhout, Daalman, Sommer, & Korrelboom, 2012). The method of the current study is limited due to the fact that participants only had two rehearsals of the implementation of the anger regulation technique they have learned. It is possible that the trend of a larger decrease in anger among the treatment groups, as compared to the control group, would have been significant if the participants would have had additional rehearsals of the anger regulation technique.

Additionally, unpredictably, the levels of conviction in paranoid ideation had a linear decreasing trend. The Conviction Subscale of the Paranoia Checklist (Freeman et al.,



2005) was chosen to measure paranoid ideation in the present study for its good psychometric properties and fit for the participant population. However, its test-retest reliability was not examined prior to this study. It is possible that this measure should not be used repeatedly or that more generally, conviction in paranoid ideation is an unstable construct. Inquiring about conviction in one's beliefs increases awareness, which may, in turn, reduce conviction. To this end, a similar trend of a decrease in conviction in delusions was also observed in a sample of participants that experienced a relapse of psychosis and were followed for 12 months (So et al., S. 2012). In any case, the decreasing trend in conviction in paranoid ideation was observed among all intervention groups and limited the capacity for the active anger regulation interventions to impact participants' conviction in paranoid ideation. Unpredictably, state anger and conviction in paranoid ideation did not appear to have similar change patterns over time, possibly related to the measurement and induction limitations reviewed above. However, exploratory analyses found that participants who had larger decreases in their state anger, from the anger induction to the end of the study, post the second anger regulation, also tended to have larger decreases in their conviction in paranoid ideation, suggesting some communality between these experiences.

The associations reviewed above suggest that adding an anger regulation module to paranoia-focused CBTp could be beneficial. CBTp that addressed factors that are causally involved in the formation and maintenance of delusions was found to have larger effect sizes at end-of-therapy as compared to CBTp studies that provided standard treatment (Mehl et al., 2015).

The present study further suggests that experiential avoidance and irrational beliefs about comfort are important constructs for the experiences of both anger and paranoia. Therefore, the anger regulation techniques of both acceptance and cognitive reappraisal may be appropriate to add to CBTp packages. These possible changes can potentially improve available treatment packages, which currently improve anger regulation but initiate little change in cognitive distortions (Haddock et al., 2004; Renwick et al., 1997). The treatments provided in these studies included cognitive reappraisal, emphasizing that further research is needed to refine the manner in which the cognitive reappraisal is conducted in anger-paranoia treatment packages to increase its effectivity. Further research is also needed on the inclusion of response modulation techniques such as acceptance in anger-paranoia treatment packages. The present study also suggests that clarity of emotions is important for both anger and paranoid-ideation. Further research is needed regarding effective ways to incorporate it into treatment packages, such as provision of psychoeducation and in-session emotional clarity practice.

The above-mentioned treatment components were found to be acceptable to the majority of the study's participants. Dropout rates in this study were low - only 3% of those who saw an intervention video dropped out of the study during the attempts to implement the anger regulation intervention. The high retention rate might be related to the research context in which participants received the intervention, though the informed consent specifically indicated that participants may stop the study at any point without being penalized. High retention rates may also be related to the online delivery of the interventions. In this case, retention in similar online interventions would be comparable,

showing promise for online interventions for a group of participants who may generally be difficult to engage in psychological treatment.

Further research is also needed on online and video interventions for anger and paranoia. Due to the methodological limitations of the study, the effect of the online video interventions for paranoid ideation and anger regulation could not have been tested properly. However, there is a large body of literature supporting the effectiveness of computer-based CBT (Grist & Cavanagh, 2013). To this end, a replication of this study with participants who have anger problems would permit to properly examine the impact of these interventions on anger and paranoid ideation and the mechanisms of their impact.

## APPENDICES

### Appendix 1

#### *Anger-recall computerized interview script*

##### **Instruction screen 1**

The following questions will focus on aspects of your life that tend to make you angry. We would like to understand how it really feels to face those issues. We want you to feel just for a few minutes the way you feel when you are angry so that we can understand the impact of anger on people. These questions are not a contest or a game, but a sincere effort to explore the consequences of remembering anger-invoking situations that you face. It is important that we have your complete cooperation with this process. If we ask you something you prefer not to talk about, please write only the information that you are comfortable sharing.

##### **Instruction screen 2**

We would like you write about a situation in the past that made you the angriest you have been. Please spend 30 seconds to a minute to consider this. Try to remember such a situation and write about it in detail.

##### **Instruction screen 3**

In this situation, which of the following feelings did you feel?

- Rage
- Fury
- Anger
- Exasperation
- Irritation

**Instruction screen 4**

Who did you blame in this situation and why?

**Instruction screen 5**

What did you think in this situation?

**Instruction screen 6**

What did you want to do in this situation?

**Instruction screen 7**

What did you think of the person who was responsible of this situation?

**Instruction screen 8**

Did you think of how you could stop the situation?

**Instruction screen 9**

What particularly made you angry in this situation?

**Instruction screen 10**

Did you want to get revenge?

## Appendix 2

### *A-priori intervention*

You have now described an event that made you very angry. When remembering events that made us angry, it is helpful to know that there are different types of anger – an anger that is normal and functional and an unhealthy anger that is more dysfunctional. The unhealthy type of anger can harm you and possibly harm others. It’s also important to know that certain thoughts and beliefs can control whether you experience the healthy anger or the unhealthy anger. By controlling your thoughts and beliefs, you could prevent yourself from reaching the unhealthy anger when remembering difficult events in your life.

