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Philadelphia College of Osteopathic Medicine

Department of Psychology

INVENTORY OF COGNITIVE DISTORTIONS: VALIDATION OF A MEASURE OF

COGNITIVE DISTORTIONS USING A COMMUNITY SAMPLE

By Michael B. Roberts, MS

Submitted in Partial Fulfillment of the Requirements of the Degree of Doctor of

Psychology

November 19, 2014

# PHILADELPHIA COLLEGE OF OSTEOPATHIC MEDICINE
## DEPARTMENT OF PSYCHOLOGY

### Dissertation Approval

This is to certify that the thesis presented to us by _Michael Roberts_

on the _19th_ day of _November_, 20_14_, in partial fulfillment of the

requirements for the degree of Doctor of Psychology, has been examined and is

acceptable in both scholarship and literary quality.


**Committee Members' Signatures:**

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**Daniel Kennedy, PsyD**

**Robert A DiTomasso, PhD, ABPP, Chair, Department of Psychology**

**Acknowledgements**

First and foremost I need to thank Dr. Robert DiTomasso, my chairperson.  Dr. DiTomasso was an ever-calming presence throughout the development and completion of my dissertation.  Before starting my dissertation, I was under the impression that meetings with one's chairperson could be stressful, but I quickly discovered that I greatly enjoyed my meetings with Dr. DiTomasso.  He was always supportive and encouraging, and he was able to provide critical feedback in a friendly and positive manner.  I thank you Dr. DiTomasso for all of your hard work and guidance throughout the dissertation process.

Next, I would like to thank the other members of my committee, Dr. Bradley Rosenfield and Dr. Daniel Kennedy, both of whom were crucial to the development of my research.  Having others' input on my dissertation allowed me to evaluate different aspects I might never have considered.  You each responded to all questions in a timely manner and worked hard to see that my dissertation was the best it could be. Your hard work and dedication made the whole process proceed very smoothly and you too were always positive in your feedback.  Again, I thank you for all of your hard work.

I would also like to take this time to thank my family, especially my mother and father who encouraged me to continue my education and reach the goal of earning my doctorate.  My mother, father, brother, and sister have always been supportive of my aspirations and their kindness, generosity, and understanding have meant a great deal to me.  I would also like to thank my brother and sister-in-law, the whole Weaver family and my close friends, all of whom have taken this journey with me and were nothing but supportive throughout the entire endeavor.

Last, but certainly not least, I would like to thank my wife, who has been by my side throughout my entire academic career.  You were a big part of my decision to continue my education at PCOM and I will be forever grateful for your constant love and support over the past five years.  Without you none of this would have been possible.

**Abstract**

        The purpose of this study was to examine and evaluate further the psychometric

properties of a self-report inventory of cognitive distortions using a nonclinical,

community sample.  A group of 474 individuals were contacted via the social networking

site, Facebook, and through a college list-serve and were asked to complete multiple

measures and also to send the link to other individuals, thus utilizing a snowball sample.

The measures used included the Inventory of Cognitive Distortions (ICD), Dysfunctional

Attitude Scale (DAS), Perceived Stress Scale (PSS), and a brief questionnaire to collect

demographic information on each participant.  Results revealed positive psychometric

properties for the Inventory of Cognitive Distortions and were generally consistent with

findings from the initial study, which utilized a clinical sample in order to examine the

factor structure.  Internal consistency reliability analysis of the total scale was found to be

strong with a Coefficient Alpha of .97, which is consistent with the previous study (alpha

= .98).  Factor analysis revealed 12 factors, eight of which closely resemble factors from

the original study.  The eight common factors included, Magnification, Fortune-Telling,

Externalization of Self-Worth, Perfectionism, Emotional Reasoning, Minimization,

Comparison to Others and Emotional Reasoning and Decision Making.  Four new factors

were identified, including Discounting the Positive and Personalization, Absolutistic or

Dichotomous Thinking, Should Statements, and Catastrophizing.  The ICD correlated

significantly with both the DAS ($p < .001$) and PSS ($p < .001$) measures.  The current

study also examined differences in overall levels of cognitive distortions as measured by

the ICD across three demographic variables, gender, age, and level of education.

Females were found to endorse significantly higher levels of cognitive distortions than

males ($p$ = .006); however, the effect size was relatively small ($d$ = -0.30).  Participants

who were within 18-29 years of age indicated significantly higher levels of cognitive

distortions than individuals 41-85 years of age ($p$ < .001, $\eta^2$ = 0.35 – large effect size),

and there was generally a gradual decrease in cognitive distortions across the age ranges.

Level of cognitive distortions was not influenced by level of education ($p$ = .68).  Last,

participants' levels of cognitive distortions were able to predict, significantly, levels of

perceived stress ($p$ < .001). Future research should include continued testing of the ICD

with a larger clinical population, include the ability to assess changes in cognitive

distortions over time during treatment, and examine the overall utility of the ICD to the

practicing clinician.

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**Chapter 1**

**Introduction**

**Statement of the Problem.**

A steady increase in the prevalence of mental health diagnoses in the United

States has been observed in recent years.  In 1999, it was estimated that 22% of

Americans, ages 18 and older suffered from a mental disorder (U.S. Department of

Health and Human Services, 1999).  In comparison, in 2005, it was estimated that within

a given year approximately one quarter, or 26.2%, of adults were diagnosed with a

mental illness (Kessler, Chiu, Demler, & Walters, 2005).  Of all mental disorders, anxiety

disorders continue to have the highest prevalence rate among Americans, estimated to

have affected 16.4% in 1999 and 18.1% in 2005 (U.S. Department of Health and Human

Services, 1999; Kessler et al., 2005).  Mood disorders had the second highest prevalence

rate in 1999 and in 2005, with estimates of 7.1% and 9.5% of the population having been

affected, respectively (U.S. Department of Health and Human Services, 1999; Kessler et

al., 2005).  Those suffering from anxiety and mood disorders as well as other mental

illnesses tend to have higher health care expenditures than those who do not have

symptoms (National Institute of Mental Health, 2006).  In 2006, of those individuals with

a diagnosis of a mental disorder, 36.2 million paid for mental health services, creating a

health care expenditure totaling $57.5 billion (National Institute of Mental Health, 2006).

Because of the increase in the prevalence of mental disorders and high health care costs

due to mental illness, more effective methods of assessing, diagnosing, and treating individuals with mental health problems are necessary.

To reduce the prevalence of mental illness and its subsequent impact on health care expenditure, the focus of measurement and treatment should include specific factors contributing to symptomatology, such as distorted thinking and dysfunctional schema (Beck, Steer, Brown, & Weissman, 1991).  Cognitive theory implies that cognitive distortion is a common factor across emotional disorders (Beck, 1967); these distortions represent ways in which an individual modifies and interprets his or her everyday experiences.  When the distortions are negative, the individual begins to interpret his or her experiences through dysfunctional subjective constructs (Beck, 1967; 1976).  Cognitive distortions involve processing information in a dysfunctional manner; Beck (1967; 1976) believed that these distortions were possible antecedents to emotional disorders.  Cognitive distortions have been found to maintain mood and anxiety disorders, the two most common mental disorders in the U.S. (Burns & Eidelson, 1998; Kessler et al., 2005).  Individuals who cope with depression have interpretational frameworks that are absolutist, revolving around themes of loss, deprivation, and personal inadequacy (Burns & Eidelson, 1998).  Those who cope with anxiety have distortions that are probabilistic in nature and consist of perceptions of possible future psychological or physical harm (Burns & Eidelson, 1998).

Beck's (1967; 1970) cognitive model of psychopathology emphasizes the measurement of pertinent constructs such as labeling an individual's specific cognitive errors.  The model also suggests the importance of understanding the interaction between cognitive distortions and other mediators that increase the risk of clinical

symptomatology.  Researchers have found a significant relationship between perceived

stress and depressive symptomatology in a clinical sample (Hewitt, Flett, & Mosher,

1992).  Research has also identified cognitive distortions as mediators between life stress

and depression in an adolescent sample (Deal & Williams, 1988).  The literature suggests

that cognitive distortions affect the perceived stressfulness of life events and play a role

in the maintenance of emotional disorders (Hammen, 1978; Deal & Williams, 1988).

Although stress and cognitive distortions have been found to correlate significantly with

the occurrence of psychopathology, research suggests that measures of cognitive

distortions may be better predictors of emotional disorders than measures of life stress

(Deal & Williams, 1988).  The research suggests the importance of effectively labeling

and attending to cognitive distortion when treating emotional disorders (Deal &

Williams, 1988).

The Inventory of Cognitive Distortions (ICD) is a measure designed to identify

specifically, both the distinctive and categorical use of cognitive distortions by mental

health patients (Yurica, 2002; DiTomasso & Yurica, 2011).  As cognitive theory implies,

cognitive distortions are important in the etiology and progression of emotional disorders

(Beck, 1976; Beck & Beck, 2011; Burns, 1980).  If these distortions can be identified and

labeled through the use of a brief quantitative measure, it would enable the clinician to

assess for distortions more efficiently and track changes in distorted thinking.  According

to Beck's (1967; 1970) cognitive model, learned ways of thinking about internal and

external stimuli, based on negative core beliefs or schema, create cognitive distortions,

which in turn maintain emotional disorders.  If clinicians can identify and change these

cognitive distortions, the core belief may be impacted, causing a reduction in symptomatology.

The ICD, which has been examined using several different clinical populations, was effective in identifying cognitive distortions. Within a clinical sample, the ICD has been found to correlate significantly both with a standard depression inventory and with a standard anxiety inventory (Yurica, 2002) and is able to identify the severity of psychological dysfunction in patients suffering from Axis I or Axis II disorders (Rosenfield, 2004); it is also able to identify relationships between distorted thinking and psychological and behavioral health risks (Uhl, 2007). Although the ICD demonstrates empirical support of its use in a clinical sample, its psychometric properties have not been examined using a large, community sample. In order to better examine the strength of the factor structure and the validity of psychological measures, it has been suggested that the psychometric properties of the ICD be examined using a nonclinical sample, similar to previous studies (Wiessman & Beck, 1978; Cohen, Kamarack, & Mermelstein, 1983). Also, using a large, community sample provides the opportunity for examination of the prevalence of cognitive distortion across different demographic characteristics, such as age, gender, and level of education.

