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Metacognitive Beliefs, Emotion Regulation Strategies, and Predisposition to Auditory Hallucinations in College Students
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<table>
<thead>
<tr>
<th>Role</th>
<th>Name</th>
<th>Title, Affiliation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chair</td>
<td>Kathleen J. Hart, Ph.D., ABPP</td>
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</tr>
<tr>
<td>Section</td>
<td>Page</td>
<td></td>
</tr>
<tr>
<td>-------------------------------</td>
<td>------</td>
<td></td>
</tr>
<tr>
<td>Table of Contents</td>
<td>i</td>
<td></td>
</tr>
<tr>
<td>List of Tables</td>
<td>ii</td>
<td></td>
</tr>
<tr>
<td>List of Appendices</td>
<td>iii</td>
<td></td>
</tr>
<tr>
<td>Acknowledgments</td>
<td>iv</td>
<td></td>
</tr>
<tr>
<td>Chapter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I. Review of the Literature</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>II. Rationale and Hypotheses</td>
<td>27</td>
<td></td>
</tr>
<tr>
<td>III. Method</td>
<td>31</td>
<td></td>
</tr>
<tr>
<td>IV. Proposed Analyses</td>
<td>37</td>
<td></td>
</tr>
<tr>
<td>References</td>
<td>38</td>
<td></td>
</tr>
<tr>
<td>Appendices</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>V. Dissertation</td>
<td>55</td>
<td></td>
</tr>
<tr>
<td>References</td>
<td>76</td>
<td></td>
</tr>
<tr>
<td>Tables</td>
<td>82</td>
<td></td>
</tr>
<tr>
<td>Appendices</td>
<td>86</td>
<td></td>
</tr>
<tr>
<td>Summary</td>
<td>93</td>
<td></td>
</tr>
</tbody>
</table>
List of Tables

Chapter V

<table>
<thead>
<tr>
<th>A. Demographics of Predisposition Groups</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>B. Group Differences for Emotion Regulation Measures</td>
<td>82</td>
</tr>
<tr>
<td>C. Group Differences for MCQ-30 Subscales</td>
<td>83</td>
</tr>
<tr>
<td>D. Regression Analysis Summary for Emotion Regulation and Metacognitive Variables Predicting Participants’ LSHS Score</td>
<td>84</td>
</tr>
</tbody>
</table>
List of Appendices

<table>
<thead>
<tr>
<th>Proposal</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Launay-Slade Hallucination Scale-Revised</td>
<td>50</td>
</tr>
<tr>
<td>B. Metacognition Questionnaire-30</td>
<td>51</td>
</tr>
<tr>
<td>C. Emotion Regulation Questionnaire</td>
<td>52</td>
</tr>
<tr>
<td>D. Acceptance and Action Questionnaire</td>
<td>53</td>
</tr>
<tr>
<td>E. Demographics Questionnaire</td>
<td>54</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chapter V</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Launay-Slade Hallucination Scale-Revised</td>
<td>86</td>
</tr>
<tr>
<td>B. Metacognition Questionnaire-30</td>
<td>87</td>
</tr>
<tr>
<td>C. Emotion Regulation Questionnaire</td>
<td>88</td>
</tr>
<tr>
<td>D. Acceptance and Action Questionnaire</td>
<td>89</td>
</tr>
<tr>
<td>E. Difficulties in Emotion Regulation Scale</td>
<td>90</td>
</tr>
<tr>
<td>F. Approval Letter from Xavier University IRB</td>
<td>91</td>
</tr>
<tr>
<td>G. Demographics Questionnaire</td>
<td>92</td>
</tr>
</tbody>
</table>
Acknowledgments

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Chapter I

Review of the Literature

Historically, hallucinations have been thought to be an indication of severe psychopathology, especially psychosis (American Psychiatric Association [APA], 2000), but more recent research has suggested that hallucinations may occur in other contexts. The *Diagnostic and Statistical Manual Fourth Edition-Text Revision* (DSM-IV-TR; APA, 2000), defines hallucinations as “a sensory perception that has a compelling sense of reality of a true perception, but occurs without external stimulation of the relevant sensory organ” (p. 823). Hallucinations occur in each of the sensory modalities: auditory, visual, tactile, olfactory, and gustatory, although auditory hallucinations are the most common (APA, 2000), and therefore they have been researched most frequently. Hallucination-like experiences such as hearing one’s name called when it has not been or hearing something when falling asleep (hypnagogic) or waking up (hypnopompic) are considered to be within the normal range of experience and are not characteristic of any type of pathology (APA, 2000).

In order to be considered a true hallucination, the experience must occur during clear sensorium, which distinguishes hallucinations from sensory changes that occur during delirium (APA, 2000). Delirium can sometimes present itself as a hallucinatory experience, but, by definition, delirium occurs when there is a “disturbance of consciousness and a change in cognition that develop over a short period of time” (APA, p. 135). This type of disturbance of consciousness occurs due to a variety of
physiological and medical conditions such as head trauma, vascular diseases, infections, and brain tumors. Whereas delirium is accompanied by a reduced awareness of one’s environment, hallucinations occur when one is aware of his or her surroundings and are not caused by medical or physiological conditions. Another important distinction to be made is that between hallucinations and illusions. Illusions occur when an external stimulus is misperceived, such as when one perceives a sound to be coming from one place when it is actually originating from another place. Auditory hallucinations occur when no external stimulus is present (APA, 2000).

As mentioned earlier, auditory hallucinations are the most commonly reported type of hallucination and usually manifest as voices (APA, 2000). There is some disagreement about whether voices or sounds perceived as coming from inside the head should be considered auditory hallucinations. The DSM-IV-TR does not make a distinction, but some clinicians feel that voices or sounds experienced as internal are not hallucinations (Sims, 1995). Experiences of a running commentary of voices or multiple voices conversing are considered to be symptomatic of severe psychopathology, specifically schizophrenia (APA, 2000). Other experiences of voices or sounds may be related to other psychological factors; these types of experiences have been observed in individuals during periods of bereavement, drug intoxication, sensory deprivation, religious or spiritual experiences, and neurological disorders (Tien, 1991).

Baker and Morrison (1998) suggested that some reports of auditory hallucinations are the result of misattribution of the auditory stimulus, particularly a failure to distinguish internal speech or thoughts from true hallucinations. The internal speech that most people use to problem-solve or direct behavior has been referred to as the conscious
or metacognitions (Young, 2008). When they misattribute internal speech, individuals do not take ownership of their thoughts, leading them to believe the thoughts are foreign. In turn, they may experience (and report) them to be auditory hallucinations rather than their own thoughts.

**Prevalence of Auditory Hallucinations**

Auditory hallucinations occur among individuals of all ages and backgrounds. Several studies have investigated the prevalence of reported auditory hallucinations in the general population, and these studies have suggested that auditory hallucinations are much more prevalent in healthy populations than initially thought, especially among college age individuals. Slade and Bentall (1988) found that 10-25% of the general population reported experiencing possible auditory hallucinations in their lifetime. Posey and Losch (1983) found that 39% of the college students they surveyed reported hearing their own thoughts aloud and 5% reported having conversations with the voices. While these experiences do not necessarily meet the definition of a hallucination, they do suggest that “hearing voices” is not as unusual as is sometimes assumed.

Similarly, Barrett and Etheridge (1992) completed two studies that examined college students’ experiences of possible auditory hallucinations. In the first study, a sample of 586 students completed a modified version of the Verbal Hallucination Questionnaire (VHQ; Posey & Losch, 1983). They found that 30-40% of college students reported experiencing auditory hallucinations, even when excluding experiences associated with the use of substances. Participants in the second study consisted of 183 college students from the first study whose score was in the top 25% of the distribution on the VHQ. These participants’ scores on the Minnesota Multiphasic Personality
PREDISPOSITION TO HALLUCINATIONS

Inventory (MMPI; Hathaway & McKinley, 1967) and Symptom Checklist-90-Revised (SCL-90-R; Derogatis, 1983) were compared to the scores of participants who denied auditory hallucinations. Notably, the groups did not differ significantly on the MMPI or SCL-90-R scales, suggesting that hallucinations may be unrelated to psychopathology, leading the researchers to believe that not all auditory hallucinations are pathological or harmful.

Studies have also examined the prevalence of the experience of auditory hallucinations at different stages of life. Pearson and colleagues (2008) examined auditory hallucinations in 250 adolescents and 246 college students, using the VHQ (Posey & Losch, 1983-84). They found similar rates of reported auditory hallucinations between these groups; 37% of the adolescent participants and 35% of the young adult participants reported experiencing isolated auditory hallucinations. However, in this study, experiences associated with substance use were not excluded. Pearson and colleagues suggest that experiences of auditory hallucinations may fall on a continuum between adolescents and adults.

Several other studies have also examined the prevalence of auditory hallucinations across the developmental lifespan, and these studies have also found that children, adolescents, and adults reported experiencing auditory hallucinations outside the context of a psychotic psychiatric disorder, dementia or delirium. For example, Dhossche, van der Ende, Hofstra, and Verhulst (2002) asked a sample of adolescents (ages 11-18) to complete the Youth Self-Report (YSR; Achenbach, 1991) at two time periods separated by eight years. Participants were also administered the Composite International Diagnostic Interview (CIDI; World Health Organization, 1992) in order to
PREDISPOSITION TO HALLUCINATIONS

systematically determine if the participant met criteria for a psychiatric diagnosis.

Prevalence of self-reported auditory hallucinations based on the YSR was 5% for adolescents aged 11-18 years, and 2% for the same individuals when they were ages 19-26. The participants who reported auditory hallucinations in early adolescence were more likely to report symptoms associated with a psychiatric disorder such as a depressive disorder, substance abuse disorder, or a posttraumatic stress disorder. Dhossche et al. also found that those adolescents who reported auditory hallucinations were at a significantly increased risk of being diagnosed with a depressive disorder and/or substance abuse eight years later (ages 19-26). In contrast to Barrett and Etheridge (1992), Dhossche et al.’s (2002) findings tie the experience of hallucinations to a variety of psychiatric difficulties.

Depression has been associated with the experience of auditory hallucinations in children, adolescents, and adults in several studies (Best & Mertin, 2007; De Loore et al., 2011; Dhossche et al., 2002). For example, De Loore and colleagues (2011) examined how the report of auditory hallucinations was related to depression in 1,780 adolescents, 13-16 years old, who underwent interviews that included questions about auditory hallucinations over two years. At the initial interview (T0), 93 participants (27%) reported experiencing hallucinations; 27% of this group reported experiencing auditory hallucinations two years later. They also found that adolescents who reported auditory hallucinations, whether persistent or non-persistent, at the initial contact were significantly more likely to report symptoms of depression two years later. The authors also found that individuals who reported hallucinations at only the initial interview were more likely to report delusional ideation and general psychopathology two years later. No participants reported hallucinations at T1 but not at T0. These results are consistent with
Dhossche et al.’s in finding a relationship between auditory hallucinations and a broad range of psychopathology, especially depression.

Several studies have sought to explore individuals’ unique experiences of auditory hallucinations. Honig and colleagues (1998) examined the experience of auditory hallucinations in 33 psychiatric patients and 18 non-patients. All participants engaged in a semi-structured interview that examined the characteristics of the hallucinations, such as frequency, content, and emotional quality, and the gender and age of the individuals reporting hallucinations. They found that the psychiatric patient group experienced their auditory hallucinations as significantly more negative than the non-patient group. The psychiatric patient group was also more afraid of their auditory hallucinations. Honig et al. interpreted their findings to suggest that auditory hallucinations may be experienced differently based on the positive or negative value that the individual attributes to the hallucinations.

As the results of Honig et al. (1998) suggest, the interpretation of auditory stimuli can play an important role in how the individual experiences them. In fact, Jenner, Rutten, Beuckens, Boonstra, and Systema (2008) found that some people who report auditory hallucinations experience them as positive, even pleasurable, and the positive experience of auditory hallucination occurs more often than was previously thought. Jenner et al. investigated reports of auditory hallucinations in individuals from an outpatient facility and compared their experiences with individuals from the Dutch Resonance Foundation (DRF), a group that views auditory hallucinations positively. Based on participants’ responses to the Positive and Useful Voices Inventory, 52% of the outpatient participants and 75% of the DRF participants reported experiencing
pleasurable hallucinations. Additionally, 40% of outpatient participants and 62% of the
DRF participants described their hallucinatory experiences as useful (Jenner et al., 2008).
Although the percentage of positive DRF respondents was significantly greater than
outpatients in all of these areas, the high percentage of the outpatient participants who
described their hallucinatory experiences as pleasurable is striking, as it runs counter to
most clinical assumptions about hallucinations, as well as some previous studies (Cottam
et al., 2011; Honig et al., 1998).