For example, could you see how thinking about the other person in your story as “a totally worthless person” could cause you to experience unhealthy anger and rage? Does thinking about the other person in your story as worthless help you feel any better or help you move on? Does it help you act in your best interests? Instead, could you possibly think that even though the other person behaved badly, they are still a worthwhile person overall?

Similarly, you may think that the other person in your story “should never have acted that way” because it’s unfair to you. Do you think that its helpful for you to believe that they should *never* have acted that way because it was unfair to you? Do you think that demanding that the other person should “never have behaved that way” will help you get over the event? Could you instead think to yourself that the other person in the story is only human and therefore it’s possible that they could behave badly sometimes? Can you acknowledge that people have free will and can choose to behave badly when they wish?

Some people may think that they can’t stand thinking about things like the way that the other person in your story behaved. Could you see how thinking that you “can’t stand

thinking about it” could make you feel more unhealthy anger or rage? Could you see how thinking that you “can’t stand” the way the other person behaved can prevent you from behaving in your best interests? Does it really make sense for you to think that because you do not like the way the other person behaved, you also can’t stand the way that they behaved? Instead, could you think “I know that they behaved badly in that situation, however I’m still able to survive and move on?” Could thinking that you can survive and move on help you act in your best interests? Could you feel less unhealthy anger and rage if you thought “I’m able to survive this and move on?”

Finally, some people might think “this is more than just bad, it’s terrible and awful what happened to me”. Could thinking that what happened to you is “terrible and awful” make you feel more unhealthy anger or rage? Could you see how thinking that what happened to you is “terrible and awful” can prevent you from moving on and acting in your best interests? So, does it really make sense to think “this is more than just bad but it’s terrible and awful what happened to me?”. Or, could you instead think “even though what happened to me was bad, it’s just bad, it’s not terrible or awful”? Could thinking that what happened to you is “just bad but not awful” help you feel less unhealthy anger and rage?

## Appendix 3

### *Post-hoc intervention*

You have now described an event that made you very angry. When remembering such events, it is helpful to know that people often experience anger as a way to avoid feeling emotional and psychological pain. For example, you might be very hurt from the actions of the other person in your story. Instead of focusing on our own negative emotions, like hurt, we shift our attention away from ourselves and toward other people who seem responsible for our suffering. The emotion of anger can quickly mask our hurt and psychological pain. This shift may give us a sense of power, but when we battle with our inner experience, it also distracts and derails us. Try to think - has being very angry ever worked for you? Has being very angry helped you progress in your life in the way that you want? Has being very angry helped you achieve life goals that are important to you? Probably not. Because when we're angry, we're struggling not to feel hurt and psychological pain. This shift takes a lot of effort and prevents us from heading in the direction of our goals.

The alternative of this shift is acceptance, which means to make peace and let go of this struggle. Acceptance means to open up and make room for pain and hurt. It means to remain in contact with our painful thoughts and feelings without attempting to avoid or change them. You don't have to like feeling hurt, want to feel hurt, or approve of feeling hurt in order to accept it. Acceptance simply means that you learn to pay attention to your thoughts and feelings and to how you respond to them. It means to actively bring your thoughts and feelings into your awareness without trying to avoid them. When you stop trying to change your negative thoughts and feelings, you free a lot of mental energy.



You can now choose to put this energy into things that are important to you. Acceptance is a method to act in a way that will lead to positive results in your life.

You can start practicing acceptance now. Drop the struggle with your hurt or offense from the other person in your story. Give your hurt and offense some breathing space and allow them to be, as they are. Don't try to resist them, run away from them, or get overwhelmed by them. Open up to your hurt and let it be.

This is not easy to do. It's an active process. To practice acceptance, it is helpful to ask yourself what was hardest about the event in your story? What is it in the story that you can't have? Maybe you can't have what you're feeling right now? Or what you're thinking right now? What you have just recognized is exactly what stands between you and letting that event go. Maybe it was hurt. Maybe it is that you felt disregarded. Try to open up to these experiences and let them be. Allow yourself to have whatever inner experiences are present at this moment. Just stay with what you are feeling and thinking for a moment. This does not mean that you like them or want them. It simply means that you are making room for them! By letting these experiences be, you are essentially putting less effort into trying not to feel them. Instead, you are giving yourself an opportunity to put your mental energy into things that are important to you. You can now channel your mental energy toward the aspects of your life that you want to focus on.

## Appendix 4

### *Control intervention*

You have now described an event that made you very angry. When people remember events that made them very angry, it is helpful to experience your emotions naturally.

Human beings have a natural ability to experience emotions well. This is similar to an instinct that makes our natural expression of emotions helpful for us. Our natural emotional responses to any situation, including situations that make us angry, are good. Our natural responses to any situation, including situations that make us angry, are comfortable.

People might experience and express the same emotion in different ways when they are in different situations. That's ok because it is natural. The way we express our emotions naturally, just as we naturally want to express them, in their most natural form, is a good form to express emotions. In other words, it is helpful to express emotions in their natural expression. Maybe there are situations in which you naturally experienced emotions in one way. Maybe there are other situations in which you naturally experienced emotions in another way. That is fine. There is no right or wrong. It is encouraged to express emotions in any given situation in the way that is natural for you to express your emotions. It is encouraged to express emotions in any given situation in the way that is comfortable for you to express your emotions. You should feel free to express your emotions in any way that is natural and comfortable for you.