To further establish the ICD as a useful clinical measure, its properties should be investigated in a manner similar to the investigation of other established measures of cognitive distortion. The Dysfunctional Attitude Scale (DAS), a leading measure for dysfunctional beliefs in clinical practice, was validated initially using a nonclinical sample consisting of college students and teachers in order to demonstrate the strength and sensitivity of the measure (Weissman & Beck, 1978). The ICD should be analyzed

using similar methodology to ensure the strength of the factor structure as well as to demonstrate further its utility as compared with the DAS.  Also, focusing on a community sample will provide a broader range of participants, therefore increasing the generalizability of the measure.

### Purpose of the Study.

The purpose of this study was to examine and further evaluate the psychometric properties of the Inventory of Cognitive Distortions (ICD), which has been shown to measure 11 types of cognitive distortions as defined by previous research for use with an adult clinical population (Beck 1976, 1967; Burns, 1980, 1989; Freeman & Oster, 1999; Gilson & Freeman, 1999; Yurica, 2002; Rosenfield, 2004).  The overall intention of this study was threefold: 1) to further validate the psychometric properties and factor structure of the ICD using a community sample; 2) to investigate how cognitive distortions in a community sample vary as a function of certain demographic characteristics such as gender, age, and level of education, and 3) to investigate whether or not level of distorted thinking can predict level of perceived stress, both of which can be antecedents to emotional disorders (Hammen, 1978; Deal & Williams, 1998).

## Literature Review

### Cognitive Theory.

Beck's cognitive theory is an important and influential theory relating to the progression and treatment of emotional disorders (Beck, 1967; 1976; Bruno, 2010). Beck's original approach to the treatment of mental illness was based on a Freudian perspective, whose theory of "melancholia" involved anger being directed inward. Following his study of depressed patients, Beck believed Freud's theory was flawed and

he theorized that negative biases and distortions tended to be a common factor to the

cognitive processes of depressed patients (Beck & Weishaar, 1989).  Based on his

observations, Beck identified the cognitive triad of emotional disorders.  He suggested

that a commonality among depressed patients regarded a negative view of the self, the

world or environment, and the future (Beck, 1967; 1976; Beck & Beck, 2011).  He

believed this triad applied to all emotional disorders; these disorders are psychological

states that involve a maladaptive excess of negative emotions or a deficiency in positive

emotional production and control (Clark & Beck, 2010).  This term, emotional disorder,

is used to encompass states of anxiety or depression.  Beck's cognitive model posits that

dysfunctional thinking relating to the cognitive triad is common to all psychological

disturbances (Beck & Beck, 2011).  Along with Beck (1967), Ellis (1977) agreed that

cognitions play an integral part in influencing emotions and behaviors.

        Ellis (1962; 1977) developed Rational Emotive Therapy (RET), which identified

11 irrational beliefs thought to predispose an individual to negative emotional reactions

or the development of an emotional disorder.  Ellis' RET was a cognitive approach to

therapy, similar to that of Beck's (1967; 1976); it is based on the concept that irrational

beliefs were the source of emotional distress or the cause of dysfunctional behavior.

Ellis' (1989) model suggests that when a strong emotional consequence follows a

significant activating event, the individual believes the event causes the negative

emotional reaction, but, in fact, the emotional reaction is caused by the individual's belief

system.  For example, a large number of people experienced the 9/11 tragedy, but each

person had a different reaction to the situation based on his or her belief system.  The

goal of RET is to alter the negative belief system, which in turn will help to change how

people react to external stimuli.  Beck's (1967; 1976) cognitive therapy is slightly

different because it attempts to alter the dysfunctional processing, which can change the

maladaptive belief system.  By understanding how these negative cognitions or belief

systems are generated and by developing therapeutic techniques to alter them, cognitive

therapy and RET became established treatments for the alleviation of emotional

disorders.

Cognitive therapy's conceptual framework relies on the belief that an individual's

subjective assessment of early life experiences shapes and maintains fundamental beliefs

about the self, world, and future (Beck, 1967; 1976).  These fundamental beliefs are

called schemas, which are defined as systems of organizing and perceiving new

information (Young, 1994).  Beck (1967) believed that the presence of negative schema

is what makes individuals vulnerable to psychiatric symptoms because they interpret their

environments through a dysfunctional framework.  The idea of schema being the

foundation for the development and maintenance of emotional disorders was later

incorporated into Young's schema theory of depression or negative affect (Young, 1994).

**Schema Theory.**

Schema theory relates negative childhood experiences, temperament, and early

maladaptive schema to the experience of depression and other emotional disorders

(Young, Klosko, Weisharr, 2003).  Schema theory suggests that early maladaptive

schema causes individuals to be vulnerable to emotional disorders because these

individuals organize their experiences based on a negative interpretational framework.

Young and colleagues (2003) define early maladaptive schemas as "broad, pervasive

themes or patterns, comprised of memories, emotions, cognitions, and bodily sensations,

regarding oneself and one's relationships with others, developed during childhood or adolescence, elaborated throughout one's lifetime and dysfunctional to a significant degree" (p. 7).  Young and colleagues suggest that the origin of early maladaptive schema develops from the obstruction of core emotional needs by negative experiences.  The researchers proposed five core emotional needs, which if negatively experienced, could lead to dysfunctional schema (Young et al., 2003; Jesinoski, 2010).  The core emotional needs include:

1.  Secure attachments to others (e.g. safety, nurturance, acceptance);

2.  Autonomy and sense of identity;

3.  Freedom to express needs and emotions;

4.  Spontaneity and play; and

5.  Realistic limits and self-control.

Young and colleagues speculate that the combination of nature (innate temperament) and nurture (early life experiences) can result in either the gratification or the obstruction of these needs.  Early maladaptive schema, which impact secondary beliefs that influence assumptions of the self and world, result from the obstruction of these core emotional needs by negative experiences (Jesinoski, 2010).

**Combining Theories.**

According to Beck's cognitive model, schemas serve to organize prior experiences, guide the interpretation of new experiences, and shape expectancies of the future (Beck, 1967; Beck, Brown, Steer, & Weissman, 1991).  Similar to Young and colleagues (2003), Beck believed negative schema to be stable, enduring cognitive structures that affect the encoding, storage, and retrieval of information (Beck, 1967,

1976; Beck, Rush, Shaw, & Emery, 1979). Beck's theory explains early maladaptive

schemas as vulnerability factors for depression and other emotional disorders (Whisman

& Kwon, 1992). Beck's model describes how a child learns to assemble reality through

his or her early experiences with the environment. Sometimes these early experiences

cause the child to accept beliefs that may prove maladaptive during adulthood (Beck &

Young, 1985). During adolescence and adulthood, when in the presence of relevant

environmental triggers, the early maladaptive schemas become activated and salient,

which often contributes to the development of psychiatric disorders (Beck, 1967).

       This is not to say that cognitive distortions and early maladaptive schemas are the

only predisposing factors for the development of emotional disorders. Dysfunctional

thoughts, beliefs, assumptions and cognitive processing are only pieces to the overall

puzzle concerning the etiology of emotional disorders. Other contributing or

predisposing factors include, but are not limited to, genetic heritability, physical disease

states, psychological trauma, and absence of coping mechanisms (DiTomasso, Freeman,

Carvajal, & Zahn, 2009). There are certainly other models that explain the development

of mood disorders, but the ICD was developed based on Beck's cognitive theory. The

cognitive model places primary emphasis on cognitive factors in predisposing individuals

to emotional disorders (DiTomasso et al., 2009). For example, individuals suffering from

anxiety disorders tend to have underlying unrealistic beliefs concerning threat or danger

and these beliefs are activated in the presence of situations with similar conditions to

those events during which the anxiety schemas were learned. "When these schemas are

activated, they fuel the patient's thinking, behavior, and emotion, all of which can serve

to reciprocally reinforce one another and the underlying schema" (DiTomasso et al., 2009, p. 107).

Based on pre-established, underlying schemas, secondary beliefs develop and function as rules or assumptions regarding the perception of the cognitive triad (Beck et al., 1979). These secondary beliefs, rules, or assumptions define self-worth and can develop into further learned ways of thinking (Beck et al., 1979). The function of the learned ways of thinking is to support the core negative schemata, causing habitual generalizing and distorting of internal and external stimuli. Cognitive distortions develop through this chain of core maladaptive schema influencing secondary beliefs and assumptions. For example, if a maladaptive schema is activated by an individual's environment, access to negative thoughts, beliefs, or assumptions occurs. These then trigger a pattern of continuous negative self-information characterized by cognitive errors or distortions. According to Beck, the danger of engaging in this pattern of cognitions is the possible development of the negative cognitive triad – viewing the self, world and future in a negative manner (Beck, 1967; Abela, & D'Alessandro, 2002). Beck's theory suggests that maladaptive information processing of internal and external stimuli by negative schema and cognitive distortions causes individuals to become more susceptible to emotional disorders. The goal of Beck's cognitive therapy is to change negative cognitive distortions, in hopes of altering the maladaptive core belief or schema, in order to alleviate symptoms of emotional disorders.

**Diathesis-Stress Model.**

Beck's cognitive theory is also based on a diathesis-stress model. This model suggests that the combination of maladaptive schema or negative predisposition

(diathesis) and the perception of negative life events (stress) cause symptoms of an

emotional disorder (Bruno, 2010).  When an individual who has a maladaptive

predisposition causing him or her to process information with a negative framework has

the experience of a stressful event, he or she becomes more susceptible to mental illness

(Sigelman & Rider, 2009; Abela, & D'Alessandro, 2002).  Beck (1967) hypothesized that

the maladaptive schema are typically dormant in individuals vulnerable to emotional

disorders and the schema will exert an influence on information processing when

activated by relevant stressors.  It is the combination of maladaptive information

processing and perceived stress that can lead to emotional disorders.