To further examine the prevalence rates of positive, pleasurable hallucinations,
Sanjuan, Gonzalez, Aguilar, Leal, and van Os (2004) asked 106 outpatient adults (19-75
years old) who reported auditory hallucinations and were taking antipsychotic
medications to complete the auditory hallucination subscale of the Psychotic Symptom
Rating Scale (PSYRATS; Haddock, McCarron, & Tarrier, 1999). In this sample, 26%
reported experiencing pleasurable “voices” at least occasionally, with 35% of these
participants reporting pleasurable hallucinatory experiences frequently. They found a
positive relationship between reports of pleasurable auditory hallucinations and perceived
control over the voices. The results also indicated that pleasurable hallucinations may be
associated with the duration and frequency of the hallucinations.

Research has also examined the meanings and perceptions of hallucinations
among people of various ethnic backgrounds and religious affiliations (Al-Issa, 1995;
Cottom et al., 2011). According to Al-Issa (1995), Western cultures consider
hallucinations to be a deviation from reality, whereas many non-Western cultures do not
make a clear distinction between hallucinations and reality. In some cultures,
hallucinations are attributed to the presence of spirits and/or a trance. Cultural beliefs
PREDISPOSITION TO HALLUCINATIONS

may also increase the expectancies of certain types of hallucinations. For example, the Mitsogho tribe in Gabon use hallucinogenic drugs to increase their suggestibility (Al-Issa, 1995).

Cottom and colleagues (2011) compared the experience of auditory hallucinations in 20 mentally healthy Christians, 15 Christians with psychosis, and 14 nonreligious patients with psychosis. Participants completed the Launay-Slade Hallucination Scale (LSHS; Launay & Slade, 1981), a modified version of the Topography of Voices Rating Scale (Hustig & Hafner, 1990), the Affective Experiences Questionnaire (Davies, Griffin & Vice, 2001), and the Cognitive Assessment of Auditory Hallucinations (Chadwick & Birchwood, 1994) to assess the content, meaning, power, and source of the auditory hallucinations. Christian and nonreligious patients heard voices significantly more frequently than mentally healthy Christians, although Cottom et al. do not report specific percentages for these findings. Patients reported experiencing more distress when hearing voices than mentally healthy Christians. All of the mentally healthy Christians and 67% of the Christian patients reported the auditory hallucinations as having a religious content, while 23% of the nonreligious patients reported their hallucinations as having a religious identity (Cottom et al., 2011).

Metacognitions

Metacognitions are defined as “awareness or analysis of one’s own learning or thinking processes” (Merriam-Webster, 2010). In 1979, Flavell extended the generic definition to include knowledge of cognitive processes and the knowledge of cognitive regulation (Livingston, 1997). Metacognition is often thought of as thinking about
thinking. In other words, it is a conscious awareness of the cognitive processes taking place.

According to Wells (2009), metacognition controls the processes of awareness and is comprised of three different components: metacognitive knowledge, metacognitive experiences, and metacognitive strategies. Metacognitive knowledge is the set of beliefs people have about their own thinking. These beliefs can be explicit (verbally expressed) or implicit (nonverbal). Metacognitive experiences are appraisals of feelings and situations that individuals have of their mental state, whereas metacognitive strategies include responses that are made to change or control one’s thinking in order to regulate emotions and cognitions (Wells, 2009).

Wells and Matthews (1994) developed the Self-Referent Executive Function model (S-REF) to describe the role that metacognitions play in psychological disorders. This model conceptualizes metacognition as a top-down control mechanism that can maintain emotional disorders (Wells, 2009). The model suggests that some individuals have a vulnerability to psychological dysfunction that can arise out of cognitive-attentional syndrome (CAS). The CAS consists of elevated self-focused attention, ruminative processing, and dysfunctional beliefs. These features are problematic when the level of self-focus and processing of internal events becomes the individual’s primary focus. This type of self-focus intensifies self-monitoring and activates hypervigilant self-appraisals and attentional biases. For example, when individuals have social anxiety, they often have anticipatory anxiety in which they ruminate on what they will say or how they will act in a given situation. They will also pay particular attention to their physiological
experiences, which can cause them to become even more hypervigilant about their internal experiences and thoughts.

Metacognitive knowledge contributes to the self-focused nature of CAS (Wells, 2007). As mentioned earlier, metacognitive knowledge consists of positive and negative metacognitive beliefs, or self-knowledge. Positive metacognitive beliefs focus on the usefulness of worry, rumination, and threat monitoring. An example of a positive metacognitive belief is believing that worrying will make one prepared for an event (Wells, 2007). Negative metacognitive beliefs focus on the uncontrollability, danger, and importance of thoughts (Wells, 2009), such as the belief that certain thoughts have the power to make bad things happen or to cause danger (Wells, 2007). Wells contends that negative metacognitive beliefs can lead to the development of psychopathology.

Metacognition develops over time throughout childhood and into adolescence. Children develop different aspects of metacognition (inner speech and conscious awareness) at varied rates. Although metacognition does not develop at the same rate in all children, Flavell, Green, and Flavell (1995) found that most children ages 3 to 5 years were able to understand certain aspects of thinking. For example, most children are capable of recognizing that individuals have some sort of mental activity taking place, but they are unable to understand that mental activity occurs even when people sit silently. The researchers also found that the children had trouble recalling their own thinking. These results suggest that small children have a limited understanding of thought and lack the capacity to realize that thinking can take place without overt verbalizations.

Cartwright-Hatton and Wells (1997) suggested that a lack of understanding of metacognitive processes can support the development of psychopathology, especially
anxiety disorders. Worry is the main cognitive process at work in anxiety disorders. Worry becomes pathological in nature when an individual begins to “worry about worry,” which is a form of metacognition. Positive metacognitive beliefs can lead individuals to continue utilizing worry-like cognitive strategies through reinforcement, while negative beliefs lead to concerns about uncontrollability of thoughts and that thoughts can be dangerous (Cartwright-Hatton & Wells, 1997). This repeated worry and the negative appraisals associated with the worries are central to pathological worry. The development of this type of pathology can occur from rumination due to the lack of perceived control over one’s thoughts, or on the other hand, by excessive attempts to control one’s thoughts through suppression.

Cartwright-Hatton and Wells’ (1997) conceptualization of how metacognition relates to pathological worry, or anxiety disorders, prompted them to create a measure that would assess the beliefs and worries that an individual has about intrusive thoughts, the Metacognitions Questionnaire (MCQ; Cartwright-Hatton & Wells, 1997). The MCQ is comprised of five distinct factors associated with metacognitions including: positive beliefs about worry; negative beliefs about thoughts and corresponding danger; cognitive confidence; superstition, punishment and responsibility; and cognitive self-consciousness.

**The Role of Metacognition in Auditory Hallucinations**

Some researchers contend that individuals sometimes report auditory hallucinations because they have misattributed normal internal events or thoughts to an external source (Baker & Morrison, 1998). Morrison and Haddock (1995) suggested that this misattribution may allow individuals to reduce the cognitive dissonance, or internal
conflict, they would feel when their thoughts do not coincide with their values or beliefs. By misattributing thoughts as voices that may not align with their beliefs or value system, they can avoid the distress of the conflicting thoughts.

To test this idea, Baker and Morrison (1998) compared participants diagnosed with schizophrenia who reported auditory hallucinations with other participants diagnosed with schizophrenia who were not reporting hallucinations on a word association task. The patients were asked to come up with a word in response to a presented word. The patients rated how much control they felt they had over the word that came to mind, how much they felt the word was their own (internality), and how much they wanted to think of that word rather than another. The two groups were compared to establish whether patients with hallucinations experienced an attributional bias regarding how they perceived the words they generated. The patients reporting hallucinations rated their words significantly lower on internality than controls, indicating that they believed the words were not generated in their own minds. Patients reporting hallucinations also believed they had less control over their responses on the word association task. This research illustrates how attributional biases may cause individuals to believe their thoughts are external voices, when in actuality, they are the one who is thinking the thought.

Another aspect of metacognition that may be related to hallucinations is the familiarity one has with his or her own lexical (word) thinking (Heilbrun, 1980). Heilbrun (1980) suggested that individuals reporting auditory hallucinations may be less familiar with their own thinking or internal voices, which is similar to Flavell et al.’s (1997) concept of inner speech. In order to test the hypothesis of lexical familiarity,
Heilbrun examined the performance of 20 psychiatric inpatients on a recognition test. He found that the participants experiencing hallucinations were less able to identify their own words, their meaning in statements, and their grammatical style in the items presented to them than the non-hallucinating group. Heilbrun interpreted these results to suggest that individuals who were less familiar with their own lexical thinking have trouble distinguishing internal thoughts from external voices, because they are unfamiliar with their own lexical expression. This unfamiliarity may result in the individual interpreting normal thought processes as auditory hallucinations.

Deficits in metacognitions seem to play an important role in the experience of auditory hallucinations. García-Montes, Perez-Álvarez, Balbuena, Garcelán, and Cangas (2006) compared the experiences of a nonclinical group and several clinical groups: current-hallucinators, individuals diagnosed with OCD, individuals diagnosed with schizophrenia who had never hallucinated, individuals diagnosed with schizophrenia who had not hallucinated in the previous six months, and a clinical control group with other psychiatric problems that did not involve hallucinations. The participants completed the MCQ and the Launay-Slade Hallucinatory Scale (Launay & Slade, 1981). The current hallucinators, the group diagnosed with OCD, and the clinical control group scored significantly higher on the negative beliefs about the uncontrollability and danger of thoughts scales of the MCQ than the nonclinical group. This finding is consistent with the findings of Baker and Morrison (1998) and supports Heilbrun’s (1980) contention that some individuals experiencing hallucinations, as well as others who experience various forms of psychopathology, believe that they have little or no control over their thoughts, especially if they are negative and/or dangerous.
Using Wells and Matthews’s (1994) S-REF model, some studies have demonstrated that participants experiencing auditory hallucinations and those who were highly predisposed to experiencing auditory hallucinations scored significantly higher on negative beliefs about uncontrollability when compared to individuals who were not experiencing hallucinations (Baker & Morrison, 1998; Morrison, Wells, & Nothard, 2000). Baker and Morrison (1998) assessed attributorial biases and metacognitive factors associated with auditory hallucinations in three groups of participants; 15 hallucinating participants who met criteria for schizophrenia, 15 non-hallucinating participants who met criteria for schizophrenia but had not experienced auditory hallucinations in the past three years, and 15 non-psychiatric participants who had not experienced any psychiatric illness in the past three years and never experienced auditory hallucinations. All participants completed the National Adult Reading Test (NART; Nelson, 1982), the Hospital Anxiety and Depression Questionnaire (HAD; Zigmond & Snaith, 1983), the MCQ, a word association task, and a structured interview.

Participants in the hallucinating group had lower scores on the word association task than the other two groups, indicating they had lower levels of internality and ownership for the self-generated words. The hallucinating group also had lower ratings of control on the task, suggesting they felt less in control of their own thought processes than the other groups. On the MCQ, the hallucinating group scored significantly higher than the other groups on the factors ‘positive beliefs about worry’ and ‘beliefs about controllability.’ Regression analyses indicated that their scores on the negative beliefs about uncontrollability and danger subscales were the only significant predictors of auditory hallucinations (Baker & Morrison, 1998). These results suggest the way
individuals view the content, controllability, and the nature of their thoughts may be related to the likelihood that they will experience auditory hallucinations.

**Emotion Regulation**

Recent research has focused on the relationship between emotion regulation and the experience of auditory hallucinations. In particular, Badcock, Paulik and Maybery (2011) have suggested that individuals who report auditory hallucinations may also experience high levels of anxiety and depression. Although research is lacking in this area, Badcock et al. suggest that individuals reporting auditory hallucinations may have maladaptive emotion regulation skills, which further exacerbates their distress.

Emotion regulation does not have a single definition but generally refers to the use of cognitive and behavioral processes that are utilized to moderate and manage one’s emotions in various situations. This includes “access to the range of emotions, flexible modulation of intensity, duration, and transitions between emotions, acquisition and use of cultural display rules, and the ability to reflect on the complexity and value of one’s own emotions in a self-supporting manner” (Cole, Michel, & Teti, 1994, p. 73). Emotion regulation has been viewed from a developmental perspective (Kopp, 1989; Campos & Barrett, 1984). From this perspective, learning how to tolerate and modulate emotions as an infant is extremely important. As one grows and matures, emotion regulation continues to play an important role in one’s day to day functioning; in fact, acquiring the skills necessary to manage one’s emotions is viewed as a major developmental task in childhood (Kopp, 1989).