Now, after you recalled an event that made you very angry, you should feel free to experience your anger in any way that is natural to you. If you have a desire to express

your anger in any way, allow yourself to do so. You are by yourself and no one is observing. Just express your anger naturally. Different parts of the story and different questions in regarding the story may have made you want to express your anger in different ways. That is fine. There is no right or wrong way to express emotions generally and there is no right or wrong manner to express anger specifically. This is your story, and this is the anger that you felt at the time and that you may feel now when you remembered the story. It is your anger, so simply express it in the way that is natural and comfortable for you. Just do exactly that. Express the anger that you may feel in any way that is comfortable for you. Any way at all. Express the anger that you may feel in any way that is natural for you. Any way at all. There is no right or wrong when it comes to expressing anger. Please feel free to express your anger in whatever way that you feel that is natural for you. Feel free to express your anger in whatever way that you feel that is comfortable for you. Any way at all to express your anger is ok. As long as it feels natural and comfortable for you.

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## TABLES

Table 1

*Descriptive Statistics – Baseline Levels of Dependent Variables*

	State Anger Time 1		Conviction in Paranoid Ideation Time 1		Attention to Emotions		Clarity of Emotions	
	$\bar{Y}$	SD	$\bar{Y}$	SD	$\bar{Y}$	SD	$\bar{Y}$	SD
	N = 146	18.99	7.27	17.39	15.65	3.93	.61	3.31

Table 2

*Intercorrelations and Covariances for dependent variables at baseline.*

Variable	M	SD	1	2	3	4
State Anger	19.91	9.06	-	6.65	-.12	-.22
Conviction in Paranoid Ideation	16.22	15.27	.517**	-	.1.66	-4.21
Attention to Emotions	3.87	.64	-.223**	-.171**	-	.08
Clarity of Emotions	3.35	.81	-.315**	-.340**	.151**	-

*Note:* Intercorrelations are presented below the diagonal; covariances are presented above the diagonal.

\*\*  $p < .01$ .

Table 3

*Intercorrelations and Covariances for dependent variables at the end of the study - post second anger regulation attempt.*

Variable	M	SD	1	2	3	4
State Anger	18.14	6.13	-	.74	2.57	2.51
Conviction in Paranoid Ideation	9.34	14.50	.584**	-	9.28	10.57
Experiential Avoidance	49.51	12.27	.348**	.359**	-	91.60
Irrational Beliefs	18.02	11.61	.359**	.433**	.643**	-

*Note:* Intercorrelations are presented below the diagonal; covariances are presented above the diagonal.

\*\*  $p < .01$ .

Table 4

*Descriptive Statistics – State Anger by time and intervention*

State Anger	Baseline		Post Anger Induction		Post Anger Regulation 1		Post Anger Regulation 2	
	$\bar{Y}$	SD	$\bar{Y}$	SD	$\bar{Y}$	SD	$\bar{Y}$	SD
A-priori intervention (n=51)	19.00	1.03	25.57	1.37	19.29	1.03	17.59	.86
Post-hoc intervention (n=50)	19.16	1.04	26.28	1.38	18.76	1.04	18.02	.87
Control (n=43)	18.86	1.24	24.47	1.94	20.86	1.12	18.93	.938

Table 5

*Descriptive Statistics – Conviction in Paranoid Ideation by time and intervention*

Conviction in Paranoid Ideation	Baseline		Post Anger Induction		Post Anger Regulation 1		Post Anger Regulation 2	
	$\bar{Y}$	SD	$\bar{Y}$	SD	$\bar{Y}$	SD	$\bar{Y}$	SD
A-priori intervention (n=51)	19.55	2.20	18.22	2.35	13.69	2.16	10.73	2.04
Post-hoc intervention (n=50)	17.18	2.23	15.32	2.37	10.70	2.18	9.10	2.06
Control (n=43)	15.52	2.40	14.09	2.56	10.98	2.35	7.98	2.22

Table 6

*Descriptive Statistics for the Regression models with Moderators*

	Attention to Emotions		Clarity of Emotions		State Anger		Conviction in Paranoid Ideation	
	$\bar{M}$	SD	$\bar{M}$	SD	$\bar{Y}$	SD	$\bar{Y}$	SD
A-priori intervention (n=51)	4.00	.60	3.28	.91	17.59	4.09	10.73	14.38
Post-hoc intervention (n=50)	3.89	.62	3.38	.83	18.02	6.19	9.10	15.68
Control (n=43)	3.87	.61	3.26	.701	18.93	7.89	7.98	13.37

*Outcome variables measured at the end of the study, post the second anger regulation; Hypothesized moderators measured at baseline*

Table 7

*Descriptive Statistics for the Regression models with Mediators*

	Irrational Beliefs about Comfort		Experiential Avoidance		State Anger		Conviction in Paranoid Ideation	
	$\bar{M}$	SD	$\bar{M}$	SD	$\bar{Y}$	SD	$\bar{Y}$	SD
A-priori intervention (n=51)	17.76	9.99	49.39	12.07	17.59	4.09	10.73	14.38
Post-hoc intervention (n=50)	18.10	12.14	48.32	13.09	18.02	6.19	9.10	15.68
Control (n=43)	18.23	12.96	51.05	11.62	18.93	7.89	7.98	13.37

*All variables were measured at the end of the study, post the second anger regulation*

Table 8

*Intercorrelations and Covariances for outcome variables and hypothesized mediators at the end of the study - post second anger regulation attempt, by intervention type*