When individuals are experiencing stress, underlying maladaptive schema can

cause an interpretation of the event through a distorted thinking filter.  Once the negative

cognitive distortion is activated, the maladaptive appraisal of the stressful event can

worsen.  Individuals with high levels of cognitive distortion may perceive stressful events

as being more stressful than individuals with low levels of cognitive distortion because

they are processing the situations in ways that distort the potential impact of the events.

The diathesis-stress component of Beck's cognitive model lends further evidence to the

information processing approach to emotional disorders.

### Information Processing and Cognition.

Beck's cognitive theory is based on the premise that negative schema influences

how individuals perceive and interpret their environments (Ingram, 1984).  The theory

suggests that individuals suffering from an emotional disorder process incoming

information in a dysfunctional manner.  Kendall (1992) suggests that this dysfunction can

take place in different areas of the cognitive taxonomy.  Kendall has described an

information processing system consisting of four features, which include: (1) cognitive

content; (2) cognitive process; (3) cognitive products and (4) cognitive structures.

Cognitive content is defined as the information stored and organized in memory.

Cognitive processes are the mechanisms by which an information processing system

processes information over time.  This includes attentional, encoding, and retrieval

processes.  Cognitive structures refer to how information or cognitive content is stored.

Kendall suggests that cognitive content is stored in terms of how it relates to other

information.  Cognitive structures are templates that filter certain cognitive processes.

Last, cognitive products are the end results of the operations of the information

processing system.  These are the thoughts or cognitions that are produced as a result of

the interaction between content (self-referent speech), process (processing mechanisms),

and structure (mental filters).

Cognitive distortions take place in the domain of cognitive processes, but are

identified as cognitive products or what the person is thinking.  An individual's causal

explanation for some situation is the product of cognitive processes and related content

(Kendall, 1992).  Kendall suggests, "The manner with which the person processes the

information will have an influence on their emotional and behavioral responses and their

overall level of adjustment" (p.2).  If an individual is processing external and internal

information based on a negative filter or schema, this can affect his or her ability to cope

with stressful situations, possibly leading to an emotional disorder.

Within the cognitive process feature of the information processing system,

Kendall (1992) differentiates between processing deficiencies and processing distortions.

Processing deficiencies occurs when an individual has inadequate cognitive activity in

situations in which information processing would prove beneficial. An example is a situation in which an individual acts without actively processing external information or acts without thinking and the behavior results in unintended consequences. Processing distortions occur when an individual is actively processing information, but the thinking processes are misguided (Kendall, 1992). For example, an individual may engage in processing but does so by filtering information through faulty reasoning processes, resulting in unwanted consequences. In the instance of emotional disorders, the faulty reasoning processes can stem from negative core beliefs or schema (Beck, 1967; 1976). The distinction between processing deficiencies and processing distortions is that one entails a failure to think and the other is a pattern of thinking in a distorted manner (Kendall, 1992).

Although processing distortions has been presented as dysfunctional, research suggests that some processing distortions can be functional or serve a purpose for maintaining positive mental health. Kendall (1992) suggests that more accurate perceptions of the surrounding environment, or more realistic cognitions, do not necessarily lead to a healthy mental state or to successful behavioral adjustment. For example, depressed patients have been found to engage in more negative cognition than non-depressed patients; however, depressed patients tended to be more accurate or realistic in their thinking than non-depressed patients (Alloy & Abramson, 1988). Research proposes that extremely positive cognitive distortions can be functional and benefit the individual (Kendall, 1992: Taylor & Brown, 1988). Taylor and Brown (1988) coined the term positive illusions to describe three functional distortions of cognitive processing. The three distortions include (1) inflated assessment of one's own abilities,

(2) unrealistic optimism about the future, and (3) an exaggerated sense of control (Taylor & Brown 1988).  These positive illusions or functional distortions are believed to be adaptive strategies for coping with stressful situations and for promoting positive mental health.  Although some processing distortions can be functional, research tends to focus on dysfunctional distortions because they are believed to produce and maintain emotional disorders (Beck, 1967; 1976; Ellis, 1977; Beck & Beck, 2011).

**Cognitive Distortions Defined.**

Emotional disorders develop due to a lack of functional distortions and the presence of dysfunctional distortions (Burns, 1980; 1989; 1999).  The negative emotional state is generated by biased information processing due to the subjective experience of negative automatic thoughts based on maladaptive schema (Clark & Beck, 2010). Negative automatic thoughts are defined as "thoughts that come rapidly, automatically, and involuntarily to mind when a person is stressed or upset and seem plausible at the time" (Neenan & Dryden, 2006, p. 5).  According to the cognitive model, the world presents individuals with negative, positive, or neutral events, which they then interpret with a series of automatic thoughts causing certain feelings or moods.  The feelings are created by the individual's thoughts and not by the actual events (Burns, 1980).  If the individual interprets the events using negative automatic thoughts, maladaptive feelings develop.  These negative automatic thoughts are based on cognitive distortions derived from negative core beliefs or schema.  Beck (1967) defined cognitive distortions as processing information in a predictable manner, resulting in identifiable errors in thinking.  Cognitive distortions negatively skew the way in which individuals perceive the cognitive triad.

In general, cognitive distortions represent the different means by which individuals modify their experiences, thereby creating dysfunctional subjective constructs (Yurica, 2002).  Beck, Freeman, Davis, and associates (2006) describe cognitive distortions in the following way, "A patient's cognitive distortions serve as sign posts that point to schema.  The style of distorting the content, frequency and consequences of the distortions are all important elements" (p. 28). The ultimate goal of cognitive therapy and cognitive behavioral therapy is to identify and change the habitual and dysfunctional ways in which a patient perceives his or her experience, in order to change his or her maladaptive schema.

**Definitions and Types of Cognitive Distortions.**

Originally, Beck (1967) defined six cognitive errors in thinking or faulty information processing.  The six cognitive errors identified were: (1) arbitrary inference; (2) absolutistic or dichotomous thinking; (3) magnification and minimization; (4) overgeneralization; (5) personalization; and (6) selective abstraction (see Definition of Terms).

Several years after Beck (1967) defined his original cognitive errors, Burns (1980) expanded the list to include a total of 10 types of cognitive distortions.  The 10 distortions included: (1) all-or-nothing thinking; (2) discounting the positive; (3) emotional reasoning; (4) jumping to conclusions; (5) labeling; (6) magnification or minimization; (7) mental filter; (8) overgeneralization; (9) personalization; and (10) should statements (see Definition of Terms).

Freeman and DeWolf (1992) and Freeman and Oster (1992) developed three additional cognitive distortions including: (1) comparison; (2) externalization of self-worth; and (3) perfectionism (see Definition of Terms).

The previously defined cognitive distortions represent the major categories of distorted thinking discussed in the clinical literature. This list does not represent all possible types of cognitive distortions and as research advances, it is possible that additional distortions may be identified (Yurica, 2002).

**Evolutionary Theory of Cognitive Distortions.**

Based on the information-processing model of cognitive distortions, researchers have a good understanding of *how* distortions develop, but an important question to address is *why* dysfunctional thoughts develop. Gilbert (1998) takes an approach in evolutionary psychology to explain the purpose of cognitive distortions and the reasons why they develop from faulty information processing. Gilbert suggested that cognitive distortions are not simply maladaptive thought patterns, but rather that they are adaptive reactions in response to the perception of threat. Gilbert believed human beings have evolved to think adaptively in order to survive.

Gilbert (1998) suggests that there are two mental systems that process information. The first system is a fast track system that quickly appraises a situation for threat and evokes an immediate response. This system utilizes heuristics, or mental shortcuts, to evaluate sensory information and triggers a fight or flight response in reaction to a perceived threat. The second system is a rational system that analyzes situations, using information from memory and complex deductive logic to reach a conclusion. This tends to be a slow, conscious process (Gilbert, 1998). Gilbert suggests

that cognitive distortions arise from the first system, as adaptive protective responses in the form of defensive processing.

For example, people are constantly immersed in information from the environment, so much so that it becomes difficult to decipher the relevant information from the irrelevant. Humans do not have enough time to attend to, analyze and interpret all external stimuli, so they are forced to use mental shortcuts to better navigate their surroundings. Some mental shortcuts used to interpret information may have derived from dysfunctional cognitive processing, but this was evolutionarily more efficient in aiding human survival (Gilbert, 1998). For example, natural selection might favor a distant human ancestor whose mental heuristic of perceived threat in reaction to the rustling of a bush triggered a flight response to avoid a dangerous animal. Natural selection may not favor the individual who uses careful analysis during such a situation (Shermer, 2006). In this case, the distorted mental shortcut of perceived threat each time a bush rustles might be adaptive. Gilbert (1998) explains the adaptive functionality of seven cognitive distortions found in the clinical literature from an evolutionary perspective; each will be discussed:

1. Selective Abstraction. Gilbert (1998) proposed that this distortion derives from an attentional bias, which can occur without conscious awareness and focuses on negative information. The function of this type of thinking would be to attend to and detect a threat quickly and efficiently in order to avoid a negative situation.

2. Arbitrary Inference (Jumping to Conclusions). During emergency situations an individual needs to think categorically in order to determine whether or not the event presents a threat. Logical thinking is a slower form of processing in

comparison with categorical thinking, which allows for quick adaptive decision-making.  When forced to make a quick decision, reducing the number of choices can increase the speed with which the decision is made.  For example, in the situation with the rustling bush, the categories would be threat or no threat (Shermer, 2006).  According to Gilbert (1997; 1998) arbitrary inference is the most salient cognitive distortion because one would prefer to be safe by reacting quickly rather than experience the possible consequences of not reacting at all.