Many forms of psychopathology, such as depression, anxiety, eating disorders, and borderline personality disorder (BPD) are related to ineffective emotion regulation
PREDISPOSITION TO HALLUCINATIONS

(Cole et al., 1994). Adequate emotion regulation has been associated with better mental health, whereas emotion dysregulation is often associated with increased risk of psychopathology (Cole et al., 1994). Emotion dysregulation refers to difficulty managing negative affect and emotional expression and can take the form of overregulation or under-regulation.

According to Gross (2002), emotion regulation strategies are a coordinated set of response tendencies that include physiological, behavioral, and experiential responses that impact how one responds to perceived challenges. Emotion regulation strategies are utilized consciously and unconsciously (Gross & Thompson, 2007). Emotion regulation capacities develop throughout infancy and into childhood and adolescence. After birth, infants depend on caregivers to help manage their emotions, but as they grow and enter childhood, their language comprehension grows and allows them to have a better and more complex understanding of emotions. During childhood, children learn what emotions are adaptive or maladaptive and implement different strategies to manage their emotions.

As children grow and begin to enter adolescence, emotions become increasingly more complex and one’s emotion regulation capacities develop in accordance with their personality (Gross & Thompson, 2007). Effortful control, the ability to inhibit a preferred response in order to have an alternate response, is linked to emotion regulation (Rothbart & Sheese, 2007). Individuals with increased effortful control are better able to manage their affective responses than individuals that lack effortful control capabilities. Other personality traits related to emotion regulation include: conscientiousness, extraversion, neuroticism, openness to experience, and agreeableness (Rothbart & Sheese, 2007).
Individuals have a tendency to use certain emotion regulations strategies more than others. Some of these strategies include cognitive reappraisal, expressive suppression, and various types of avoidance. The frequency with which individuals use particular strategies is contingent upon personality characteristics and self-perceived capability to be successful with a particular strategy (John & Gross, 2007). An individual’s expectations in conjunction with their personality factors are central in determining what the strategy an individual will attempt to use. Although there is consistency in use of emotion regulations strategies across time and situations, their use has not been described as a “trait” and the development of effective emotion regulation strategies has been the focus of interventions such as Dialectic Behavior Therapy (DBT; Linehan, 1993), suggesting that this feature of functioning can be altered.

As mentioned, emotion dysregulation has been associated with various psychiatric disorders, including depression, anxiety, schizophrenia, eating disorders and BPD (Cole et al., 1994), and several interventions for these disorders include emotion regulation skills as an important aspect of treatment. Specifically, Dialectical Behavior Therapy (DBT), developed to treat BPD, incorporates adaptive emotion regulation skills into treatment (Linehan, 1993). Other theories and interventions have been developed to improve emotion regulation across a variety of disorders, these include cognitive reappraisal (Gross, 2001) and Acceptance and Commitment Therapy (ACT; Hayes, Strosahl, & Wilson, 1999).

*Cognitive Reappraisal and Expressive Suppression*

Gross (2001) created a process model of emotion regulation to explain how emotions can be influenced and experienced in various ways. According to this model,
emotion regulation is divided into two general types of strategies: antecedent-focused and response-focused. Antecedent-focused strategies refer to things that individuals can do before their emotions have become fully activated; this allows them to keep their extreme emotions from affecting their behavior. Response-focused strategies are things that individuals do after they have started experiencing emotions and once the response tendency has been created. According to Gross, there are five categories of emotion regulation strategies: situation selection, situation modification, attentional deployment, cognitive change, and response modulation. Cognitive change refers to the meaning one gives a particular situation, and response modulation refers to the attempts one makes to change emotion response tendencies once they have already started. These two strategies are the focus of Gross’s research because of their widespread use (Gross & John, 2003).

Cognitive reappraisal is a type of emotion regulation strategy that is part of cognitive change and is an antecedent-focused strategy (Gross, 2002). Cognitive reappraisal refers to the intentional interpretation of an emotion-evoking situation in a non-emotional way. Expressive suppression, a response-focused strategy, is a type of response modulation in which individuals inhibit their emotional expression to an emotion-evoking situation (Gross, 2002).

Gross and John (2003) conducted a series of studies that compared the use of reappraisal and suppression and the consequences of using each strategy. All of the studies were based on the responses of 1,483 undergraduate student volunteers. The first study examined the demographic characteristics of individuals who used reappraisal or suppression. The participants completed the Emotion Regulation Questionnaire (ERQ; Gross & John, 2003), which identifies whether an individual has a tendency to use
PREDISPOSITION TO HALLUCINATIONS

reappraisal or suppression. They found both gender and ethnic differences in the use of these strategies: men scored significantly higher on the Suppression scale than women, but there were no gender differences on the Reappraisal scale. Latino, African American, and Asian American individuals scored significantly higher on the Suppression scale than European Americans.

The second study examined how the use of suppression or reappraisal may be related to overall adjustment (Gross & John, 2003). In this study, participants’ ERQ scores were compared to a variety of other scales that assessed mood management, inauthenticity, rumination, and coping mechanisms. The ERQ Suppression score was significantly correlated with inauthenticity, but the Reappraisal score was not. Gross and John interpreted this finding to suggest that those who tend to use suppression are aware of their lack of authenticity when they intentionally do not express their emotions. The Reappraisal score was significantly correlated with coping through reinterpretation, meaning that participants reported changing their thoughts to be more optimistic and learning from their experience. The Suppression score was significantly correlated with coping through venting, or overtly expressing their distress, and with rumination, suggesting that those who use suppression are more likely to ruminate about their negative moods and periodically express emotional experiences strongly (Gross & John, 2003).

The third study explored how well close acquaintances were able to provide accurate reports of the participants’ emotional expressions (Gross & John, 2003). Participants completed the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) while their peers rated the emotions the participants typically
expressed when interacting with others by rating the degree to which the participants control their emotions by not expressing them and their ability to change the way they think about a situation. Participants’ Reappraisal scores were significantly correlated with positive emotions (based on both self-report and peer report), indicating that the use of reappraisal was related to the experience of positive emotion. Suppression scores had a significant negative relationship with expression of positive emotion, based on both self- and peer-report, suggesting that the use of suppression is related to decreased experience of positive emotion. The correlation between Suppression score and negative emotions was not significant.

Gross and John (2003) also explored the relationships between reappraisal, suppression, social functioning, and the experience of depressive symptoms. In these studies, they examined participants’ responses to measures that assessed their social relationships and depressive symptoms, in addition to the previously described measures. They found that the Reappraisal score was significantly positively correlated with sharing emotions with others, whether positive or negative, and significantly negatively correlated with depressive symptoms. That is, participants who used reappraisal also appeared to have closer relationships and were better liked by their peers than those who used suppression. Suppression was negatively related to sharing emotions with others, whether positive or negative, and positively related to avoidance in relationships with others (Gross & John, 2003). Suppression was positively correlated with experiencing depressive emotions and feeling less satisfied with their lives. These results suggest that the habitual use of suppression is related to depressive symptoms, decreased life satisfaction, and less intimate relationships.
Ehring and colleagues (2010) explored how individuals’ use of spontaneous reappraisal and suppression differs from instructed reappraisal and suppression when exposed to depressive stimuli. They asked 73 undergraduate students, 41% of whom had experienced at least one major depressive episode, to complete the German version of the Beck Depression Inventory (BDI; Hautzinger, Baier, Worall, & Keller, 1995), the ERQ, and the German version of the Nonacceptance scale on the Difficulties in Emotion Regulation Scale (DERS; Ehring, Fischer, Schnülle, Bösterling, & Tuschen-Caffier, 2008). The participants then watched three film clips; the first was used to elicit neutral emotions and the other two to elicit a sad mood. Between each clip, participants completed a distraction task that was designed to bring their mood back to baseline. In the first sadness-inducing clip, no instructions were given to influence participants’ emotion regulation strategy. In the second sadness-inducing clip, the participants were randomly instructed to use reappraisal or suppression if they experienced an emotion during the clip. Participants then completed the Strategies Questionnaire and the German version of the PANAS (Krohne, Egloff, Kohlmann & Tausch, 1996). Participants who had experienced a major depressive episode obtained significantly higher scores on the suppression portion of the Strategies Questionnaire, indicating that they suppressed their emotional experiences significantly more than the never-depressed individuals, and scored significantly higher on the Nonacceptance scale on the DERS. Further analyses revealed that participants in the instructed reappraisal condition experienced less negative mood during the film clip than those in the instructed suppression condition (Ehring et al, 2010). These results indicate that the use of reappraisal is linked to less negative emotions than the use of suppression.
**Experiential Avoidance and Acceptance**

Experiential avoidance is an emotion regulation strategy that involves negative evaluations of private events, such as thoughts, feelings, sensations, and intentional attempts to escape events (Kashdan, Barrios, Forsyth, & Steger, 2006). While at times experiential avoidance can be a protective strategy, use of avoidance becomes problematic and pathological when it is excessively and rigidly used to avoid all unpleasant experiences. Continual use of avoidance increases the distress associated with the events and can lead one to feel inauthentic (John & Gross, 2004). Research suggests that experiential avoidance is related to trait anxiety and anxiety sensitivity (Kashdan et al., 2006). Avoidance was also a predictor of daily anxiety-related pathology and emotional distress. This research suggests that use of avoidance is an influential factor in the etiology and maintenance of anxiety disorders. Kashdan and colleagues propose that frequent reliance on experiential avoidance is related to a general psychological vulnerability. Several interventions have been developed to address the problems associated with experiential avoidance, one of which is Acceptance and Commitment Therapy.

Acceptance and Commitment Therapy (ACT; Hayes, Strosahl, & Wilson, 1999) is part of what is referred to as the third generation of behavior therapy. ACT incorporates acceptance, mindfulness, and values clarification into traditional behavior therapy techniques. ACT is based on the theory that psychopathology emerges from the interaction of language and reasoning. This interaction is sometimes maladaptive and prevents the individual from changing his or her behavior. In this model, the lack of flexibility in behavior is created from poor control over the content and perspective of
PREDISPOSITION TO HALLUCINATIONS

one's thoughts. Cognitive fusion occurs when individuals cannot properly regulate their behavior through verbal processes such as rules or values. This becomes problematic when verbal processes are not in line with environmental or contextual stimuli (Hayes et al., 2006). ACT is based on the idea that maladaptive behaviors are created by unsuccessful attempts to avoid or suppress thoughts and feelings (Bach & Hayes, 2002).

ACT is comprised of six core processes: acceptance, cognitive defusion, being present, self as context, values, and committed action (Hayes et al., 2006). Acceptance refers to the active process of being nonjudgmental about internal experiences rather than intentionally avoiding a distressing situation or stimuli. Cognitive defusion refers to the techniques involved in changing the undesirable functions of thoughts by creating contexts in which these functions are weakened. Being present refers to an individual’s ability to remain in contact with the psychological and environmental aspects of a current situation while remaining non-judgmental. Individuals are encouraged to use language to focus on what is occurring rather than trying to predict or judge a situation. Human language, such as “I,” “you,” “now,” and “then,” creates a phenomenon in which sense of self is a perspective that elicits feelings of ownership. It is important for individuals to be able to separate themselves from that perspective and view their experiences objectively and from a distance. Values are a central aspect of ACT because one’s values impact the way one will behave in a given situation which may include avoidance or social compliance. ACT uses values to help individuals make choices while at the same time preventing their verbal processes from allowing them to make choices based on avoidance. Committed action refers to the focus on behavioral change in traditional
behavior therapies. A commitment to behavior change is central to ACT (Hayes et al., 2006).

**Role of Emotion Regulation in Auditory Hallucinations**

Although ACT is a newer therapy and has not been empirically validated, several studies have examined the use of ACT with individuals who are experiencing psychotic symptoms such as auditory hallucinations (Bach & Hayes, 2002; Guadiano & Herbert, 2006). Bach and Hayes examined the use of ACT with 80 psychotic psychiatric inpatients that were experiencing auditory hallucinations or delusions and were at risk for re-hospitalization; patients with substance-induced psychosis, dementia, delirium, or a contributing medical condition were not included in this study. Participants were randomly assigned to either treatment as usual (TAU), which involved medication, psychoeducational groups, and individual psychotherapy, or to TAU and four individual ACT sessions.