Variable	Intervention Type	$\bar{M}$	SD	1	2	3	4
State Anger	Control	18.93	7.89		1.11	4.35	4.91
	REBT	17.59	4.09	-	.402	1.12	1.48
	ACT	18.02	6.19		.826	2.51	1.58
Conviction in Paranoid Ideation	Control	7.98	13.37	.766**		10.96	13.35
	REBT	10.73	14.38	.424**	-	10.61	11.58
	ACT	9.10	15.68	.603**		6.93	7.72
Experiential Avoidance	Control	51.05	11.61	.508**	.483**		104.04
	REBT	49.39	12.08	.208	.412**	-	84.08
	ACT	48.32	13.09	.309*	.240		92.13
Irrational Beliefs	Control	18.23	12.96	.514**	.527**	.692**	
	REBT	17.76	9.99	.333*	.544**	.697**	-
	ACT	18.10	12.14	.210	.288**	.580**	

*Note:* Intercorrelations are presented below the diagonal; covariances are presented above the diagonal. \*\*  $p < .01$ ; \*  $p < .05$

## FIGURES

Figure 1

*Graphic Representation of Variables – A-priori Intervention*

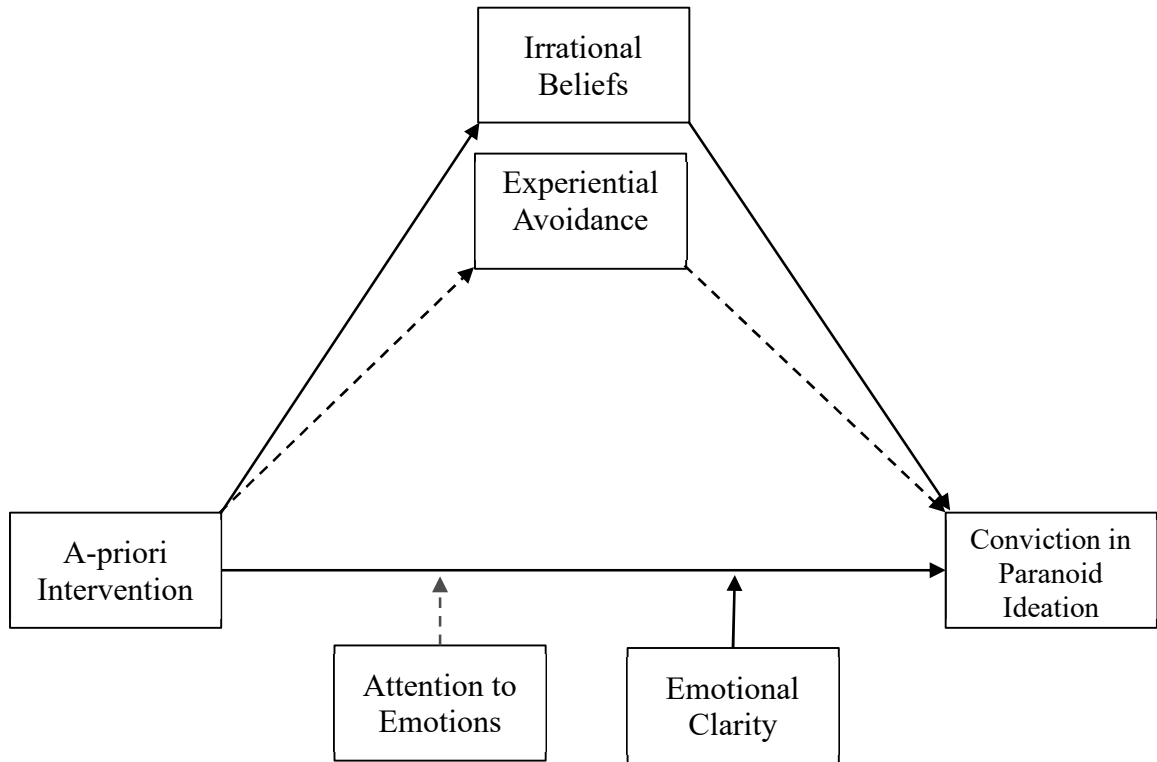




Figure 2

*Graphic Representation of Variables – Post-hoc Intervention*

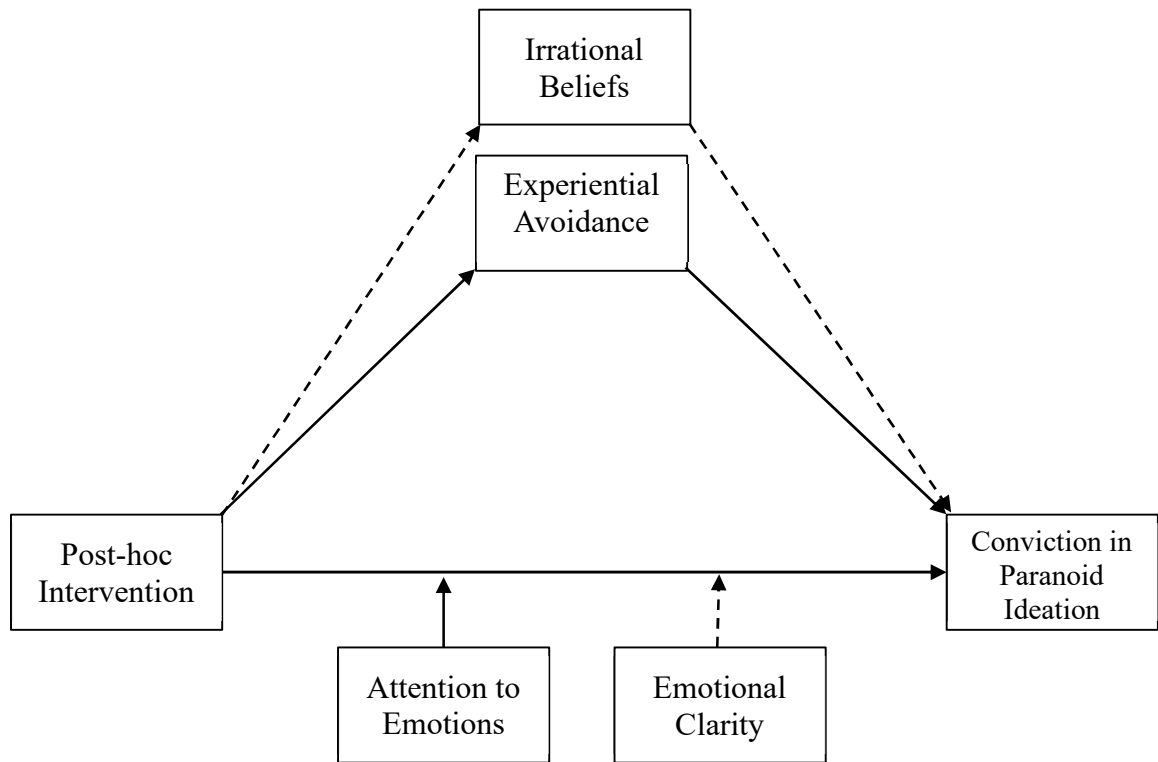


Figure 3

*Mixed model ANOVA – repeated measure of state anger; between-subject variable of intervention*

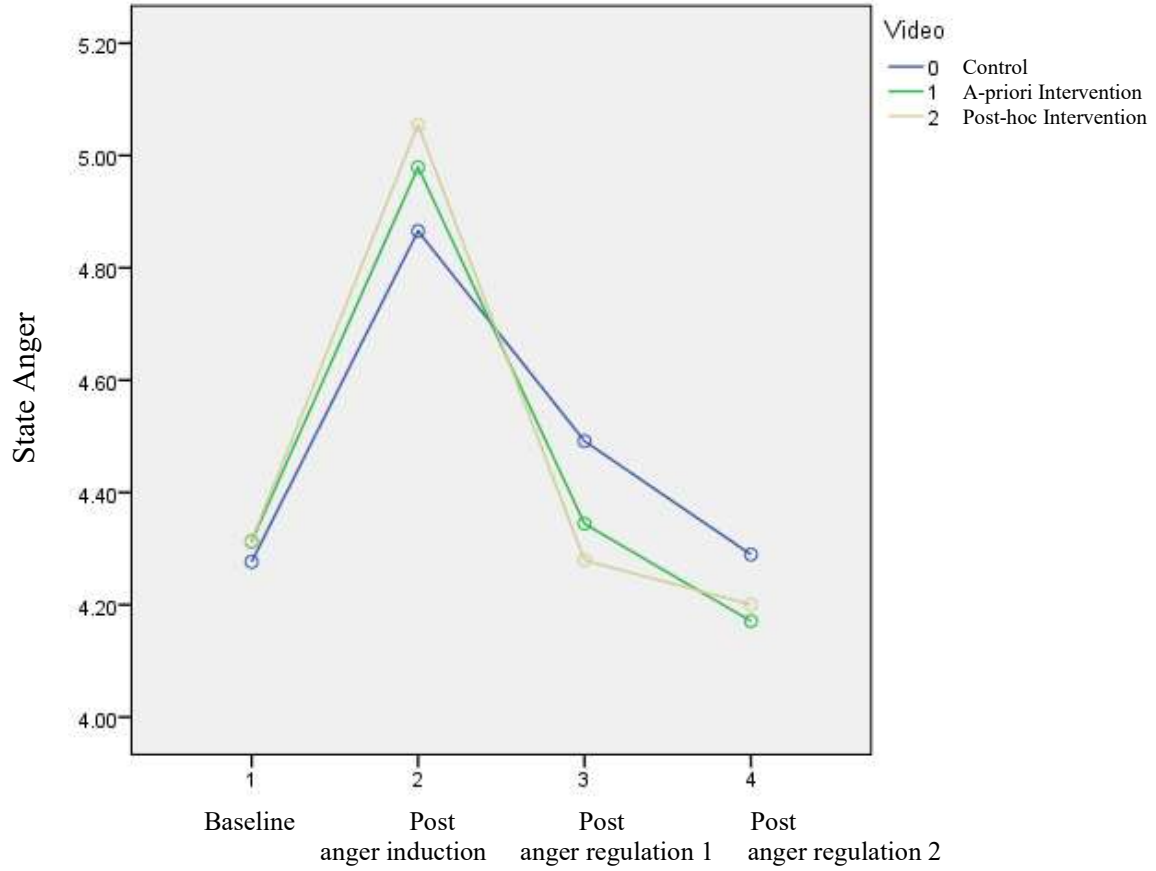


Figure 4

*Mixed model ANOVA – repeated measure of conviction in paranoid ideation; between-subject variable of intervention*