3.  Dichotomous Thinking (All-or-Nothing).  Again, this cognitive distortion involves categorical thinking in order to make a quick judgment of threat or no threat.  Swift decision making through categorical processing can reduce response time, which may lead to an action that will help avoid the potential threat (Gilbert, 1998).

4.  Emotional Reasoning.  By relying on fast track emotional reasoning to make decisions, individuals can use their emotions to interpret the level of perceived threat during events, increasing the probability of reacting in a safe manner.

5.  Disqualifying the Positives.  Minimizing one's own attributes or being restrained in the estimation of one's abilities is generally related to modesty.  Research has found that low levels of modesty can be perceived as an attractive trait (Baumeister, 1992).  If one is viewed as attractive, he or she will be more likely to mate and pass on the modesty trait.  Also, by minimizing one's own abilities, he or she may be protected from unrealistic expectations by others (Gilbert 1997; 1998).

6. Comparison.  Gilbert (1998) discusses the comparison distortion (Freeman &

DeWolf, 1992; Freeman & Oster, 1992) in terms of a social comparison of the

self or others, either in the positive or negative direction.  It is adaptive for people

to compare themselves socially in order to know how to fit in with the dominant

group, to understand how to advance socially, to recognize who in society is

superior or inferior, and to determine the most beneficial method of interacting

with others (Gilbert, 1998).  Depending on how an individual compares him or

herself with others can have an impact on self-esteem, level of confidence, and

feelings of stress or of happiness.  For example, if comparing oneself to others

and the view of self is positive and the view of others is negative, an increase in

self-esteem may occur.  But, if the view of self is negative and the view of others

is positive, a reduction in self-esteem may take place.

7. Personalization (Self-Blame).  Attributions of self-blame may be adaptive because

it offers an illusion of control over random threatening events.  The illusion of

control allows for the misperception of control over purely chance-determined

negative events, often comforting the individual that he or she could have

controlled the situation.  This feeling of control can lead to the belief that a

negative event can be prevented in the future (Langer, 1975).  Self-blame may

also lead to the avoidance of attacks on others, which in turn reduces the risk of

attacks by others (Gilbert, 1998).

Gilbert (1998) hypothesized that cognitive distortions are mediated by an

unconscious information processing system that quickly interprets environmental events,

using mental shortcuts to aid in human survival through the avoidance of threats.

Although these automatic cognitive mechanisms were once adaptive and necessary for

survival, present day cognitive distortions can be maladaptive and lead to mental illness.

**Cognitive Distortions and Mental Illness.**

*Depression.*

According to Beck's (1967; 1976) cognitive model of depression, cognitive

distortions play a significant role in the etiology and maintenance of depression.

Throughout relevant research, when grouped data are compared, individuals suffering

from depression have consistently displayed greater levels of cognitive distortion than

non-depressed individuals (Marton, Churchard, & Kutcher, 1993; Swallow & Kupier,

1990).  As stated previously, for individuals coping with depression, cognitive distortions

tend to involve absolutist thinking, increased negative cognitions about the self, and

revolve around themes of loss, deprivation, and personal inadequacy (Burns & Eidelson,

1998; Haaga, Dyck, & Ernst, 1991).  The negative automatic thoughts represent those

cognitive distortions of decreased self-worth and all-or-nothing exaggerated thinking

when interpreting external events (Leung & Wong, 1998).  Leung and Wong (1998)

found that when interpreting external events, these cognitive distortions tend to center

around internalizing the problem instead of externalizing the problem.  Internalizing the

problem pertains to the belief that the individual, himself or herself, is the cause of the

negative event but externalizing the problem is the belief that external factors are the root

of one's difficulties (Leung & Wong, 1998).  The researchers examined four cognitive

distortions, catastrophizing, personalizing, overgeneralization, and selective abstraction,

across a community sample and a clinical sample.  The results suggested a strong

association between the four distortions and internalizing problems.  Following a stressful

external event, depression can develop if an individual holds negative, absolutist

cognitive distortions about the self (Beck, 1967; 1976; Leung & Wong, 1998; Burns &

Eidelson, 1998).

Martin and Kutcher (1994) examined the prevalence of cognitive distortion in a

sample of 94 depressed adolescent psychiatric outpatients.  The study examined the

variation in prevalence of cognitive distortion, depending on the severity of depressive

symptoms.  The study compared depressed individuals with high levels of cognitive

distortion with those with low levels of cognitive distortion.  Based on the results of the

study, the researchers concluded there was a relationship between cognitive distortion

and multiple factors of depression (e.g. more severe symptomatology, a lack of social

self-confidence, and greater introversion).  The results emphasize a link between greater

intensity of cognitive distortion and more severe depression in adolescents (Martin &

Kutcher, 1994).

Cognitive distortion has also been identified as a factor of depression in patients

suffering from chronic pain.  Previous studies have found that chronic pain patients who

have a poor understanding of their pain problems and  generalized cognitive distortions,

tend to have increased levels of depression (Smith, Aberger, Follick, & Ahern, 1986;

Smith, Peck, Milano, & Ward, 1988; Lefebvre, 1981).  Smith, O'Keeffe, and Christenson

(1994) examined the relationship between cognitive distortions and depression in a

sample of chronic pain sufferers.  The results suggested that chronic pain patients and

non-pain patients with depression reported more cognitive distortion than non-depressed

pain patients and normal controls.  The researchers concluded that their results supported

the cognitive theory explanation of the impact of cognitive distortions on depression and

that the theory was relevant to chronic pain patients (Smith, O'Keeffe, & Christenson, 1994).

Lefebvre (1981) found similar results in a sample of patients suffering from chronic low back pain. The patients in the study were grouped into four categories, depressed psychiatric patients, depressed low back pain patients, non-depressed low back pain patients, and non-depressed persons without low back pain. The researcher measured four types of cognitive errors: catastrophizing, overgeneralization, personalization, and selective abstraction. The results indicated that depressed patients, with or without low back pain, endorsed all cognitive errors significantly more strongly than those non-depressed patients. The researcher concluded that depression in low back pain patients is a factor both of low back pain and of cognitive errors (Lefebvre, 1981).

Beck's (1967; 1976) original cognitive model was developed to explain the effects of schema, cognitive distortion, and negative automatic thoughts on the progression of depression. Research has found supporting evidence that cognitive distortion is an important factor in the etiology and exacerbation of depression in adolescents, adults, and chronic pain patients (Beck, 1967; 1976; Leung & Wong, 1998; Martin & Kutcher, 1994; Smith, Aberger, Follick, & Ahern, 1986; Smith, Peck, Milano, & Ward, 1988; Lefebvre, 1981; Smith, O'Keeffe, & Christenson, 1994; Abela, & D'Alessandro, 2002). Following the outpouring of research supporting Beck's cognitive theory of depression, researchers examined the role of cognitive distortion in the development of other emotional disorders, such as anxiety.

*Anxiety.*

Cognitive distortions have also been linked to anxiety disorders (Burns & Eidelson, 1998; Ingram & Kendall, 1987; Clark & Beck, 2010; Beck & Clark, 1988).  As stated previously, for those coping with anxiety, cognitive distortions tend to be probabilistic in nature and consist of perceptions of possible future psychological or physical harm (Burns & Eidelson, 1998).  Based on the information-processing model, Ingram and Kendall (1987) suggest that sufferers of anxiety disorders have schemas pertaining to threat.  The researchers propose the schema of anxious individuals shift between cognitive distortions of the self to distortions of their external worlds.  Ingram and Kendall believe that when a perceived threat is absent, anxious individuals have schema consisting of propositions relevant to the self (e.g. individuals see themselves as anxious or fearful).  However, while experiencing a perceived threatening or dangerous situation, "a relative shift occurs away from the self-schema to schema designed to facilitate the processing of danger cues either externally in the environment or internally within the self" (Ingram & Kendall, 1987, p. 5).  Essentially, when confronted with an anxiety-provoking situation, anxious schema trigger cognitive distortions pertaining to the processing of external stimuli as threatening, but when not experiencing an anxious situation, the individual has schema operations that define anxious features about the self.

In comparison with depression, Ingram and Kendall (1987) suggest that instead of automatic negative thinking, as found in depressed patients, anxiety sufferers tend to have automatic negative questioning.  In automatic thinking, the focus is on absolutist conclusions and statements, such as "I *am* a failure," whereas with automatic questioning, the thoughts focus on questions about personal adequacy in the situation, such as "*What*

will they think of me?" or "*Are* they laughing at me?"  Based on previous negative

cognitive processing, research has suggested that the cognitive content of anxiety

sufferers tends to be distorted when they question the future (Kendall & Hollon, 1989).

Individuals who perceive themselves as unable to cope with threatening situations or

those who interpret present or future situations as harmful may develop some form of

anxiety disorder.

Leitenberg, Yost, & Carroll-Wilson (1986) examined anxiety in a sample of

school children in fourth, sixth, and eighth grades.  The study compared cognitive errors

in children with high evaluation anxiety, operationalized as high scores on the Test

Anxiety Scale for Children, with children with low evaluation anxiety.  The researchers

found that children with high evaluation anxiety endorsed significantly higher levels of

cognitive errors than did children with low evaluation anxiety (Leitenberg et al., 1986).

Weems, Berman, Silverman, and Saavedra (2001) found similar results in a sample of

adolescents.  The researchers examined the relationship between cognitive errors and

different aspects of anxiety (trait, manifestation, and sensitivity) in a sample of

adolescents suffering from an anxiety or phobic disorder.  Results of the study indicated

that each of the measures of anxiety was significantly correlated to each of the cognitive

errors, including catastrophizing, overgeneralization, personalization, and selective

abstraction.  The researchers concluded that findings "support a cognitive model of

anxiety which posits that such emotional disturbances are characterized by faulty or

negative ways of thinking" (Weems et al., 2001, p. 572).  Wells (1997) further supports

the finding that anxious patients present with cognitive biases or distortions.  Wells

identified such cognitive distortions as dichotomous thinking, mental filtering,

catastrophizing, and personalization in patients suffering from anxiety disorders. Although research tends to focus on depression and anxiety when examining cognitive distortions, thinking errors have been found to influence other disorders as well.