Participants completed measures assessing the frequency, distress, and believability associated with their delusions or hallucinations. Re-hospitalization data were collected at a four month follow-up period from the hospital records. Seven (20%) of the ACT participants were re-hospitalized compared to 14 (40%) of the TAU patients. Interestingly, participants in the ACT condition reported experiencing more psychiatric symptoms than the TAU participants but avoided re-hospitalization at a higher rate. Bach and Hayes (2002) suggest that this may be due to the participants’ greater acceptance of their symptoms, which may make them more likely to acknowledge the symptoms. Participants in the ACT condition reported a significant decrease in the believability of
PREDISPOSITION TO HALLUCINATIONS

their delusions and hallucinations from admission to the hospital to follow-up, while participants in the TAU condition did not report a significant decrease.

Guadiano and Herbert (2006) also examined the use of ACT with psychotic patients. Participants included 40 adult inpatients that were recruited from a university-based hospital psychiatric unit. Participants were assigned randomly to either the TAU condition, which included medication, case management, and psychotherapy, or to the TAU plus ACT condition which consisted of several individual ACT sessions depending on the length of stay. Participants completed the Brief Psychiatric Rating Scale (BPRS; Overall & Gorham, 1962), the Clinical Global Impressions Scale (CGI; National Institutes of Mental Health, 1985), the Sheehan Disability Scale (SDS; Leon, Olfson, Portera, Farber, & Sheehan, 1997) and several self-ratings of their psychotic symptoms upon admission and before discharge. Re-hospitalization data were collected four months after discharge by contacting the patients' insurance providers. The ACT condition participants showed significantly greater improvement compared to the TAU participants post-treatment based on their scores on the BPRS, CGI, SDS, and self-ratings. Nine (45%) of the participants in the TAU condition were re-hospitalized, compared to five (28%) of the participants in the ACT condition. Further analyses indicated that the ACT group showed a medium effect size for change on the BPRS at post-treatment. Finally, analyses showed that change in the believability of hallucinations was an independent predictor of change in distress in the ACT group but not in the TAU group. These results suggest that ACT is effective in reducing affective severity and distress associated with hallucinations.
As the preceding review of the literature has shown, recent research suggests the need to understand auditory hallucinations in a broader way. Studies have examined differences between individuals who report experiencing auditory hallucinations and those who do not (risk for psychiatric disorders; De Loore et al., 2011; Dhossche et al., 2002). Research has also investigated the links between auditory hallucinations and metacognitions, which reflects an individual’s understanding of, acceptance of, and control over his or her thought processes (Baker & Morrison, 1998; García-Montes et al., 2006). Indeed, metacognitive beliefs have been shown to play an important role in how an individual interprets the hallucination. Metacognitions can also influence one’s emotion regulation processes. For example, individuals who believe they have little control over their thoughts have been shown to struggle to moderate their emotions. Research examining the relationships between auditory hallucinations and emotion regulation processes is in its infancy, however. The current study aims to further examine the relationship between auditory hallucinations and metacognitive beliefs and also to investigate possible relationships between auditory hallucinations and emotion regulation processes among college students.
Chapter II

Rationale and Hypotheses

Auditory hallucinations have traditionally been associated with severe psychopathology (APA, 2000); however, recent research has suggested that auditory hallucinations can occur in other contexts. Prevalence studies have shown that as many as 30%-40% of college students report experiencing auditory hallucinations in their lifetime (Barrett & Etheridge, 1992; Pearson et al., 2008). Depressive symptoms have been associated with experiences of auditory hallucinations in children, adults, and adolescents (Best & Mertin, 2007; De Loore et al., 2011; Dhossche et. al., 2002). Auditory hallucinations can be experienced differently depending on how the individual perceives or interprets the hallucinations. For example, some research has suggested that some individuals experience their hallucinations as pleasurable or useful (Jenner et al., 2009), although others may interpret their hallucinations as negative or harmful (Honig et al., 1998).

Metacognition plays an important role in how an individual may interpret or experience an auditory hallucination. Metacognitive knowledge, or how I think about our own thinking, contributes to the way in which an individual would experience an auditory hallucination. Research suggests that individuals who believe they have little or no control over their thoughts may feel more threatened by or fearful of hallucinations (Baker & Morrison, 1998; Garcia-Montes et al., 2006). Metacognitive knowledge contributes to increased self-focus and hypervigilance in individuals who are vulnerable
to psychological dysfunction (Wells & Matthews, 1994). Positive metacognitive beliefs focus on the utility of worry and rumination, increasing the likelihood that one will worry or ruminate, whereas negative metacognitive beliefs focus on the lack of control one has over his or her thoughts (Wells, 2007). The combination of positive and negative metacognitive beliefs may affect how one experiences and reacts to experiencing auditory hallucinations. Deficits in metacognition may also influence how one reports the experience of an auditory hallucination. For example, misattributing internal events or thoughts to an external source could lead one to report experiencing auditory hallucinations. Research suggests that individuals experiencing hallucinations may have difficulty recognizing their own thoughts or words as internal (Baker & Morrison, 1998; Heilbrun, 1980).

Emotion regulation processes can be impacted by one’s metacognitions. Emotion regulation consists of the use of both cognitive and behavioral strategies to manage and moderate one’s emotions (Cole et al., 1994). Emotion regulation strategies such as cognitive reappraisal and expressive suppression involve active, conscious effort (Gross, 2002). Research suggests that the use of reappraisal is linked to experiencing fewer psychiatric symptoms such as depression and is related to the experience of positive emotion (Gross & John, 2003). Other emotion regulation strategies, such as those used in Acceptance and Commitment Therapy (ACT; Hayes et al., 1999), have been found to reduce distress experienced by individuals with psychotic symptoms (Bach & Hayes, 2002; Guadiano & Herbert, 2006). ACT has been linked to a decrease in the believability of hallucinations and an overall improvement in symptomatology.

In light of the above, the following hypotheses will be tested:
H⁰₁: There is no statistically significant difference in avoidance scores (as measured by the AAQ) of individuals who are highly predisposed to report auditory hallucinations versus individuals who have a low predisposition to report auditory hallucinations (as measured by their performance on the LSHS-R).

H⁰₂: There is no statistically significant difference in the suppression scores (as measured by the ERQ) of individuals who are highly predisposed to report auditory hallucinations versus individuals who have a low predisposition to report auditory hallucinations (as measured by their performance on the LSHS-R).

H⁰₃: There is no statistically significant difference in the metacognition scores (as measured by the MCQ-30 subscales: Positive Beliefs, Uncontrollability and Danger, Cognitive Confidence, Need to Control Thoughts, and Cognitive Self-Consciousness) of individuals who are highly predisposed to report auditory hallucinations versus individuals who have a low predisposition to report auditory hallucinations (as measured by their performance on the LSHS-R).

Based on the results of previous studies, it is my expectation that individuals with high predisposition to report auditory hallucinations will have higher scores on the Positive Beliefs, Uncontrollability and Danger, Need to Control Thoughts, and Cognitive Self-Consciousness subscales of the MCQ-30 subscales than individuals with low predisposition to report auditory hallucinations. It is also my expectation that individuals with high predisposition to report auditory hallucinations will score lower on the
Cognitive Confidence subscale of the MCQ-30 than individuals with low predisposition to report auditory hallucinations. Although little research has examined the relationship between auditory hallucinations and emotion regulation strategies, my expectation is that individuals with high predisposition to report auditory hallucinations will score higher on the Acceptance and Action Questionnaire and the suppression factor on the Emotion Regulation Questionnaire than individuals with low predisposition to report auditory hallucinations.
Chapter III

Methods

Participants

Participants in this study will be approximately 325 undergraduate students from Xavier University, which is a mid-sized, private Catholic university in the Midwest. The participants will be recruited through the university’s participant pool. There are no exclusion criteria; this study will be open to all students who are interested. Participants will receive course credit for their participation in the study as determined by their instructors.

Power Analysis

A power analysis was conducted in order to determine the number of participants needed for the ANOVAs using the suggested method by Cohen (1992). In order to detect a medium effect size of $d=0.50$ at an alpha level of 0.05, 65 participants are needed in both the high and low hallucination predisposition groups.

Past research has reported a range of percentages of individuals who are predisposed to experiencing auditory hallucinations, making it difficult to determine the percentage of participants in the present study who will be predisposed to auditory hallucinations. Slade and Bentall (1988) found that 10%-25% of individuals reported an experience of auditory hallucinations, whereas Barrett and Etheridge (1992) found that 30%-40% of individuals reported experiencing auditory hallucinations. In an attempt to avoid overestimating the number of students who will be included in the high
predisposition group, it is expected that approximately 20% of the sample will be highly predisposed. At this rate, it will be necessary to screen 325 participants to obtain 65 participants who are highly predisposed.

**Measures**

*Launay-Slade Hallucination Questionnaire-Revised (LSHS-R)*. The Launay-Slade Hallucination Scale was created by Launay and Slade (1981) and later revised by Bentall and Slade (1985; see Appendix A). The LSHS-R is a 12-item self-report measure that examines predisposition to hallucinations in normal populations. Participants are asked to rate each statement on a five-point Likert scale (0—certainly does not apply to me, 1—possibly does not apply to me, 2—unsure, 3—possibly applies to me, 4—certainly applies to me). Responses from the statements are summed to create a total score. Higher scores indicate increased predisposition to experience auditory hallucinations. For the purposes of this study, the total score will be the only score examined.

The LSHS-R has been modified for this study with the addition of a statement about drug or alcohol use when having a hallucination-like experience. Participants will respond Yes or No to the statement. All participants, regardless of their answer, will be included in the original analyses. Those who report having used drugs or alcohol when having a hallucination-like experience will be compared with those who deny using drugs or alcohol when having a hallucination-like experience in post hoc analyses, providing a large enough sample.

The LSHS-R has an internal consistency of .90 and test-retest reliability of .84 (Fonseca-Pedrero, 2010). Several studies examining the factor structure of the scale revealed three factors (Aleman, Nieuwenstein, Böcker, & De Haan, 2001; Waters,
PREDISPOSITION TO HALLUCINATIONS

Badcock, & Maybery, 2003; Paulik, Badcock, & Maybery, 2006). Aleman et al. (2001) labeled the factors: general hallucinatory tendency, subjective externality of thought, and vividness of day dreams, while Waters et al. (2003) labeled the factors vivid daydreams, hallucinations with religious theme, and auditory/visual hallucinations. Paulik and colleagues labeled the factors similarly to Waters et al. (2006). Specific research examining the validity of the LSHS-R is lacking.

Metacognition Questionnaire-30 (MCQ-30). The Metacognition Questionnaire-30 (MCQ-30) is a short form of the Metacognition Questionnaire developed by Cartwright-Hatton and Wells (1997). The MCQ-30 measures individual differences in metacognitive beliefs and monitoring (Wells & Cartwright-Hatton, 2004; see Appendix B). The scale consists of 30 statements that participants are asked to rate on a four-point Likert scale (1-do not agree, 2-agree slightly, 3-agree moderately, 4-agree very much). An example of a statement is “Worrying helps me cope.” Factor analysis on the scale revealed five factors: Cognitive Confidence, Positive Beliefs, Cognitive Self-Consciousness, Uncontrollability and Danger, and Need to Control Thoughts; six items load onto each factor. Factor correlations range from .26-.63 (Spada, Mohiyeddini, & Wells, 2008). Cognitive Confidence and Cognitive Self-Consciousness have the lowest correlation and Uncontrollability and Danger and Need to Control Thoughts have the highest correlation. The responses to the statements are summed to create a total score and the items from each of the factors are summed to create subscale scores. Higher scores on the MCQ-30 indicate increased proneness to worry and anxiety.

Internal consistency ranges from .72 to .93 demonstrating adequate to high reliability, and test-retest reliability is .75. The factor structure of the MCQ-30 is
consistent with that of the original MCQ, demonstrating adequate construct validity (Wells & Cartwright-Hatton, 2004). The MCQ-30 is correlated with the Penn State Worry Questionnaire (Meyer, Miller, Metzger, & Borkovec, 1990) and demonstrates adequate convergent validity with a correlation of .54.

*Emotion Regulation Questionnaire (ERQ).* The Emotion Regulation Questionnaire measures which emotion regulation strategy an individual is more likely to use (Gross & John, 2003; see Appendix C). The ERQ is a 10-item questionnaire. Participants are given statements that they are asked to rate on a seven-point Likert scale (1-strongly disagree, 4 neutral, 7-strongly agree). An example of a statement is “I keep my emotions to myself.” Responses from each factor are summed to create Reappraisal and Suppression subscale scores.