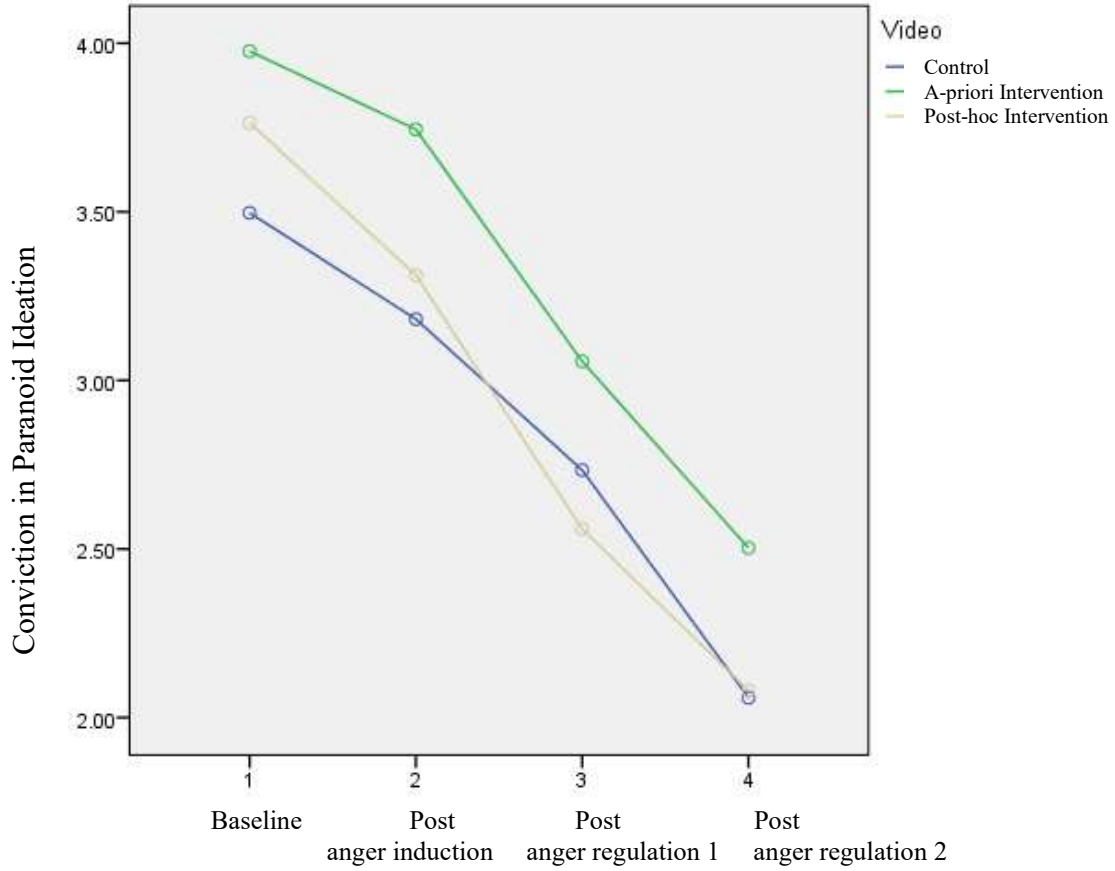
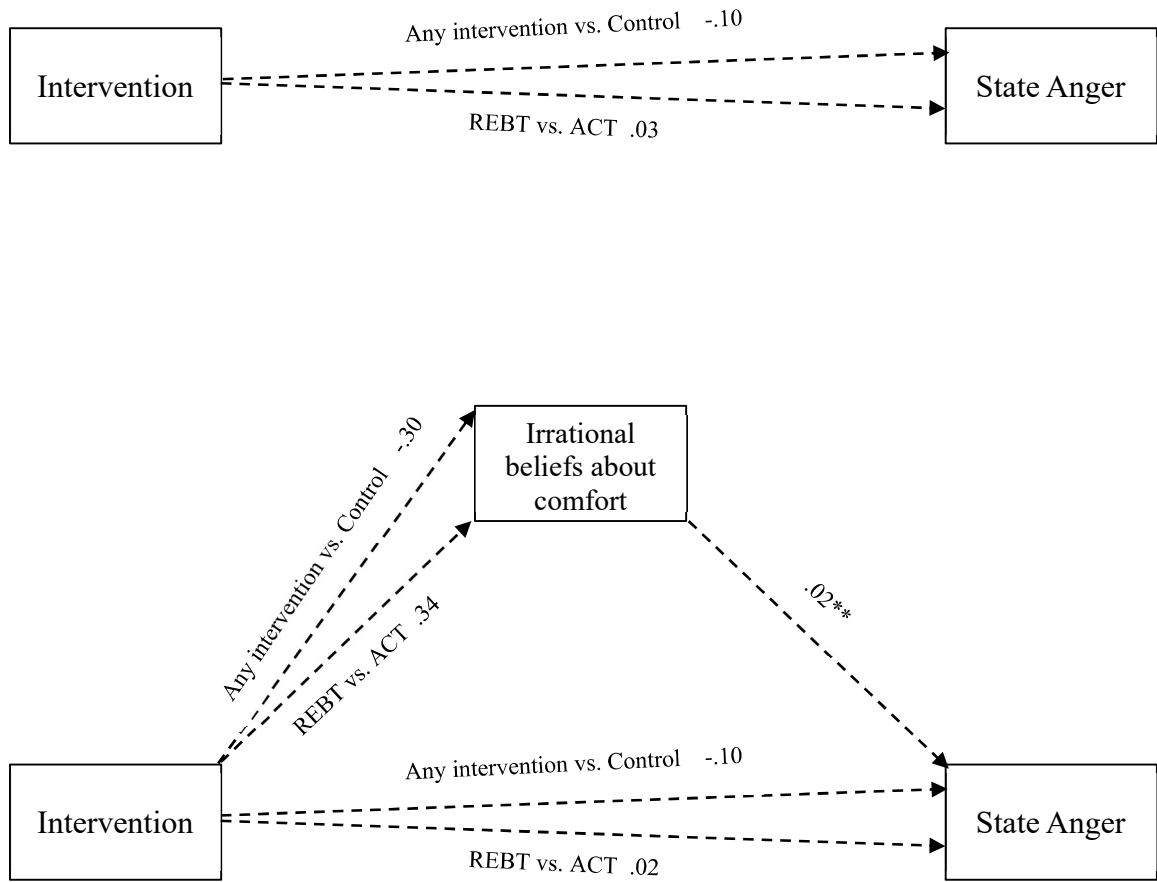