### *Other Axis I and Axis II Disorders.*

Cognitive distortions have been described in the literature on problem behaviors in adolescents (Barriga, Landau, Stinson, Liau, & Gibbs, 2011), eating disorders (Shafran, Teachman, Kerry, & Rachman, 1999), obsessive-compulsive disorder (OCD) (Rachman & Shafran, 1999), gambling addictions (Toneatto, Blitz-Miller, Calderwood, Dragonetti, & Tsanos, 1997), and sex offenses (Ward, Hudson, Johnstons, & Marshall, 1997; Ward, 2000).

Cognitive distortions are found not only in Axis I disorders but have also been identified in Axis II disorders. A common cognitive distortion found in patients with Dependent Personality Disorder is dichotomous thinking, whereas patients struggling with Borderline Personality Disorder tend to use catastrophic thinking and perfectionism in addition to dichotomous thinking (Freeman, Pretzer, Fleming, & Simon, 1990; Layden, Newman, Freeman, & Morse, 1993). Beck, Freeman, Davis, and associates (2004) found that patients with Histrionic, Narcissistic, and Obsessive Compulsive Personality Disorders also utilized cognitive distortions.

In summary, cognitive distortion is an important factor in the etiology, maintenance, and exacerbation of many Axis I and Axis II disorders. Due to extensive research providing evidence for the presence of cognitive distortions in mental illness, a range of measures were developed to identify such thinking errors. These measures, which were developed to identify cognitive components of mental illness, can aid in the

development of more effective treatments.  The following is a review of current measures

of cognitive distortions.

**Measures of Cognitive Distortion.**

Five clinical instruments, which were specifically designed to measure the general

construct of cognitive distortion, were found throughout the literature.  The five

instruments were the Automatic Thoughts Questionnaire (ATQ, Hollon & Kendall,

1980), Cognitive Errors Questionnaire (CEQ, Lefebvre, 1981), Cognitive Distortion

Scale (CDS, Briere, 2000), Dysfunctional Attitude Scale (DAS, Weissman & Beck,

1978), and the measure currently being investigated, the Inventory of Cognitive

Distortions (ICD, Yurica, 2002; DiTomasso & Yurica, 2011).

*Automatic Thoughts Questionnaire.*

The Automatic Thoughts Questionnaire consists of 30 items, designed to measure

the frequency of occurrence of automatic negative self-statements associated with

depression (Hollon & Kendall, 1980).  The individual is asked to think about how often

in the past week he or she has experienced certain automatic thoughts, using a Likert-type

scale ranging from 1 = "not-at-all" to 5 = "all-the-time".  The total score is derived from

the sum of all 30 items.  Initially, 788 male and female undergraduate students were

asked to recall a specific life experience which they found to be depressing and to record

their automatic thoughts and reactions.  The researchers then selected the 100 most

common thoughts and generated the initial ATQ-100.  The initial ATQ was further

examined for item selection and cross-validation by comparing the scores of 348

undergraduate students across four measures, the ATQ, the Beck Depression Inventory

(BDI), the Minnesota Multiphasic Personality Inventory Depression scale (MMPI-D),

and the State-Trait Anxiety Inventory (STAI) A-Trait scale.

Following the second administration of the ATQ, 30 items were found to

differentiate between depressed and non-depressed participants (Hollon & Kendall,

1980). On each of the 30 negative self-statements, the depressed participants reported

significantly more occurrences of negative thought than non-depressed participants. A

significant relationship was found between the ATQ and the BDI and MMPI-D, with

correlations falling within the moderate to high range (*r*'s range from .45-.70). The

significant correlation between the ATQ and the STAI-trait scale (*r* = .79) was

unexpected because the authors believed the ATQ would have been able to differentiate

between self-reported depression and self-reported anxiety. In regard to reliability, both

split half reliability, odd versus even items, and coefficient alpha were calculated and

found to be significant (.97 and .96 respectively). The authors concluded the ATQ to

have sufficient internal reliability and concurrent validity and justified its use as a

measure of depression-related automatic negative thoughts (Hollon & Kendall, 1980).

The construct validity of the measure was supported by findings that depressed

clinical samples reported more negative automatic thoughts than nonclinical samples

(Dobson & Breiter, 1982). The ATQ was further validated using a clinical sample of

mental health center patients and of medical center patients (Harrell & Ryon, 1983).

Once again the ATQ was able to differentiate between depressed and non-depressed

patients and the measure correlated significantly with the BDI and MMPI-D. The split

half reliability and coefficient alpha were similar to that of the Hollon and Kendall (1980)

study, thus further emphasizing the measure's reliability. The use of the ATQ has also

been validated for assessing negative automatic thoughts associated with depression in

children, adolescents, and adults both in clinical and in non-clinical samples (Kazdin,

1990: Dent & Teasdale, 1988; Dobson & Breiter, 1982; Dohr, Rush & Bernstein, 1989;

Harrell & Ryan, 1983; Ross, Gottfredson, Christensen & Weaver, 1986).

A revised version of the measure (ATQ-R) was published in 1989 and included

positive and neutral self-statements to the already established negative self-statements

(Kendall, Howard, & Hays, 1989).  The revised measure continued to differentiate

between depressed and non-depressed participants, but it also accounted for significantly

more variance than the original ATQ alone (Kendall, Howard, & Hays, 1989; Burgess &

Haaga, 1994).  The positive statements were added, based on the cognitive model's

proposition that depressed mood is linked to the presence of negative thoughts along with

the absence of positive thoughts.

### *Cognitive Errors Questionnaire.*

The Cognitive Errors Questionnaire (CEQ) was initially designed to coincide with

the Low Back Pain Cognitive Errors Questionnaire (LBP-CEQ).  The measures were

developed to investigate the application of the cognitive theory of depression in

depressed psychiatric patients, depressed low back pain patients, non-depressed low back

pain patients, and non-depressed persons without low back pain (Lefebvre, 1981).  The

questionnaire, which was designed to measure the general level of cognitive distortion, is

also capable of measuring four specific types of cognitive errors: catastrophizing,

overgeneralization, personalization, and selective abstraction.  The results indicated that

participants with or without low back pain, who were also suffering from depression,

endorsed significantly more cognitive errors than non-depressed patients (Lefebvre, 1981).

The general CEQ is composed of 24 vignettes, two to three lines long that describe daily life situations; each is followed by a negative thought about the vignette, reflecting one of the four cognitive distortions.  Respondents are asked to rate whether or not each negative thought is comparable with the ways in which they would react in a similar situation, as described by the vignette.  The rating is made on a 5-point Likert-type scale, ranging from 1 = "almost exactly as I would think" to 5 = "not at all as I would think".  To ensure respondents react to a wide range of situations, the context of the vignettes is divided equally across work, family, home, and recreational settings.  A second section was added to the general CEQ to measure negative cognitions in patients with low back pain (Lefebvre, 1981).  The LBP-CEQ also consisted of 24 vignettes followed by a negative cognition.

Original examination of the CEQ found the measure to have high test-retest reliability ($r$'s range from .80-.85), alternate forms reliability ($r$'s range from .76-.82), and internal consistency reliability ($r$'s range from .89-.92).  Research findings also indicate that the CEQ was able to distinguish between the depressed and non-depressed in a sample of older adults and pain patients (Scogin, Hamblin, & Beutler, 1986; Smith, O'Keefe, & Christensen, 1994).  A study investigating depression in chronic low back pain patients utilized the CEQ to determine if cognitive distortions were a factor of somatization or of general distress (Smith, Aberger, Follick, & Ahern, 1986).  The cognitive distortions as recorded by the CEQ were significantly correlated with the MMPI Depression, Psychasthenia, and Schizophrenia subscales, but it was not associated

with the Hypochondriasis or Hysteria subscales. The researchers concluded that the CEQ

demonstrated cognitive distortions as being a factor of distress, related to depression, but

not a factor of somatization (Smith et al., 1986).

In order to incorporate somatization symptoms into the subscale to assess,

comprehensively, the cognitive errors of those patients suffering from low back pain,

Moss-Morris and Petrie (1997) developed a shorter and revised version of the CEQ. The

CEQ-R contains 12 items that assess general cognitive errors and also a 9-item subscale

that assesses somatic complaints. The researchers gathered data for the CEQ-R from 141

patients suffering from various chronic pain symptoms and also from healthy controls.

The total, semantic, and general subscales of the CEQ-R demonstrated high reliability

across those participants with pain symptoms ($r = .95, .93, .90$ respectively). The

modified measure also demonstrated strong discriminate validity evidenced by the ability

to distinguish between pain sufferers with depression and healthy controls (Morris &

Petrie, 1997).

The CEQ was also revised to assess cognitive distortions in children. Leitenberg,

Yost, and Carrol-Wilson (1986) developed the Children's Negative Cognitive Error

Questionnaire (CNCEQ) to examine four types of cognitive errors in children. The four

cognitive errors are similar to the adult CEQ because both measures include

overgeneralizing, catastrophizing, personalization, and selective abstraction. Researchers

originally used a normative sample consisting of fourth, sixth, and eighth-grade students

and found that generally these children did not report a significant level of negative

thinking across any of the cognitive errors. Test-retest reliability of the total CNCEQ

was found to be moderate and the internal consistency reliability was found to be high (*r*

= .65, Cronbach's alpha = .89).  The test-retest reliability was weaker than Lefebvre's

(1981) original CEQ measure for adults ($r$ = .85).

Further studies found that when the CNCEQ was used to assess children with

self-reported symptoms of depression, low self-esteem, and anxiety, these children

endorsed significantly more cognitive errors than did their non-depressed, high self-

esteem, and non-anxious counterparts (Leitenberg, Yost, & Carrol-Wilson, 1986).