Factor analyses revealed that the measure consists of two factors: reappraisal and suppression. Internal reliability coefficients are .79 for Reappraisal and .79 for Suppression. Test-retest reliability across three months was .69 for both factors. The ERQ has been compared to the Trait Meta-Mood Questionnaire (Salovey, Mayer, Golman, Turvey, & Palfai, 1995). Convergent validity ranged from -.41 for Suppression to .36 for Reappraisal. When compared to the Big Five Inventory (John & Srivastava, 1999) correlations for Reappraisal ranged from -.20 (Neuroticism) to .15 (Openness); correlations for Suppression ranged from -.41 (Extraversion) to -.11 (Agreeableness). These correlations demonstrate adequate discriminant validity.

*Acceptance and Action Questionnaire (AAQ).* The Acceptance and Action Questionnaire (AAQ) is a measure of experiential avoidance (Hayes et al, 2004; see Appendix D). The AAQ is a 9-item questionnaire. Participants are asked to rate each
statement on a seven-point Likert scale (1-never true, 4-sometimes true, 7-always true). An example of a statement is “When I feel depressed or anxious, I am unable to take care of my responsibilities.” Scores on responses to statements 1, 4, 5, and 6 are reversed; responses to the statements are summed to create a total score. Higher scores indicate more experiential avoidance.

The AAQ has an internal consistency of .70 and a test-retest reliability of .64. The AAQ has been compared to a measure of avoidant coping, the White Bear Suppression Index (Wegner & Zanakos, 1994) with convergent validity ranging from .44 to .50. Construct validity has been established by comparing the AAQ with the Beck Depression Inventory-II (Beck, Steer, & Brown, 1996) and the Beck Anxiety Inventory (Beck, Rush, Shaw, & Emery, 1979). The AAQ demonstrated adequate construct validity with correlation coefficients of .60 and .58 respectively.

Procedure

The proposed study will be reviewed by Xavier University’s Institutional Review Board (approved on 22 September 2012). Once approved, undergraduate students who are participant pool members will be able to read a description of the study on the participant pool bulletin board. The description will inform potential participants that participation is anonymous and will contain slips of paper for participants to take that will have the web address for the study.

When participants enter the survey web-address into their web-browser, they will be taken directly to the informed consent portion of the internet-based survey (Survey Monkey). Participants who choose to consent to participate in the survey will then start completing the LSHS-R, MCQ-30, ERQ, and AAQ. The measures will be presented in
counterbalanced order across participants to avoid any order effects. After completing the four questionnaires, the participants will then complete a demographics questionnaire (see Appendix E). Participants will be prompted to fill in their age, gender, race, ethnicity, religious affiliation and will have the option to fill in any past/present psychiatric diagnosis. Participants will also respond Yes or No to a statement asking about experiencing auditory hallucinations; if the participant responds yes, the participants will be prompted to rate the distress and believability of the experience(s) on a scale from zero to 100 (Bach & Hayes, 2002). Following the demographics questionnaire, the participants will be prompted to enter their name, class and professor in a separate survey. The identifying information is collected for the purpose of awarding credit and is in no way linked to the original survey responses. Upon completion of the survey, participants will be made aware of the purpose of the study and where they can access free counseling services as well as contact information if they have any questions regarding the study or about their rights as research participants.

All participants’ survey responses are completely anonymous and will be stored in a secure database. The information that is gathered for awarding credit for participation will be stored in a separate database which is in no way linked to the survey responses.

For the analysis, participants will be divided into two groups (high predisposition to auditory hallucinations and low predisposition) based on their responses to the LSHS-R. Feelgood and Rantzen (1994) used cutoff scores to determine group affiliation. In the current study, the distribution of scores on the LSHS-R will be examined to determine whether the use of cutoff scores is appropriate.
Chapter IV

Proposed Analyses

The overarching aim of this study is to compare the metacognitive skills and emotion regulation strategies of individuals who are highly predisposed to report auditory hallucinations (HPRA) against individuals who have a low predisposition to report auditory hallucinations (LPRA). Therefore, the overall analysis plan will compare the scores of these groups on relevant self-report measures.

The first and second hypotheses will examine the differences between the HPRA group on all of the emotion regulation measures (AAQ and ERQ). In order to test these hypotheses, a MANOVA will be conducted.

The third hypothesis will examine the difference between the HPRA and LPRA groups on the five MCQ subscales. In order to test this hypothesis, a MANOVA will be conducted.
References


Appendix A

Launay-Slade Hallucination Scale-Revised (LSHS-R)

The Launay-Slade Hallucination Questionnaire-Revised (LSHS-R) was modified from the original scale created by Bentall and Slade (1986) and can be found in Slade, P.D., & Bentall, R.P. (1988). *Sensory deception: A scientific analysis of hallucination.* Baltimore, MD: Johns Hopkins University Press.
Appendix B

Metacognition Questionnaire-30 (MCQ-30)

The Metacognition Questionnaire-30 (MCQ-30) is protected by copyright so it is not reproduced in this document. This measure is available through Guildford Press, at www.guilford.com.
Appendix C

Emotion Regulation Questionnaire (ERQ)

Appendix D

Acceptance and Action Questionnaire (AAQ)

Appendix E

Demographics Questionnaire

Age: ______

Gender: ______

Race: ______

Ethnicity: ____________________________

Religious Affiliation: ____________________

Have you ever been diagnosed with a psychiatric disorder by a mental health provider?

Yes  No  Prefer not to answer

If yes, what was the diagnosis? ____________________________

Have you ever heard voices or other sounds when you were not falling asleep, asleep, or just after waking up?

Yes  No

If yes,

What is it that you hear? (choose all that apply)
   a. sound that is recognizable
   b. voice that is recognizable
   c. sound that is unrecognizable
   d. voice that is unrecognizable
   e. pleasant
   d. unpleasant

On a scale of 0 to 100, how distressed are you when you hear voice(s)/sound(s)?
(0 means not distressed at all, and 100 is the most distressed you've ever been.) ________

On a scale of 0 to 100, to what degree do you believe the voice(s)/sound(s) is true?
(0 means you are certain it is not real or true, and 100 means you are absolutely certain that it is real or true.) ________
Chapter V
Dissertation

Abstract

The purpose of this study was to examine the metacognitive and emotion regulation functioning of college students who have high vs. low predisposition to report experiencing auditory hallucinations. Participants were 375 undergraduate students at a mid-sized, private Catholic university who completed self-report measures of metacognitive beliefs, emotion regulation and predisposition to auditory hallucinations online. Students who reported high predisposition to auditory hallucinations produced significantly higher scores on measures of avoidance when faced with emotional distress, and reported more maladaptive metacognitive beliefs than students who had a low predisposition to report auditory hallucinations. A multiple regression analysis found three predictors for high predisposition to report auditory hallucinations: negative beliefs about uncontrollability and danger, cognitive self-consciousness, and impulse control difficulties. The implications of the current findings, as well as suggestions for future research, are discussed.
Metacognitive Beliefs, Emotion Regulation Strategies, and Predisposition to
Auditory Hallucinations in College Students

*The Diagnostic and Statistical Manual Fifth Edition* (DSM-5; APA, 2013) defines hallucinations as “perception-like experiences that occur without an external stimulus. They are vivid and clear, with the full force and impact of normal perceptions, and are not under voluntary control” (p. 87). Auditory hallucinations are the most common type of hallucination and are generally experienced as voices (APA, 2013). Historically, hallucinations have been thought to be an indication of severe psychopathology, especially psychosis (APA, 2000), but recent research (Baker & Morrison, 1998; Best & Mertin, 2007) has suggested that hallucinations, specifically auditory hallucinations, may be related to other areas of functioning, including emotion regulation and metacognition, in individuals who do not have other indications of psychosis.

Studies that have investigated the prevalence of reported auditory hallucinations in the general population have suggested that auditory hallucinations are much more prevalent in healthy individuals than previously thought, especially among college age individuals. Slade and Bentall (1988) found that 10-25% of the general population reported experiencing auditory hallucinations in their lifetime, while Posey and Losch (1983) found that 39% of the college students they surveyed reported hearing voices. Further, Barrett and Etheridge (1992) found that 30-40% of college students reported experiencing auditory hallucinations. Although these experiences do not necessarily meet the diagnostic criteria of an auditory hallucination, they do suggest that “hearing voices” is not as unusual as is generally thought, nor as indicative of psychopathology, such as psychosis.
Experiences of auditory hallucinations have generally been linked with psychosis, but research has found that auditory hallucinations may be associated with a number of psychological factors, such as bereavement, drug intoxication, sensory deprivation, religious or spiritual experiences, neurological disorders, and depression (DeLoore et al., 2011; Tien, 1991). Baker and Morrison (1998) suggested that auditory hallucinations may also be the result of a misattribution of an auditory stimulus, more specifically, a failure to distinguish internal speech or thoughts from true hallucinations. This misattribution, or lack of metacognitive understanding, may indicate that these individuals do not take ownership of their thoughts, allowing them to believe the thoughts are foreign.

**Metacognitions and Auditory Hallucinations**

Metacognitions, or awareness of one’s own thinking, develops throughout childhood and into adolescence. Aspects of metacognition, such as inner speech and conscious awareness, develop at varied rates. Just as auditory hallucinations have been linked to various psychological difficulties, lack of understanding or development of metacognitive functioning can also support the development of psychopathology, such as anxiety disorders (Cartwright-Hatton & Wells, 1997). Worry, the main cognitive process relevant in anxiety disorders, becomes pathological when an individual develops positive metacognitive beliefs, such as to “worry about worry” or negative beliefs about worry, which lead to concerns about uncontrollability of thoughts and dangerousness of thoughts.

As previously mentioned, some research suggests that reports of auditory hallucinations are related to misattribution of normal internal events, or thoughts, to an
external source. This misattribution may serve the adaptive function of reducing the
cognitive dissonance experienced if one’s thoughts do not agree with one’s values
(Morrison & Haddock, 1995). To evaluate this possible relationship, Baker and Morrison
(1998) compared the word association task performance of non-psychiatric participants,
participants diagnosed with schizophrenia who reported auditory hallucinations, and
participants diagnosed with schizophrenia who were not reporting auditory
hallucinations. The patients reporting hallucinations rated their words significantly lower
on internality than non-hallucinating patients, indicating they believed the words were not
generated in their own minds. Patients reporting hallucinations also reported believing
they had less control over their responses than the non-hallucinating patients and non-
psychiatric controls. Participants in the hallucinating group also scored significantly
higher than other groups on the Positive Beliefs about Worry and Negative Beliefs about
Uncontrollability and Dangerousness subscales of the Metacognition Questionnaire-30
than the other groups. Further, a regression analysis found that the Negative Beliefs about
Uncontrollability and Danger subscale was the only significant predictor of group
auditory hallucinations. These results suggested that beliefs about controlling one’s
thoughts and the beneficial nature of worrying are related to reports of experiencing
auditory hallucinations.

Heilbrun (1980) also examined the relationship between hallucinations and
metacognition by exploring psychiatric inpatients’ lexical thinking in order to determine
if individuals reporting auditory hallucinations would be less familiar with their own
thinking and internal voices than individuals who were not hallucinating. He found that
individuals experiencing hallucinations were less able to recognize their own words when
they were asked to identify their own previously made statements and grammatical style in the items presented to them than their non-hallucinating counterparts. These results suggest that individuals reporting auditory hallucinations may be unfamiliar with their own thoughts, making it more likely that they interpret their thought processes as auditory hallucinations.

**Emotion Regulation and Auditory Hallucinations**

Emotion regulation generally refers to the use of cognitive and behavioral processes to moderate and manage one’s emotions, which typically develop over the course of childhood and adolescence (Campos & Barrett, 1984; Kopp 1989). Various types of psychopathology, such as depression, anxiety, eating disorders, and Borderline Personality Disorder, are related to ineffective emotion regulation (Cole et al., 1994). Badcock and colleagues (2011) suggested that individuals who report auditory hallucinations may have maladaptive emotion regulation skills. Although this relationship has not been examined directly, several studies have examined the effectiveness of various emotion regulation strategies and interventions for individuals experiencing various types of psychopathology, including auditory hallucinations (Gross & John, 2003; Guadiano & Herbert, 2006). These strategies and interventions include cognitive reappraisal, expressive suppression, and Acceptance and Commitment Therapy (ACT).