Figure 5

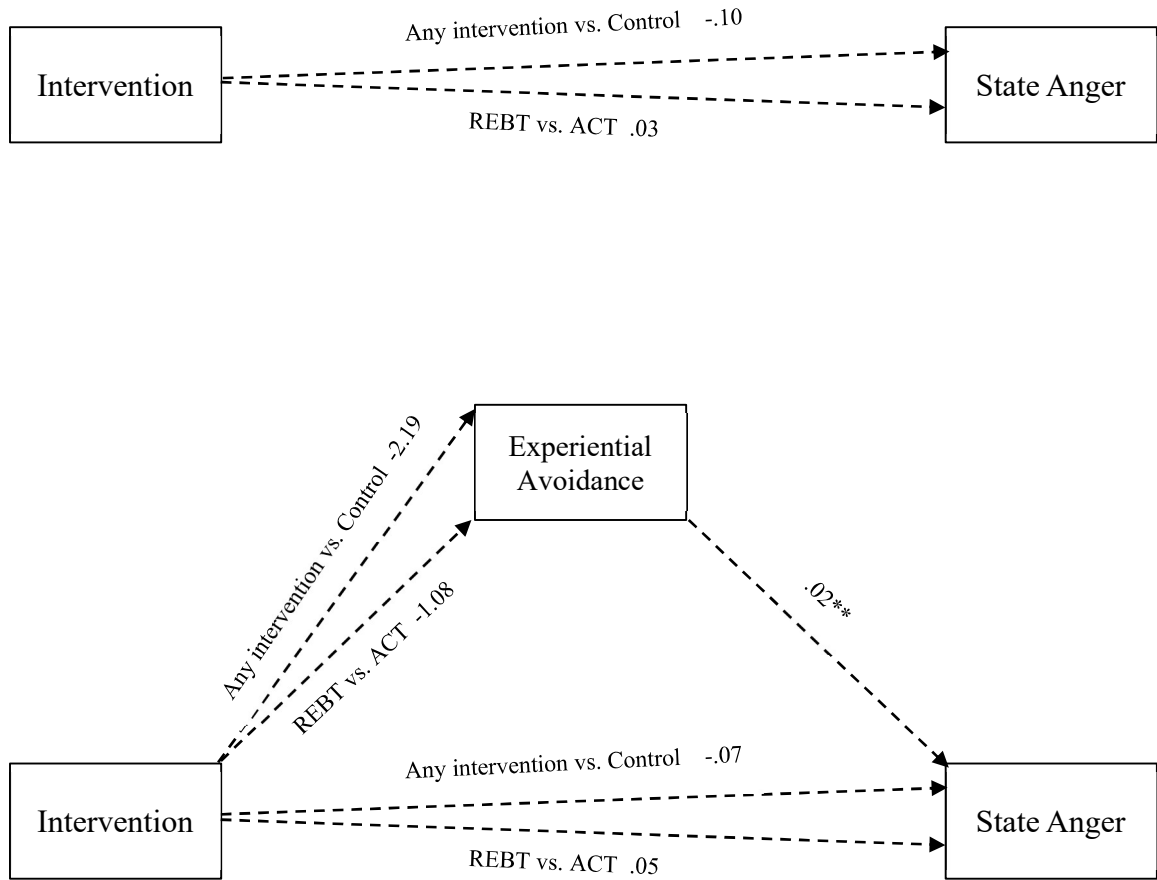
*Mediation model - dependent variable of state anger at the end of the study, independent variable of intervention type, and a mediator of irrational beliefs about comfort*