However, results have been inconclusive when using the CNCEQ to investigate the

relationship of distorted thinking and affective disorders in adolescents (Messer,

Kempton, Van Hasselt, Null & Bukstein, 1994), to identify common cognitive errors in

social anxiety and depression (Epkins, 1996), and to better understand customary

cognitive distortions in child psychopathology (Leung & Poon, 2001).  Across studies

and populations, versions of the CEQ tend to have strong validity and varying reliability

when measuring four specific cognitive errors (Lefebvre, 1981; Scogin, Hamblin, &

Beutler, 1986; Morris & Petrie, 1997; Leitenberg, Yost, & Carrol-Wilson, 1986; Smith,

Aberger, Follick, & Ahern, 1986).  Although the CEQ has been validated and revised to

measure cognitive errors across a range of populations and differing illnesses, the

measure is capable of evaluating only four cognitive errors.

### *Cognitive Distortions Scale.*

The Cognitive Distortions Scale (CDS) is the most recently developed measure of

cognitive distortion, besides the Inventory of Cognitive Distortion (ICD) (Briere, 2000).

The instrument was developed because the author felt that previous measures of negative

ideations were limited by a number of factors such as age range restrictions, limited

number of items, poorly defined constructs, and questionable accuracy in distinguishing

between cognitive distortions and mood states (Briere, 2000). The CDS, which is a 40-item, self-assessment of cognitive distortion for adults, comprises items in the form of short phrases, each representing a dysfunctional thought or feeling. The individual is asked to rate how often he or she has had these different thoughts and feelings in the last month; the measure uses a 5-point Likert-type scale ranging from 1 = "never" to 5 = "very often". The instrument is said to measure five scales, each considered to be a cognitive distortion; these include self-criticism, self-blame, helplessness, hopelessness, and preoccupation with danger (Briere, 2000). Each factor consists of eight items; the raw scores are converted into T-scores, and if T is equal to or greater than 70, that particular distortion would be considered clinically significant. The measure is brief and simple to score, taking only 10 to 15 minutes to administer and approximately five minutes to score.

The CDS was evaluated using a normative sample of 611 individuals from the general population. Internal consistency reliability for the fives scales was high and ranged from .89 to .97 and an overall mean alpha of .93. Construct validity was examined by comparing the CDS scale scores with three measures of depression, the Multiscore Depression Inventory (MDI), the Personality Assessment Inventory (PAI), and the Trauma Symptom Inventory (TSI). All tests yielded relatively high correlations, supporting the validity of the CDS (Briere, 2000). Owens, Chard, & Cox (2008) used the CDS to evaluate cognitive distortions in returning Veterans suffering from Posttraumatic Stress Disorder (PTSD). The CDS was administered to a sample of 99 veterans and the results suggested high internal consistency reliability for each subscale, with reliability coefficients ranging from .81 to .94. The CDS was able to track changes in cognitive

distortion and depression across pre- and post-treatment evaluations (Owens, Chard, &

Cox, 2008).  The CDS has also been found to distinguish between female patients with

dual diagnoses of PTSD and substance abuse disorder; these individuals have more

cognitive distortions than female patients with a single diagnosis (Najavits, Gotthardt,

Weiss, & Epstein's, 2004).  Although studies have found the CDS to be reliable in

assessing cognitive distortions in PTSD patients, there remains a dearth of literature

about utilizing the CDS in clinical practice.

### *Dysfunctional Attitude Scale.*

The Dysfunctional Attitude Scale (DAS) is an instrument consisting of 40-items

designed to identify and measure dysfunctional attitudes, particularly those that may

relate to depression (Weissman & Beck, 1978; Weissman, 1979).  The instrument is

constructed of single-sentence items and is said to measure seven value systems including

approval, love, achievement, perfectionism, entitlement, omnipotence, and autonomy.

Answers to the items are reported on a seven-point scale ranging from 1 = "totally agree"

to 7 = "totally disagree".  The DAS provides a single-scaled score ranging from 40 to

280, with lower scores indicating more adaptive attitudes and higher scores representing

more dysfunctional attitudes.  Weissman (1979) designed the DAS by basing items on

Beck's (1967) cognitive theory of depression.  The items were constructed based on

Beck's six original cognitive errors: arbitrary inference, selective abstraction,

overgeneralization, magnification, personalization, and dichotomous reasoning.

Throughout Weissman's development and validation of the DAS, the term dysfunctional

attitude was used synonymously with thinking errors and cognitive distortions.

The DAS was originally evaluated using a sample of 355 undergraduate and graduate students in psychology. Two versions of the measure (A and B) were created from a sample of 100 items and both of these were validated using the student sample (Weissman, 1979). The instrument was found to have high internal consistency reliability, with alphas ranging from .84 to .92. The DAS also demonstrated significant test-retest correlations, .80 to .84, over an 8-week period, suggesting excellent stability. In regards to concurrent validity, the DAS was found to correlate significantly with the Beck Depression Inventory (BDI). Similar results were found using the DAS-A when examining the instrument's properties in a separate sample of undergraduate students (Cane, Olinger, Gotlib, & Kuiper, 1986). Oliver and Baumgart (1985) also found results in support of the DAS in a sample of hospital employees and spouses. Test-retest reliability was good following a 16-week period ($r = .73$) and the DAS again correlated with the BDI ($r = .41$).

Beck, Brown, Steer, and Weissman (1991) examined the use of the DAS for identifying dysfunctional attitudes in a clinical population. The results lent further support for the factor structure of the DAS. Nelson, Stern, and Cicchetti (1992) also evaluated the functionality of the DAS with a population of depressed and non-depressed individuals. The relationship between versions A and B was stronger when used with a clinical population ($r = .92$) than with a student population as originally examined by Weissman and Beck (1978) ($r = .79$). Scores on the two versions of the DAS were also found to have a stronger correlation within the depressed sample ($r = .94$) than within the non-depressed sample ($r = .84$).

The DAS continues to be revised and shortened throughout the literature, with consistent results in regard to validity and reliability. The DAS-A was revised using a large community sample of 8,960 participants.  The researchers found support for a shortened version of the DAS-A consisting of only 17 questions; this revised form held strong reliability and validity as evidenced by the ability to distinguish between depressed and non-depressed participants (Graaf, Roelofs, & Huibers, 2009).  Beevers, Strong, Meyer, Pilkonis, and Miller (2007) evaluated both forms of the DAS in a sample of depressed participants and generated 9-item versions of each.  Both short forms were highly correlated with the original 40-item DAS-A, with correlations ranging from .91 to .93.  Following the participants over the course of treatment, the brief versions identified similar amounts of change in symptomatology as did the original DAS.  The researchers concluded that the two shortened versions of the DAS provided accurate and efficient assessment results of dysfunctional attitudes among depressed individuals (Beevers et al., 2007).

The DAS is a widely used instrument for assessing dysfunctional attitudes in both clinical and nonclinical populations. Across a variety of investigations, the DAS has been used to investigate dysfunctional attitudes, such as dysfunctional attitudes and its relation to problem solving abilities (Otto, Fava, Penava, & Bless, 1997), psychosis and substance abuse (Graham, 1998), interpersonal behavioral issues (Whisman & Freedman, 1998), depression (Oliver, Murphy, Ferland, & Ross, 2007), bipolar disorder (Scott, Stanton, Garland, Ferrier, 2000; Lam, Wright, & Smith, 2004), and panic disorder (Ohrt, Sjodin, & Thorell, 1999).

**Limitations of Prior Cognitive Distortion Measures.**

Based on a review of the literature, previous measures of cognitive distortions had common limitations; Yurica, (2002), therefore, developed the Inventory of Cognitive Distortions. Yurica believed that a more standardized measure of cognitive distortion is necessary in order to address previous instruments' poor consensus of defining cognitive distortions, variable measurement across instruments, outdated measurement, and limited applicability and scope; with a standardized measure in place there is the potential for advancement in cognitive therapy.

A common limitation across all four previous measures is the lack of specificity in the terms used to describe cognitive distortions. The variety in definition can be seen in Weissman's (1979) description of the DAS because the terms "belief," "schema," "cognitive distortions," "thinking errors," and "dysfunctional attitudes" are used interchangeably. Also, two of the most commonly used measures of cognitive distortions, the DAS and ATQ, tend to measure the exact content of thoughts, as opposed to the actual error or process that leads to the automatic thought (Covin, Dozois, Ogniewicz, & Seeds, 2011). Both measures examine specific automatic thoughts rather than the underlying processes that cause distorted thinking. Previous instruments also vary on the types of cognitive distortions that each measures (Weissman, 1979; Hollon & Kendall, 1980; Briere, 2000). There is a lack of specificity concerning those constructs that should be measured and how those cognitive distortions should be defined.

Previous measures of cognitive distortion were also limited in their scope and applicability because all instruments focused primarily on depressive disorders (Yurica, 2002). Since the development of the earlier instruments, cognitive theory has expanded

beyond depression and cognitive distortion has been identified as an important factor in the maintenance of other Axis I and Axis II psychological disorders. Also, some of the instruments were developed as total score measures and provide only information regarding overall level of cognitive distortion. Based on previous literature, Yurica (2002) believed "previous measures did not provide relevant clinical information in terms of categorizing and identifying specific types of cognitive distortions" (p. 56).

In summary, the ICD was developed to better address the clinical utility of identifying and defining the usage of specific cognitive distortions. The ICD, which is based on a unified definition of cognitive distortions, is standardized and offers consistent measurement; it incorporates updated information regarding the role that cognitive distortions play in multiple psychological disorders, and has more generalized applicability and scope (Yurica, 2002).