Gross and John (2003) explored the differences in utilizing cognitive reappraisal and expressive suppression among a sample of undergraduate students. Cognitive reappraisal is the intentional interpretation of an emotion-evoking situation in a non-emotional way, while expressive suppression occurs when individuals inhibit their emotional expression to emotion-evoking situations. Participants completed a variety of
questionnaires about emotion management, coping skills, and emotion expression. Gross and John found that cognitive reappraisal was associated with positive emotions while expressive suppression was related to depressive emotions and decreased life satisfaction. Ehring and colleagues (2010) found similar results when comparing reappraisal and suppression. Undergraduate participants with a history of depression reported having difficulty accepting their emotional responses and increased use of suppression, while never-depressed participants reported greater use of reappraisal and less negative emotions. These results suggest that reappraisal may be associated with greater mental health while suppression may be associated with increased likelihood for negative emotions and psychopathology.

Acceptance and Commitment Therapy (ACT; Hayes et al., 1999) is an intervention based on the theory that maladaptive behaviors are created by unsuccessful attempts to avoid or suppress thoughts and feelings. It incorporates acceptance, mindfulness, and values into behavior therapy techniques (Bach & Hayes, 2002). Several studies have examined how acceptance and utilization of ACT is related to improved mental health, specifically in relation to psychotic symptoms such as auditory hallucinations (Bach & Hayes, 2002; Guadiano & Herbert, 2006), thus providing insight into how these features of functioning may relate to the experience of auditory hallucinations.

Bach and Hayes (2002) examined the use of ACT with inpatients experiencing psychotic symptoms compared to treatment as usual (TAU). Participants completed measures assessing the frequency, distress, and believability associated with their delusions or hallucinations. While participants in the ACT condition reported more
psychotic symptoms, they avoided re-hospitalization at a higher rate and reported a significant decrease in the believability of their hallucinations and delusions than the TAU participants. The researchers suggested that this may be due to the participants’ greater acceptance of their symptoms and decreased avoidance.

Similarly, Guadiano and Herbert (2006) examined the use of ACT versus TAU with psychotic patients at a university-based hospital psychiatric unit. Using both several ratings of psychotic symptoms and rehospitalization rate as measures, participants in the ACT condition showed significantly greater improvement in their post-treatment scores on the psychotic symptom measurements than participants receiving TAU. Additionally, a decrease in the believability of hallucinations was an independent predictor of change in distress in the ACT group but not the TAU group. These results suggest that acceptance rather than avoidance of symptoms may play a role in the experience of auditory hallucinations.

Given the findings to date, examination of the relationship among the experience of auditory hallucinations, emotion regulation strategies, and metacognitive development will help increase understanding of each of these features, as well as to provide indications for treatment and intervention. The way that individuals manage these issues may play an important role in their psychological functioning. This study explored these relationships among college students, a group where report of auditory hallucinations is relatively common. It was hypothesized that individuals who have a high predisposition to report experiencing auditory hallucinations endorse greater use of experiential avoidance than those with a low predisposition. It was also hypothesized that those with a high predisposition also utilize suppression as a way to manage emotions, when
compared to the low predisposition individuals. Finally, it was hypothesized that individuals with a high predisposition report significantly greater maladaptive metacognitive beliefs than individuals with a low predisposition. In order to further explore emotion regulation, the Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004) was added to the measures participants completed. This study also had an exploratory component. Additional aims of this study were to further explore how difficulties in emotion regulation relate to predisposition to report auditory hallucinations and to identify predictors of predisposition to auditory hallucinations.

**Method**

**Participants**

Participants were 375 undergraduate students at a mid-sized, private Catholic university in the Midwest. The participants volunteered through the university’s participant pool during the course of one semester. There were no exclusion criteria. Participants received course credit for their participation in the study as determined by their instructors.

Table 1 presents the demographic characteristics of the sample. Most of the sample were women (61%) with a mean age of 20.34 ($SD = 4.9$). Participants were divided into two groups based on their scores on the Launay-Slade Hallucination Scale-Revised (LSHS-R). Scores on the LSHS-R ranged from 12 to 44 with a mean score of 23.57 ($SD = 7.21$). Cut-off scores were created based on the highest and lowest 25% of scores on the LSHS-R and the groups were then narrowed to allow for two standard deviations of scores to separate the high and low predisposition groups. Participants who received a total score on the LSHS-R of 31 or above ($n = 72$) comprised the high
predisposition group, whereas those whose scores were 19 or lower were in the low predisposition group \(n = 77\). There were no significant differences in age, race, or religious affiliation between the high predisposition and low predisposition groups. There were significant differences found between the high predisposition group and low predisposition group on whether participants had received a psychiatric diagnosis previously, participants experienced auditory hallucinations while sleeping, participants used substances when experiencing auditory hallucinations, and on participants' distress and trueness ratings of their reported auditory hallucinations; the high predisposition group was more likely to have had a psychiatric diagnosis, reported more auditory hallucinations while not sleeping/waking, were more likely to have used substances when experiencing auditory hallucinations, and had higher ratings of distress and trueness than the low predisposition group.

**Measures**

*Launay-Slade Hallucination Questionnaire-Revised (LSHS-R)*. The Launay-Slade Hallucination Scale, created by Launay and Slade (1981) and later revised by Bentall and Slade (1985; see Appendix A), is a 12-item self-report measure that examines predisposition to hallucinations in nonpsychiatric samples. Participants are asked to rate each statement on a five-point Likert scale (0-certainly does not apply to me to 4-certainly applies to me). Those ratings are summed to create a total score, with higher scores indicating higher predisposition to experience auditory hallucinations. For the purposes of this study, the total score was the only score utilized.

The LSHS-R has an internal consistency of .90 and test-retest reliability of .84 (Fonseca-Pedrero, 2010). Several studies have examined the factor structure of the scale,
and all revealed three factors (Aleman, Nieuwenstein, Böcker, & De Haan, 2001; Paulik, Badcock, & Maybery, 2006; Waters, Badcock, & Maybery, 2003), although the labeling of those factors has varied by study. Aleman et al. (2001) labeled the factors: general hallucinatory tendency, subjective externality of thought, and vividness of day dreams, while Waters et al. (2003) labeled the factors vivid daydreams, hallucinations with religious theme, and auditory/visual hallucinations. Paulik and colleagues labeled the factors similarly to Waters et al. (2006). The LSHS-R was modified for this study with the addition of a statement about drug or alcohol use when having a hallucination-like experience. Participants responded Yes or No to the statement.

*Metacognition Questionnaire-30 (MCQ-30).* The MCQ-30 is a short form of the Metacognition Questionnaire developed by Cartwright-Hatton and Wells (1997). The MCQ-30 measures individual differences in metacognitive beliefs and monitoring (Wells & Cartwright-Hatton, 2004; see Appendix B). The scale consists of 30 statements that participants are asked to rate on a four-point Likert scale (1-do not agree to 4-agree very much). Factor analysis on the scale revealed five, 6-item factors: Cognitive Confidence, Positive Beliefs, Cognitive Self-Consciousness, Uncontrollability and Danger, and Need to Control Thoughts (Spada, Mohiyeddini, & Wells, 2008). Cognitive Confidence and Cognitive Self-Consciousness have the lowest correlation with $r=.26$ and Uncontrollability and Danger and Need to Control Thoughts have the highest correlation with $r=.63$. The responses to the statements are summed to create a total score and the items from each of the factors are summed to create subscale scores. Higher scores on the MCQ-30 indicate increased proneness to worry and anxiety.
PREDISPOSITION TO HALLUCINATIONS

Internal consistency ranges from .72 to .93, demonstrating adequate to high reliability, and test-retest reliability is .75. The factor structure of the MCQ-30 is consistent with that of the original MCQ, demonstrating adequate construct validity (Wells & Cartwright-Hatton, 2004). The MCQ-30 is correlated with the Penn State Worry Questionnaire at .54, demonstrating adequate convergent validity (Meyer, Miller, Metzger, & Borkovec, 1990).

**Emotion Regulation Questionnaire (ERQ).** The ERQ is a 10-item measure that determines which emotion regulation strategy an individual is more likely to use (Gross & John, 2003; see Appendix C). Participants are given statements that they rate on a seven-point Likert scale (1-strongly disagree to 7-strongly agree). Responses are summed to create Reappraisal and Suppression subscale scores.

Factor analyses revealed that the measure consists of two factors: Reappraisal and Suppression. Internal reliability coefficients are .79 for Reappraisal and .79 for Suppression. Test-retest reliability across three months was .69 for both factors. Convergent validity has been established with the Trait Meta-Mood Questionnaire (Salovey, Mayer, Golman, Turvey, & Palfai, 1995); correlations with that measure ranged from -.41 for Suppression to .36 for Reappraisal. When compared to the Big Five Inventory (John & Srivastava, 1999) correlations for Reappraisal ranged from -.20 (Neuroticism) to .15 (Openness); correlations for Suppression ranged from -.41 (Extraversion) to -.11 (Agreeableness). These correlations demonstrate adequate discriminant validity.

**Acceptance and Action Questionnaire (AAQ).** The AAQ is a 9-item measure of experiential avoidance (Hayes et al, 2004; see Appendix D). Participants are asked to
rate each statement on a seven-point Likert scale (1-never true to 7-always true).

Responses to the statements are summed to create a total score, with higher scores indicating more experiential avoidance.

The AAQ has an internal consistency of .70 and a test-retest reliability of .64. The AAQ has been compared to a measure of avoidant coping, the White Bear Suppression Index (Wegner & Zanakos, 1994) with convergent validity ranging from .44 to .50. Construct validity has been established by comparing the AAQ with the Beck Depression Inventory-II (Beck, Steer, & Brown, 1996) and the Beck Anxiety Inventory (Beck, Rush, Shaw, & Emery, 1979). The AAQ demonstrated adequate construct validity with correlation coefficients of .60 and .58 respectively.

*Difficulties in Emotion Regulation Scale (DERS).* The DERS is a 36-item measure of several dimensions of emotion regulation strategies (Gratz & Roemer, 2004; see Appendix E). Participants rate each statement on a five-point Likert scale (1-almost never to 5-almost always). Factor analysis on the scale revealed six factors: Lack of Awareness of Emotional Responses, Lack of Clarity of Emotional Responses, Nonacceptance of Emotional Responses, Limited Access to Emotion Regulation Strategies Perceived as Effective, Difficulties Controlling Impulses When Experiencing Negative Emotions, and Difficulties Engaging in Goal-Directed Behaviors When Experiencing Negative Emotions. Factor correlations range from .08 to .62 (Gratz & Roemer, 2004). The responses to the statements are summed to create a total score and the items from each of the factors are summed to create subscale scores. Higher scores on the DERS indicate increased difficulties with emotion regulation.
PREDISPOSITION TO HALLUCINATIONS

Internal consistency ranges from .84-.89, demonstrating adequate to high reliability. The DERS demonstrates adequate construct validity when compared to measure of experiential avoidance and emotional expressivity (Gratz & Roemer, 2004).

Procedure

The Xavier University Institutional Review Board (see Appendix F) approved this study. Undergraduate students volunteered to participate after reading a description of the study on the participant pool bulletin board which also provided the website for the survey. All data were collected using SurveyMonkey (Finley & Finley, 1999), which is a service that allows users to create and manage surveys and collect responses online. Participants entered their name, class and professor in a separate survey to allow them to earn course credit for their participation; this information was in no way linked to the original survey responses.

Student volunteers completed the LSHS-R, MCQ-30, ERQ, AAQ, and DERS in counterbalanced order across participants to avoid any order effects. After completing the four questionnaires, the participants completed a demographics questionnaire (see Appendix G). In addition to providing their age, gender, race, ethnicity, and religious affiliation, students had the option to fill in any past/present psychiatric diagnosis. Participants also responded Yes or No to a statement asking about experiencing auditory hallucinations; if the participant responded yes, the participants were prompted to rate the distress and believability of the experience(s) on a scale from zero to 100, using a strategy described by Bach and Hayes (2002).
Results

The overarching aim of this study was to compare the metacognitive skills and emotion regulation strategies of individuals who are highly predisposed to report auditory hallucinations (HPRA) with individuals who have a low predisposition to report auditory hallucinations (LPRA). The HPRA (n = 72; LSHS-R total score > 31) and LPRA (n = 77; LSHS-R < 19) groups represented scores at the highest and lowest quartile that were then narrowed so that the scores on the LSHS-R were separated by two standard deviations, resulting in approximately the highest and lowest 20% of participants scores on the LSHS-R.