**\*\* p < .01**

Figure 6

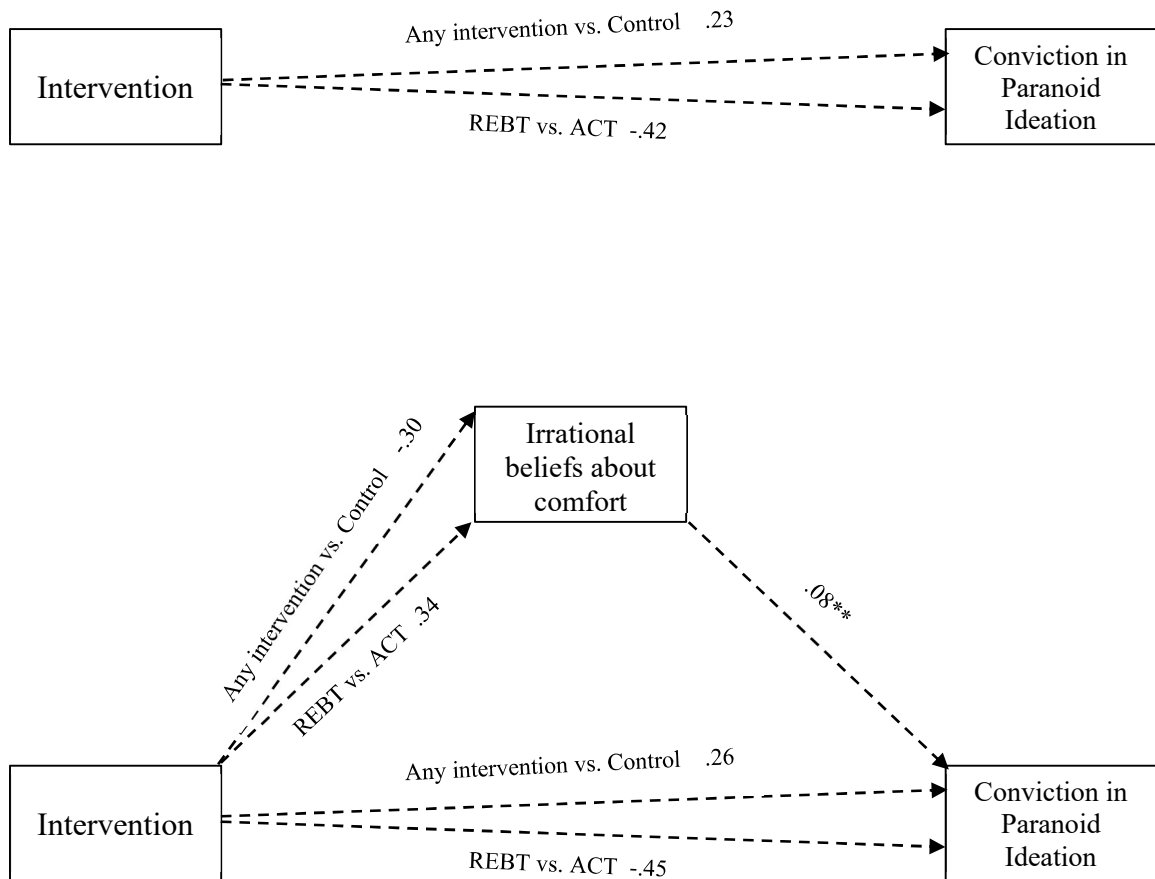
*Mediation model - dependent variable of state anger at the end of the study, independent variable of intervention type, and a mediator of experiential avoidance*



**\*\* p < .01**

Figure 7

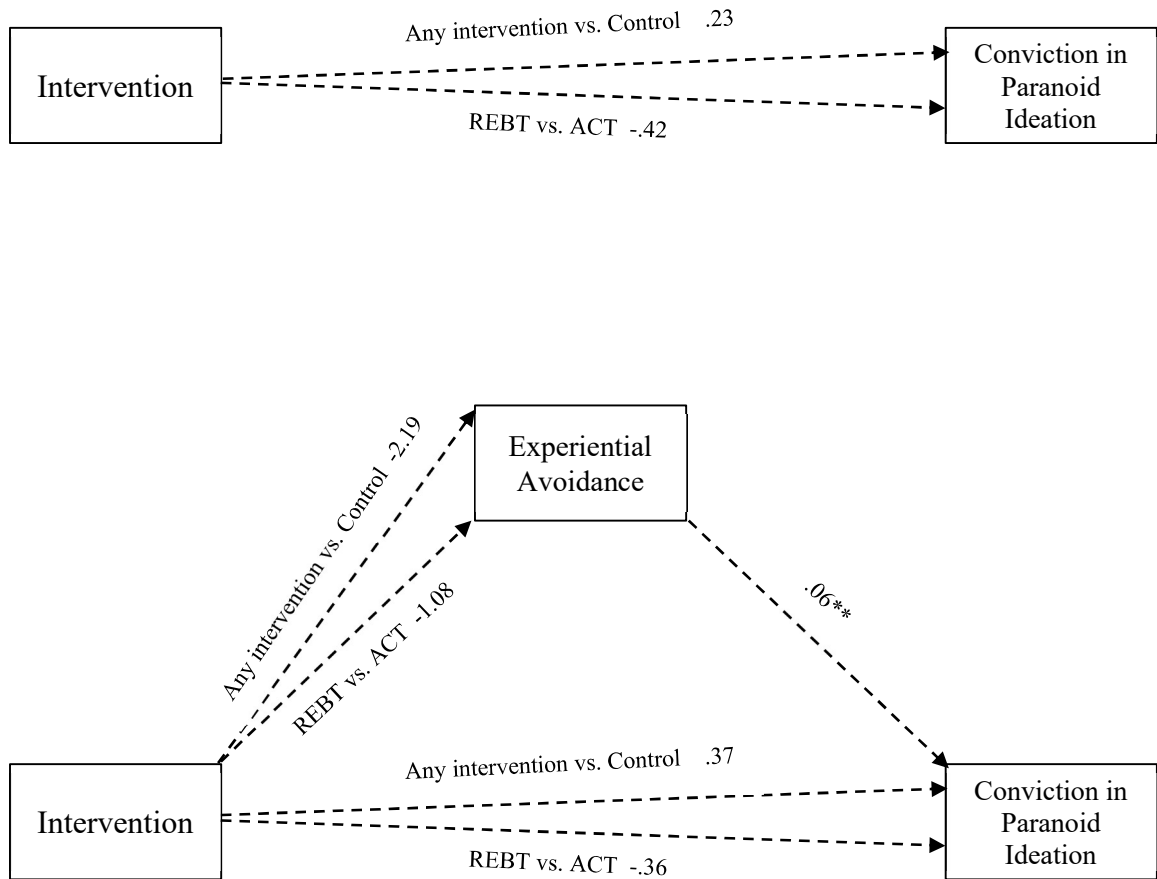
*Mediation model - dependent variable of conviction in paranoid ideation at the end of the study, independent variable of intervention type, and a mediator of irrational beliefs about comfort*



\*\* p < .01

Figure 8

*Mediation model - dependent variable of conviction in paranoid ideation at the end of the study, independent variable of intervention type, and a mediator of experiential avoidance*



\*\* p < .01

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