**Inventory of Cognitive Distortions.**

The ICD is a 69-item measure that describes 11 types of cognitive distortions. The instrument, which is easy to administer, takes approximately 15 to 20 minutes to complete, and can be used with people ages 18 and older. DiTomasso and Yurica (2011) emphasize that the ICD is not a diagnostic measure and should not be used as the only means of assessing clinical symptoms. This tool is a method of examining patients' cognitive distortions, which may be intensifying a clinical condition, or making an individual susceptible to future psychological difficulties. DiTomasso and Yurica also suggest the potential clinical value of the ICD. The researchers describe the instrument's utility as being fourfold: (1) it is a method of identifying patients' forms of distorted thinking, (2) it can identify patients' uses of particular cognitive distortions for particular

diagnoses, (3) it can provide clinicians with a tool that focuses on improving patients'

meta-cognitive skills, including educating patients on cognitive distortions' role in

psychological disorders, and (4) it can be used to assess changes in patients' distorted

thinking patterns throughout treatment by measuring cognitive distortions pre-, post-, and

during treatment.

The principal investigation and development of the ICD used a sample of 188

patients from two outpatient clinics, with 66 participants composing a control group

(Yurica, 2002).  Following a factor analysis, 11 factors were retained.  The 11 factors

were said to measure the following cognitive distortions: (1) externalization of self-

worth, (2) fortune-telling, (3) magnification, (4) labeling, (5) perfectionism, (6)

comparison with others, (7) emotional reasoning, (8) arbitrary inference/jumping to

conclusions, (9) emotional reasoning and decision making, (10) minimization, and (11)

mind-reading.  In a separate study that utilized the ICD to assess the relationship between

cognitive distortions and burnout in nurses, Diefenbeck (2005) found further evidence to

support this factor structure.  Yurica (2002) investigated the ICD's test-retest reliability

and total scale internal reliability.  The total scale coefficient alpha demonstrated high

internal consistency reliability (.98) and following a five-week interval, test-retest

reliability was also found to have a high reliability coefficient (.998).  In regard to

validity, the ICD correlated significantly with the DAS ($r = .70$) and with the BDI ($r =$

.70).  These results suggested the higher the endorsement of cognitive distortions, the

higher the frequency of dysfunctional thinking and the greater the endorsement of

depressive symptoms (Yurica, 2002).  Also, the ICD was able to distinguish between

depressed and non-depressed individuals, as well as differentiate between individuals

suffering from an anxiety disorder and individuals in a control group (Yurica, 2002; Rupertus, 2004).

Rosenfield (2004) investigated the relationship between cognitive distortions and Axis I and Axis II psychopathology to examine the use of the ICD to determine the association between distorted cognitions and psychological distress. The researcher found that individuals meeting criteria for any Axis I or Axis II disorders reported a higher frequency of cognitive distortion as measured by the ICD, than those individuals free of a psychological disorder. Rosenfield found that approximately half of the variance both in the severity and in the number of psychological dysfunctions was accounted for by frequency of cognitive distortions. The study found that when there was an increase in the number of clinical disorders for which an individual met the criterion as well as an increase in the severity of the Axis I condition, there was also an elevated frequency of engaging in cognitive distortion (Rosenfield, 2004). This same positive, incremental correlation was found when investigating the relationship between severity and quantity of Axis II personality disorders and frequency of cognitive distortions (Rosefield, 2004). This research lends further support for the ability of the ICD to differentiate between those with or those without psychological dysfunction; it also demonstrates the utility of the measure because there was a direct relationship between cognitive distortion and rate and severity of Axis I and Axis II psychopathology (Rosenfield, 2004).

Last, Uhl (2007) investigated the utility of the ICD in a medical setting. The researcher investigated the association between psychiatric and psychosocial factors that influence how patients deal with health problems and the frequency of cognitive

distortions as measured by the ICD.  The results suggested that the more frequently a

patient engages in cognitive distortions, the more likely he or she is to engage in negative

psychological and health risk behaviors.  Patients who were unlikely to have drug, eating,

caffeine, inactivity, and smoking problems had significantly lower ICD scores than those

likely to have such problems (Uhl, 2007).  Within a medical setting, the ICD was also

found to be useful in identifying the relationships between distorted thinking and

psychological and behavioral health risks, as well as the relationship between patterns of

unhealthy behavior and cognitive distortions in those individuals who are obese (Goins,

2008; Shook, 2010).

In summary, the ICD has demonstrated good reliability and validity across

different populations.  The instrument was able to differentiate among individuals

suffering from anxiety or depression as well as to predict unhealthy lifestyles in a sample

of medical patients, depending on the level of cognitive distortion (Yurica, 2002;

Diefenbeck, 2005; Rosenfield, 2004; Uhl, 2007; Goins, 2008; Shook, 2010; Rupertus,

2004).  Following its development, the ICD has been used to investigate cognitive

distortions in a wide variety of settings, but there remains a dearth of research examining

the psychometric properties of the instrument in a community sample, as well as

examining its use in comparing cognitive distortions and perceived stress.  According to

the diathesis-stress model, individuals' cognitive distortions will only influence his or her

information processing of external events during a situation perceived as stressful (Beck,

1967).  In the absence of stress, cognitive distortions may remain inactive and not

influence an individual's pattern of thinking.  If this theory is correct, then the level of

cognitive distortion as measured by the ICD should correlate with the level of perceived

stress.  If an individual has a high level of cognitive distortions, he or she should also perceive stressful situations as more stressful than individuals with a low level of distorted thinking.

        **Cognitive Distortions and Stress.**

        The diathesis-stress model of emotional disorders provides support for better understanding the relationship between stress and cognitive distortions (Beck, 1967). Deal and Williams (1998) investigated whether or not cognitive distortion mediates between life stress and depressive symptoms in a sample of high school students.  The researchers predicted that the DAS and ATQ measures of cognitive distortion would be better predictors of depression, as measured by the BDI, than life stress.  Their prediction was supported because adolescents with high levels of cognitive distortions had more depressive tendencies than those with low levels of cognitive distortions (Deal & Williams, 1998).  Researchers also found that cognitive distortions influenced the perceived stressfulness of life events.  Those adolescents with higher levels of cognitive distortion tended to perceive life events as more stressful (Deal & Williams, 1998).  This research lends support for the diathesis-stress model because individuals with high levels of cognitive distortion tended to interpret life situations as more stressful and were more susceptible to depressive symptoms.  Without the underlying cognitive distortions to mediate individuals' experiences, life events may not appear as stressful and depressive symptoms may not develop.

        Studies examining depression involving chronic pain patients have also found support for the relationship between stress, cognitive distortion, and depression (Smith, O'Keefe, & Christensen, 1994; Lefebvre, 1981).  The researchers concluded that

depression arises in response to the stress of chronic pain (Smith, O'Keefe, & Christensen, 1994).  When faced with a stressful event, emotional responses are processed based on underlying cognitive distortions, which can lead to emotional disorders.

Interestingly, Hammen (1978) found different results when investigating the relationship between distorted thinking, life stress, and depression.  Five hundred and twenty-two undergraduate male and female students completed a measure of depression (BDI), life stress (Life Events Inventory), and distorted thinking (unpublished measure of cognitive distortion).  The results indicated that depressed and non-depressed individuals presented different patterns of distortion depending on level of life stress.  Interestingly, among depressed individuals, low life stress was associated with greater distortion than was high life stress (Hammen, 1978).  This finding differs from the results of the Deal and Williams (1998) study.  Hammen concluded that life stress, distorted thinking, and depression are related, but that the relationship requires further investigation with psychometrically sound instruments to measure both cognitive distortions and life stress, as was noted in the limitations section.

Previous research emphasizes the necessity to understand the relationship between cognitive distortion, stress and depression as well as the need for more evidenced-based instruments (Deal & Williams, 1998; Hammen, 1978; Smith, O'Keefe, & Christensen, 1994).

**Perceived Stress Scale.**

*Development and Background.*

For the current study, a measure of perceived stress was required in order to examine the relationship between stress and cognitive distortions.  Cohen, Kamarck, and Mermelstein (1983) developed a global measure of perceived stress called the Perceive Stress Scale (PSS).  The researchers felt at that time there were no measures of stress that incorporated an individual's perception of the event's stressfulness and that a global measure of how one perceives stressful events could be important in determining the relationship between stress and pathology (Cohen et al., 1983).  The researchers felt that most measures of stress were objective, which implies that actual events are the precipitating cause of pathology and illness-related behavior instead of how the event is perceived and interpreted.  The researchers' argument is that the perception of stress is due to the cognitively mediated emotional response to the objective event and not simply to the event itself.

The PSS "measures the degree to which situations in one's life are *appraised* as stressful" (Cohen et al., 1983, p. 385).  The instrument was designed to measure how unpredictable, uncontrollable, and overloading people find their lives to be; each of these tends to be essential components of the experience of stress (Cohen, 1978; Seligman, 1975).  The PSS also has direct items about the current level of experienced stress.  In comparison with life event scales, which record a respondent's objective view of whether or not an event is stressful, the PSS is a more direct measure of the *level* of stress experienced.  The researchers presume that "it is this level of appraised stress, not the objective occurrence of the events that determines one's response to a stressor" (Cohen et

al., 1983, p. 387).  The authors also consider the measure to be more global than previous instruments because it is sensitive to chronic stress from ongoing life circumstances, stress from expectations concerning future events, and reactions to specific events.

The PSS, a 14-item measure of perceived stress, is a scale that can be administered in only a few minutes.  It was designed for community use, requiring respondents to have at least a junior high school education.  The properties of the PSS were originally examined with two samples of college students and a sample of participants in a smoking cessation program.  Coefficient alpha reliability for the scale was .84 and .85 in the college samples and .86 in the smoking cessation sample, demonstrating good reliability (Cohen et al., 1983).  The PSS was a better predictor of both depressive and physical symptomatology than were the scores on a stressful life events measure.  Scores on the PSS predicted utilization of health services, positively correlated with social anxiety, and positively correlated with cigarette smoking behavior (Cohen et al., 1983).  The scale also demonstrated good convergent validity by relating to a life-event impact score, which is based to some degree on appraisal of life events.  The authors concluded that the PSS has adequate internal and test-retest reliability and also correlated in the expected manner with a range of self-report and behavioral criteria (Cohen et al., 1983).