I examined the differences between the HPRA and LPRA groups’ performance on each of the measures of emotion regulation (the AAQ, ERQ, and DERS) using a MANOVA, which indicated overall significant differences, $F = 4.15, p < .001$. A Bonferroni correction was performed to reduce Type I error due to multiple comparisons ($\alpha=.006$). Table 2 lists the means and standard deviations for each of the measures and subscales, and the ANOVA results for each of the individual comparisons. Participants’ scores on the measures were similar to the mean scores reported in the validation studies (Gratz & Roemer, 2004; Gross & John, 2003; Hayes et al., 2004). There were significant differences between the HPRA and LPRA groups on the AAQ, with the HPRA showing greater use of experiential avoidance, and on the Nonacceptance of Emotional Responses, Difficulties in Goal-Directed Behavior, Impulse Control Difficulties, Limited Access to Emotional Regulation Strategies, and Lack of Emotional Clarity subscales of the DERS, with the HPRA group scoring higher on all subscales, indicating greater difficulty with accepting emotional reactions, trouble acknowledging emotions, and a low utilization of
adaptive emotion regulation strategies. While these variables were statistically significant, effect sizes were very small for all variables.

I also examined the difference between the HPRA and LPRA groups on the five subscales of the MCQ-30 using a MANOVA, which indicated overall significant differences, $F = 6.82, p < .001$. A Bonferroni correction was performed to reduce Type I error due to multiple comparisons ($\alpha = .01$). Table 3 lists the means and standard deviations for each subscale, along with the results of the individual ANOVAs. Participants’ scores on the MCQ-30 were similar to those found previously (Wells & Cartwright-Hatton, 2004). There were significant differences between the groups on all subscales of the MCQ-30, with the HPRA group scoring higher on all subscales. These results indicate that participants in the HPRA group are more likely to use worrying to cope, have a greater need for control of their thoughts, and have increased fear that their worries are uncontrollable or dangerous. While all subscales reached statistical significance, all effect sizes were very small.

A standard multiple regression analysis was conducted to examine which dependent measures scores would predict the LSHS-R score. Table 4 provides the results of the regression analysis. Although the overall regression was significant, $R^2 = .24$, $p < .001$), only three scores predicted the LSHS-R score: the Negative Beliefs about Uncontrollability and Danger and Cognitive Self-Consciousness subscales of the MCQ-30 along with the Impulse Control Difficulties subscale of the DERS. These results suggest that concerns about being unable to control worrying, hyper-vigilance of thoughts, and difficulty with impulse control predicted higher scores on the LSHS-R.
Discussion

Although experiencing auditory hallucinations is generally thought to be related to serious psychopathology, recent studies (e.g., Baker & Morrison, 1998; Best & Mertin, 2007) have found experiences of auditory hallucinations to occur in a variety of individuals, with and without serious mental illnesses. The aim of the current study was to examine predisposition to auditory hallucinations in the context of other related areas, such as metacognition and emotion regulation. Although they did not differ in terms of basic demographic characteristics, college students whose LSHS-R scores suggested high predisposition to report experiencing auditory hallucinations differed from college students whose LSHS-R scores suggested low predisposition to report experiencing auditory hallucinations in a variety of areas related to emotion regulation strategies and metacognitive functioning.

Of the 375 undergraduate student participants, 19% were categorized into the HPRA group and 21% were in the LPRA group. In the entire sample, 10% of the students reported experiencing auditory hallucinations and 10% \( n = 37 \) students reported using drugs while having an auditory hallucination experience. Interestingly, 12 of these participants were in the HPRA group while 25 were in neither the High nor Low (the “Middle”) predisposition group. There may have been more participants from the middle predisposition group because participants in this group may not attribute their experiences to auditory hallucinations because of the drug use; therefore they may under report their auditory hallucination experiences leading to a lower LSHS-R score. Additionally, 10% of the sample also reported experiencing auditory hallucinations while not sleeping. Within this subsample, 29% had a history of psychiatric diagnosis, 21%
PREDISPOSITION TO HALLUCINATIONS

reported history of drug use when experiencing auditory hallucinations, while 83% denied drug use during these experiences. These incidence rates are similar to those reported by the National Alliance of Mental Illness (NAMI), which found that one in four college students report having a psychiatric diagnosis (NAMI, 2013).

I found that groups differed significantly on the MCQ-30, indicating that HPRA students reported being much more likely to worry in response to distress, fear their worry may become uncontrollable, have a greater need to control their thoughts, but are more confident in their thinking than those in the LPRA group. These results are similar to those reported by Baker and Morrison (1998), who found that individuals reporting hallucinations believed they had less control over their responses to a word association task and also were less likely to believe they generated the responses in their own minds when compared to individuals who were not reporting hallucinations. Similarly, García-Montes and colleagues (2006) found that clinical groups, including those experiencing hallucinations, reported concerns about their thoughts becoming uncontrollable and dangerous when compared to a clinical control group. This finding is also supported by Heilbrun’s (1980) contention that some individuals experiencing hallucinations, as well as other forms of psychopathology, fear they have limited control over their thoughts, especially if the thoughts are negative and/or dangerous. While previous research supported the current findings related to the uncontrollability of thoughts, this study is the first to find that HPRA individuals have higher cognitive confidence, need for more control, and cognitive self-consciousness, as measured by the subscales of the MCQ-30.

The HPRA and LPRA groups also differed on their responses to the AAQ, with the HPRA group reporting experiential avoidance as a way to regulate emotions more
often than the LPRA group. This suggests that utilizing experiential avoidance strategies may be related to the distress the individual experiences in relation to auditory hallucinations. While avoidance appears to be related to reports of experiencing auditory hallucinations, the use of suppression, or emotional avoidance, was not significantly different between the two groups. Guadiano and Herbert (2006) also found acceptance, as opposed to avoidance, was related to decreased fear and believability of hallucinations when comparing an acceptance-based treatment to treatment as usual with a group of inpatients experiencing psychosis. Change in believability of hallucinations was an independent predictor of change in distress in the acceptance group, suggesting that acceptance is effective in reducing distress associated with hallucinations. While previous research has not examined avoidance and hallucinations specifically, the use of acceptance strategies suggests that avoidance may have the inverse effect on believability of hallucinations.

The groups’ significant differences on the Nonacceptance of Emotional Responses and Lack of Emotional Clarity scales of the DERS indicate that HPRA individuals have difficulty with emotional clarity and are resistant to accepting emotional experiences. College students in the HPRA group were more likely to struggle to reach emotional clarity and less likely to be accepting of emotional responses than their peers in the LPRA group. These results suggest that individuals who are highly predisposed to auditory hallucinations may have difficulty acknowledging how they feel, and if they do, they may reject those feelings as problematic or undesirable. Previous research has not specifically examined the relationships between predisposition to auditory hallucinations and difficulties with emotion regulation; however, Ehring and colleagues (2010) found
that individuals with depression were more likely to not accept their emotional responses. Further research should examine the relationship between auditory hallucinations and emotional regulation difficulties in depth.

Finally, the groups’ significant differences on the Difficulties Engaging in Goal-Directed Behavior, Impulse Control Difficulties, and Limited Access to Emotion Regulation Strategies scales of the DERS indicate that college students in the HPRA group were significantly more likely to struggle with goal-directed behavior, had limited access to effective strategies to regulate emotions, and reported more difficulties with impulse control. The Impulse Control Difficulties subscale measures the degree to which one can remain in control of one’s behavior when experiencing negative emotions. This may prevent individuals from engaging in goal-directed behavior and may also lead to difficulties in ability to utilize effective emotion regulation strategies. Previous research has not examined the relationship between auditory hallucinations and emotion regulation strategies or impulse control difficulties; this could be an area of future research.

The multiple regression analysis revealed three predictors of participants’ LSHS-R score: Negative Beliefs about Uncontrollability and Danger, Cognitive Self-Consciousness, and Impulse Control Difficulties. Previous research had found Negative Beliefs about Uncontrollability and Danger to be a predictor of auditory hallucinations in clinical populations (Guadiano & Herbert, 2006), but this is the first study to find Cognitive Self-Consciousness and Impulse Control Difficulties to be predictors. Cognitive Self-Consciousness is related to worry about thoughts and increased self-monitoring, which may relate to why this variable and Negative Beliefs about Uncontrollability and Danger are both predictors of LSHS-R scores. Additionally,
Impulse Control Difficulties may be manifested during times of increased worry in which individuals cannot help but ruminate on the issues of their thoughts, leading to increased concerns about one’s own thoughts.

These predictive variables are an important finding of this study because they may help to target effective treatment interventions for individuals experiencing these psychological difficulties. The Negative Beliefs about Uncontrollability and Danger, Cognitive Self-Consciousness, and Impulse Control Difficulties all assess how individuals interpret their thinking and behavior, and how they respond during emotionally distressing events. For example, an item from the Impulse Control Difficulties subscale states “When I’m upset I become out of control.” Individuals experiencing any of these symptoms may present to a mental health professional for treatment; therefore, knowing how these constructs are related may suggest areas of intervention. By reviewing these items, a mental health professional may be able to intervene on the specific issues at hand, such as rumination, emotion regulation skills, and irrational thoughts. Future research should examine how psychological interventions may help to address the specific issues presented in these measures.

There are limitations to the present study that should be considered when interpreting the present findings. A major limitation of this study is the use of a correlational design, which does not allow for the study of cause-and-effect relationships. Therefore, it is not known if the various features measured in this study are co-existing, or if the use of specific strategies causes other features of experience, such as the experience of auditory hallucinations.
Another limitation of the current study is the fact that all participants are from a fairly homogeneous sample of university student volunteers. This likely restricts the generalizability of the results to other groups, such as psychiatric patients or community samples. Specifically, although 10% of this sample indicated that they had sought mental health treatment and received a diagnosis, this is a rate of psychiatric diagnosis that is lower than the 25% incidence in the general population (NAMI, 2013).

This study also is limited by the use of only self-report questionnaires that do not allow for in-depth exploration of the types of experiences that participants were describing as hallucinations. Further, features of the questionnaires may have encouraged a particular response style that might affect the nature of the results. Although participants appeared to endorse a variety of experiences, it is possible that they may have endorsed particular options in response to study demand characteristics.

Overall, while a number of studies have examined the report of auditory hallucinations, metacognition, and emotion regulation separately, this is the first study to explore the relationships among all three constructs. Additionally, this study examined predisposition to auditory hallucinations in a nonclinical sample. While we found significant results, it is important that future research continue to examine these relationships in order to replicate the current findings. Future research should examine these constructs in relation to other samples, and to explore the possibility of causal relationships between the constructs.
References


PREDISPOSITION TO HALLUCINATIONS


# Table 1

## Demographics of Predisposition Groups

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<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>34.7%</td>
<td>6.2%</td>
<td>0.0%</td>
<td>59.0**</td>
</tr>
<tr>
<td>No</td>
<td>65.3%</td>
<td>93.8%</td>
<td>100.0%</td>
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</tr>
<tr>
<td>Substance Use</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>16.7%</td>
<td>11.1%</td>
<td>1.3%</td>
<td>10.19*</td>
</tr>
<tr>
<td>No</td>
<td>83.3%</td>
<td>88.9%</td>
<td>98.7%</td>
<td></td>
</tr>
<tr>
<td>Distress Rating</td>
<td>≥50</td>
<td>27.0%</td>
<td>16.2%</td>
<td>71.3*</td>
</tr>
<tr>
<td></td>
<td>&lt;50</td>
<td>73.0%</td>
<td>83.8%</td>
<td></td>
</tr>
<tr>
<td>Trueness Rating</td>
<td>≥50</td>
<td>26.2%</td>
<td>11.5%</td>
<td>78.7*</td>
</tr>
<tr>
<td></td>
<td>&lt;50</td>
<td>73.8%</td>
<td>88.5%</td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup>Note: χ² results presented follow the same trend as the results comparing percentages between HPRA and LPRA

<sup>*</sup><i>p</i> < .05

<sup>**</sup><i>p</i> < .001
Table 2

*Group Differences for Emotion Regulation Measures*

<table>
<thead>
<tr>
<th>Emotion Regulation Measure</th>
<th>High Predisposition</th>
<th>Low Predisposition</th>
<th>F</th>
<th>ηp²</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Reappraisal Score</td>
<td>27.88</td>
<td>5.78</td>
<td>29.21</td>
<td>6.50</td>
</tr>
<tr>
<td>Suppression Score</td>
<td>15.04</td>
<td>4.76</td>
<td>13.66</td>
<td>4.98</td>
</tr>
<tr>
<td>AAQ Total Score</td>
<td>36.60</td>
<td>7.07</td>
<td>30.95</td>
<td>5.52</td>
</tr>
<tr>
<td>Nonacceptance of Emotional Responses</td>
<td>16.51</td>
<td>6.39</td>
<td>11.30</td>
<td>4.41</td>
</tr>
<tr>
<td>Difficulties Engaging in Goal-Directed Behavior</td>
<td>16.47</td>
<td>4.56</td>
<td>12.29</td>
<td>4.81</td>
</tr>
<tr>
<td>Impulse Control Difficulties</td>
<td>15.18</td>
<td>5.55</td>
<td>9.86</td>
<td>3.79</td>
</tr>
<tr>
<td>Lack of Emotional Awareness</td>
<td>14.89</td>
<td>4.25</td>
<td>15.05</td>
<td>4.49</td>
</tr>
<tr>
<td>Limited Access to Emotion Regulation Strategies</td>
<td>20.50</td>
<td>7.33</td>
<td>14.10</td>
<td>5.14</td>
</tr>
<tr>
<td>Lack of Emotional Clarity</td>
<td>12.85</td>
<td>3.64</td>
<td>10.29</td>
<td>2.88</td>
</tr>
</tbody>
</table>

**p < .001**
Table 3

*Group Differences for MCQ-30 Subscales*

<table>
<thead>
<tr>
<th>MCQ-30 Subscale</th>
<th>High Predisposition</th>
<th>Low Predisposition</th>
<th>F</th>
<th>$\eta^2_\text{p}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive Beliefs about Worry</td>
<td>12.13</td>
<td>10.30</td>
<td>4.54*</td>
<td>.02</td>
</tr>
<tr>
<td>Negative Beliefs about Uncontrollability and Danger</td>
<td>15.07</td>
<td>9.77</td>
<td>31.43**</td>
<td>.15</td>
</tr>
<tr>
<td>Cognitive Confidence</td>
<td>11.47</td>
<td>9.14</td>
<td>9.02**</td>
<td>.05</td>
</tr>
<tr>
<td>Need for Control</td>
<td>13.25</td>
<td>10.95</td>
<td>11.38**</td>
<td>.06</td>
</tr>
<tr>
<td>Cognitive Self-Consciousness</td>
<td>16.58</td>
<td>14.22</td>
<td>7.67**</td>
<td>.04</td>
</tr>
</tbody>
</table>

*$p=.01$

$**p\leq.001$
Table 4

Regression Analysis Summary for Emotion Regulation and Metacognitive Variables Predicting Participants’ LSHS Score (N=375)

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SEB</th>
<th>β</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive Beliefs About Worry</td>
<td>-0.04</td>
<td>0.10</td>
<td>-0.02</td>
</tr>
<tr>
<td>Negative Beliefs About Uncontrollability &amp; Danger</td>
<td>0.31</td>
<td>0.12</td>
<td>0.20*</td>
</tr>
<tr>
<td>Cognitive Confidence</td>
<td>0.04</td>
<td>0.11</td>
<td>0.02</td>
</tr>
<tr>
<td>Need for Control</td>
<td>0.05</td>
<td>0.13</td>
<td>0.02</td>
</tr>
<tr>
<td>Cognitive Self-Consciousness</td>
<td>0.24</td>
<td>0.11</td>
<td>0.12*</td>
</tr>
<tr>
<td>Reappraisal Score</td>
<td>-0.02</td>
<td>0.06</td>
<td>-0.02</td>
</tr>
<tr>
<td>Suppression Score</td>
<td>0.06</td>
<td>0.07</td>
<td>0.04</td>
</tr>
<tr>
<td>AAQ Total Score</td>
<td>0.08</td>
<td>0.07</td>
<td>0.07</td>
</tr>
<tr>
<td>Nonacceptance of Emotional Responses</td>
<td>0.08</td>
<td>0.10</td>
<td>0.06</td>
</tr>
<tr>
<td>Difficulties Engaging in Goal-Directed Behavior</td>
<td>0.03</td>
<td>0.10</td>
<td>0.02</td>
</tr>
<tr>
<td>Impulse Control Difficulties</td>
<td>0.38</td>
<td>0.12</td>
<td>0.26**</td>
</tr>
<tr>
<td>Lack of Emotional Awareness</td>
<td>-0.11</td>
<td>0.10</td>
<td>-0.07</td>
</tr>
<tr>
<td>Limited Access to Emotion Regulation Strategies</td>
<td>-0.17</td>
<td>0.11</td>
<td>-0.16</td>
</tr>
<tr>
<td>Lack of Emotional Clarity</td>
<td>0.21</td>
<td>0.14</td>
<td>0.10</td>
</tr>
</tbody>
</table>

$R^2 = 0.24$ (N=375, p<0.001).

*p<0.05, **p<0.01.
Appendix A

Launay-Slake Hallucination Scale-Revised (LSHS-R)

The Launay-Slake Hallucination Questionnaire-Revised (LSHS-R) was modified from the original scale created by Bentall and Slade (1986) and can be found in Slade, P.D., & Bentall, R.P. (1988). *Sensory deception: A scientific analysis of hallucination.* Baltimore, MD: Johns Hopkins University Press.
Appendix B

Metacognition Questionnaire-30 (MCQ-30)

The Metacognition Questionnaire-30 (MCQ-30) is protected by copyright so it is not reproduced in this document. This measure is available through Guilford Press, at www.guilford.com.
Appendix C

Emotion Regulation Questionnaire (ERQ)

Appendix D

Acceptance and Action Questionnaire (AAQ)

Appendix E

Difficulties in Emotion Regulation Scale (DERS)

Appendix F

Approval Letter from Xavier University IRB

September 27, 2012

Melanie Castillo
5355 Tompkins Ave #3
Cincinnati, OH 45227

Dear Ms. Castillo:

The IRB has completed the review of your protocol #1213, Metacognitive Beliefs, Emotion Regulation Strategies, and Predisposition to Auditory Hallucinations in College Students using expedited review procedures. We appreciate your thorough treatment of the issues raised and your timely response. Your study is approved in the Expedited category under Federal Regulation 45 CFR 46. Approval expires September 27, 2013. A progress report, available at http://www.xavier.edu/irb/forms.cfm, is due by that date.

If you wish to modify your study, including any changes to the approved Informed Consent form, it will be necessary to obtain IRB approval prior to implementing the modification. If any adverse events occur, please notify the IRB immediately.

We wish you success with your research!

Sincerely,

[Signature]

Morell E. Mullins, Jr., Ph.D.
Chair, Institutional Review Board
Xavier University

MEM/sb

c: Kathleen Hart, Advisor
Appendix G

Demographics Questionnaire

Age: _________

Gender: _______

Race: ________________

Ethnicity: ____________________________

Religious Affiliation: ____________________

Have you ever been diagnosed with a psychiatric disorder by a mental health provider?

Yes  No  Prefer not to answer

If yes, what was the diagnosis? ______________________________

Have you ever heard voices or other sounds when you were not falling asleep, asleep, or just after waking up?  Yes  No

If yes, what is it that you hear? (choose all that apply)

  a. sound that is recognizable
  b. voice that is recognizable
  c. sound that is unrecognizable
  d. voice that is unrecognizable
  e. pleasant
  d. unpleasant

On a scale of 0 to 100, how distressed are you when you hear voice(s)/sound(s)?

(0 means not distressed at all, and 100 is the most distressed you’ve ever been.) ______

On a scale of 0 to 100, to what degree do you believe the voice(s)/sound(s) is true?

(0 means you are certain it is not real or true, and 100 means you are absolutely certain that it is real or true.) ________
Summary

Title: Metacognitive Beliefs, Emotion Regulation Strategies, and Predisposition to Auditory Hallucinations in College Students

Problem. Auditory hallucinations are the most common type of hallucination and are generally experienced as voices and occur when there is no external stimulus present (APA, 2013). Historically, hallucinations have been thought to be an indication of severe psychopathology, especially psychosis (APA, 2013), but recent research (Baker & Morrison, 1998; Best & Mertin, 2007) has suggested that hallucinations, specifically auditory hallucinations, may be related to other areas of functioning, including emotion regulation and metacognition.

Metacognition plays an important role in how an individual may interpret or experience an auditory hallucination. Metacognitive knowledge, or how I think about our own thinking, contributes to the way in which an individual would experience an auditory hallucination. Research suggests that individuals who believe they have little or no control over their thoughts may feel more threatened by or fearful of hallucinations (Baker & Morrison, 1998; Garcia-Montes et al., 2006). Deficits in metacognition may also influence how one reports the experience of an auditory hallucination. For example, misattributing internal events or thoughts to an external source could lead one to report experiencing auditory hallucinations. Research suggests that individuals experiencing hallucinations may have difficulty recognizing their own thoughts or words as internal (Baker & Morrison, 1998; Heilbrun, 1980).

Emotion regulation strategies such as cognitive reappraisal and expressive suppression involve active, conscious effort (Gross, 2002). Research suggests that the use of reappraisal is linked to experiencing fewer psychiatric symptoms such as depression and is related to the experience of positive emotion (Gross & John, 2003). Other emotion regulation strategies, such as those used in Acceptance and Commitment Therapy (ACT; Hayes et al., 1999), have been found to reduce distress experienced by individuals with psychotic symptoms (Bach & Hayes, 2002; Guadiano & Herbert, 2006). ACT has been linked to a decrease in the believability of hallucinations and an overall improvement in symptomatology.

Method. Participants were 375 undergraduate students at a mid-sized, private Catholic university in the Midwest, and were recruited through the University’s participant pool. Participants consisted of 145 men and 230 women with a mean age of 20.34 (SD = 4.9). Participants were divided into two groups based on their scores on the Launay-Slade Hallucination Scale-Revised (LSHS-R). Participants who received a total score on the LSHS-R of 31 or above (n = 72) comprised the high predisposition group, whereas those whose scores were 19 or lower were in the low predisposition group (n = 77). Two MANOVAs were completed to examine three different hypotheses: the relationship between predisposition to report experiencing auditory hallucinations and metacognitive beliefs (using the Metacognition Questionnaire-30, MCQ-30), suppression (using the Emotion Regulation Questionnaire, ERQ), and experiential avoidance (using the Acceptance and Avoidance Questionnaire, AAQ).
Findings. I examined the differences between the HPRA and LPRA groups’ performance on each of the measures of emotion regulation (the AAQ, ERQ, and DERS) using a MANOVA, which indicated overall significant differences, $F = 6.68$, $p < .001$. There were significant differences between the HPRA and LPRA groups on the AAQ, with the HPRA showing greater use of experiential avoidance; and on the Nonacceptance of Emotional Responses, Difficulties in Goal-Directed Behavior, Impulse Control Difficulties, Limited Access to Emotional Regulation Strategies, and Lack of Emotional Clarity subscales of the DERS, with the HPRA group scoring higher on all subscales, indicating greater difficulty with accepting emotional reactions, trouble acknowledging emotions, and a lack of utilization of adaptive emotion regulation strategies.

I also examined the difference between the HPRA and LPRA groups on the five subscales of the MCQ-30 using MANOVA. There were significant differences between the groups on all subscales of the MCQ-30, with the HPRA group scoring higher on all subscales. These results indicate that participants in the HPRA group are more likely to use worrying to cope, have a greater need for control of their thoughts, and have increased fear that their worries are uncontrollable or dangerous.

A standard multiple regression analysis was conducted to examine which scores would predict the LSHS-R score. Although the overall regression was significant, $R^2 = .24$, $p < .001$, only three scores predicted the LSHS-R score: the Negative Beliefs about Uncontrollability and Danger and Cognitive Self-Consciousness subscales of the MCQ-30 along with the Impulse Control Difficulties subscale of the DERS. These results suggest that concerns about being unable to control worrying, hypervigilance of thoughts, and difficulty with impulse control predicted higher scores on the LSHS-R.

Implications. Overall, while a number of studies examine the auditory hallucinations, metacognition, and emotion regulation separately; this is the first study to explore the relationships between all three constructs. Additionally, this study examined predisposition to auditory hallucinations in a nonclinical population. The results of this study suggest possible interventions to utilize with clients experiencing psychological symptoms related to these constructs. While the study found significant results, it is important that future research continue to examine these relationships in order to replicate the current findings and explore the possibility of causal relationships between the constructs.