### *Evidence Supporting Use of Perceived Stress Scale.*

Cohen (1988) examined the properties of the PSS in a probability sample to ensure the scale was sensitive enough to detect stress in a nonclinical sample.  Stress is often a precursor or mediator of pathology; therefore, being able to identify high levels of stress in a nonclinical sample may aid clinicians in preventing the development of

symptoms.  After collecting data from over 2,000 participants, Cohen found that the PSS

was able to predict a range of health-related outcomes associated with perceived stress.

Roberti, Harrington, and Storch (2006) found similar findings in support of the PSS in a

sample of undergraduate students.  The researchers used a 10-item version of the PSS,

instead of the original 14-item, and the results suggested that the instrument measured

two factors relating to stress.  These factors were (1) perceived helplessness and (2)

perceived self-efficacy.  The Cronbach's alpha reliability coefficients for the PSS-10 and

the two factors were high, suggesting strong internal consistency (Total Score = .89;

Perceived Helplessness = .85; Perceived Self-Efficacy = .82).  The PSS-10 demonstrated

good convergent validity after correlating significantly with the State-Trait Anxiety

Inventory (STAI); the instrument also demonstrated good divergent validity as evidenced

by an insignificant correlation with the Sensation Seeking Scale, Form V (SSS-V), which

measures a persons desire to participate in adventure seeking behaviors (Roberti et al.,

2006).  After evaluating the properties of the PSS in a nonclinical sample, research turned

to investigating the use of the scale in a clinical sample.

Pbert, Doerfler, and DeCosimo (1992) used the original 14-item PSS scale to

examine the relationship between perceived stress and psychosocial dysfunction in two

clinical samples.  These samples were individuals participating in a health promotion

program and individuals who were currently participating in a 12-week outpatient cardiac

rehabilitation program.  The researchers compared scores on the PSS with scores on the

Life Experience Scale (LES) to determine which scale is a better predictor of

psychological and physical distress. As stated previously, the PSS measures an

individual's stress appraisal (perceived stress), whereas the LES instrument is an

objective measure of stressful events (life event scores) (Cohen et al., 1983). Research

suggests that objective features of events, or the desirability of life events, are less

important in determining the degree to which individuals experience stress than are the

individuals' judgments or appraisals of the events (Lazarus & Folkman, 1984). Pbert,

Doerfler, and DeCosimo found across samples, that perceived stress, as measured by the

PSS, was significantly related to self-reported negative affect and physical symptoms.

The PSS and the LES were only moderately correlated, suggesting that the two scales

measure different aspects of stress. The researchers concluded that perceived stress was a

better predictor of affective and physical symptoms than an objective measure of stress

(Pbert et al., 1992).

Hewitt, Flett, and Mosher (1992) investigated the relationship between perceived

stress and depressive symptoms in a sample of severely depressed patients. The results

suggested that scores on the PSS were predictive of scores on the BDI. High total scores

of perceived stress were predictive of more symptoms of depression. The researchers

concluded that the PSS is a multidimensional and internally consistent measure of

perceived stress (Hewitt et al., 1992).

The properties of the PSS-14 have also been examined following the translation

of the scale into Japanese and Spanish. The Japanese version was administered to 23

native Japanese speakers and the scale was found to have high internal consistency

reliability. Also, when compared with the English version of the scale, the two versions

had almost identical factor structures, with the Japanese version adding support for the

two-factor model of the PSS, perceived helplessness and perceived self-efficacy (Mimura

& Griffiths, 2004). The Spanish version of the PSS was found to have high internal

consistency reliability across two studies (alphas equaling .81 and .83) as well as strong

test-retest reliability (r = .73) (Remor, 2006; Teresa, Ramirez, & Hernandez, 2007).  Of

the two studies examining the Spanish version of the PSS, one found a similar factor

structure, compared with the English version, and the other found high internal

consistency reliability (alpha = .82) and high test-retest reliability (r = .77) for the

Spanish version of the PSS-10 (Remor, 2006; Teresa, Ramirez, & Hernandez, 2007).

Throughout the literature, the PSS has demonstrated its effectiveness in

measuring perceived stress and has also established a link between stress and

psychological symptoms (Roberti et al., 2006; Pbert et al., 1992; Hewitt et al., 1992;

Remor, 2006; Teresa, Ramirez, & Hernandez, 2007; Mimura & Griffiths, 2004).  Based

on the diathesis-stress model of emotional disorders, stress has been found to mediate the

intensity of underlying cognitive distortions, but the relationship between stress, distorted

thinking, and emotional disorders is in need of further research (Beck, 1967; Hammen,

1978; Deal & Williams, 1998).

**Cognitive Distortions and Demographic Characteristics.**

There is a lack of literature regarding the idea that cognitive distortions vary by

certain demographic characteristics.  For a majority of research involving the study of

cognitive distortions, variability in distorted thinking across different participant

characteristics is briefly mentioned.  The current study will examine how cognitive

distortions and stress differ across demographic characteristics, as measured by the ICD.

When evaluating the properties of a measure, it is important to understand whether or not

the scores on the instrument vary, depending on common demographic differences such

as age, gender, and level of education.  This ensures proper use and interpretation of the measure in clinical practice.

Based on a review of the literature regarding gender differences and cognitive distortions, Bruno (2010) concludes that research pertaining to the relationship between the two constructs is almost nonexistent.  Gender differences in cognitive distortions are rarely investigated and when this relationship is examined, the results are varied.  Sowa and Lustman (1984) explored gender differences in relation to depression, depressive cognitions and perception of stressful life events.  The researchers used the ATQ instrument, previously mentioned, and the results suggested that men exhibited greater distortions in cognitive content.  A year later, Oliver and Baumgart (1985) used the DAS to investigate gender differences in dysfunctional attitudes; based on the results, there were no significant differences between genders.  Although the two studies present conflicting results, different cognitive distortion measures were used, which may have caused the variation in the findings.  Bruno (2010) and Leung and Wong (1998) found slight gender differences in the type of cognitive distortions that are used by males and the type that are used by females.  Both studies found that males tend to externalize their problems using self-serving biases, whereas females tend to internalize their problems using self-debasing distortions (Bruno, 2010; Leung & Wong, 1998).  Further research is necessary to better understand the variation in findings regarding gender differences and cognitive distortions.

Another construct being examined in the current study is stress. Relative to this aspect are the findings by Sowa and Lustman (1984), who found that women rated the impact of stressors more severely, but that men reported more stressful life change.

Cohen and colleagues (1983) found no gender differences in perceived stress when using the PSS to investigate perceived stress in a community sample. Within a clinical sample, however, Hewitt and colleagues (1992) found a significant gender difference because women had higher stress levels than men. Again, the studies may have used different measures of stress or may have examined different samples, both of which may have caused the variation in results. Further investigation of gender differences in perceived stress would be beneficial to better understand the impact stress has on males and females.

Currently there is a lack of literature discussing the prevalence and severity of cognitive distortion across age and level of education in a nonclinical sample. The ICD allows for comparison of an overall level of cognitive distortion across the different demographic characteristics.

In summary, previous research has reached conflicting conclusions regarding gender differences in cognitive distortions and perceived stress; this is an area that requires further investigation (Sowa & Lustman, 1984; Oliver & Baumgart, 1985; Bruno, 2010; Leung & Wong, 1998). Also, there is a dearth of literature regarding differences in cognitive distortions across age and level of education (Stehouwer et al., 1985). To investigate these differences in greater detail as well as to examine the prevalence of cognitive distortions in the general public would be beneficial. If clinicians had a measure that was sensitive enough to detect specific cognitive distortions in a community sample, and could better understand and predict the underlying cognitive processing that may lead to emotional disorders, they could develop more closely focused treatments as well as track changes in symptomatology. The purpose of the current study is to

investigate the use of the ICD in measuring cognitive distortions in a community sample and whether or not the instrument correlates with a measure of perceived stress. In order to obtain a community sample in an efficient and cost effective manner, data will be collected via the Internet. Although the Internet is a useful means of gathering data, there are numerous drawbacks that must be considered.

**Internet Data Collection.**

With the exponential growth of Internet usage over the past decade, the Internet has become a popular source for data collection. Due to its rapid growth and easy access to large or specific samples, an increasing number of researchers are relying on the Internet to study human attitudes, preferences, and behaviors (Best & Krueger, 2004). Using the Internet for data collection has many advantages including cost effectiveness, sampling possibilities, administrative flexibility, and compilation alternatives. In regard to sampling possibilities, the Internet can be used to sample a wide range of participants through advertisements, email, and social media networks (Best & Krueger, 2004). The Internet allows for administrative flexibility because the administration of instruments can be tailored to fit the researcher's needs. Also, it is more convenient for the participant to be able to complete the questionnaires when he or she has the opportunity instead of having to participate during a specified time or specific meeting place. Compilation alternatives pertain to the Internet providing researchers with a variety of options for collecting responses (Best & Krueger, 2004). Participants have the ability to complete the entire questionnaire or complete a portion and return to it at a later date. By using the Internet, participants can click a hyperlink sent through email or social network and instantly complete the questionnaire. This ease of responding can encourage a

greater number of participant responses (Best & Krueger, 2004). Although there are multiple benefits to using the Internet for data collection, this method does have drawbacks.

When using the Internet for data collection, Best and Krueger (2004) list three prominent drawbacks. First, the researcher may obtain a limited or biased sample due to poor coverage and accessibility. Access to the Internet is not universal, so data can be collected only from those who own a computer and have Internet access. Best and Krueger have stated that as of 2002, less than two- thirds of U.S. adults were connected to the Internet. Since 2002, access and usage of the Internet have grown substantially. As of 2010, 75.9% of U.S. citizens older than three years of age have had access to the Internet in the home. This means that over 290 million people had access to the Internet in 2010 (United States Census Bureau, 2010). In regard to a varied sample, using the Internet may allow for a more diverse sample because of the vast number of users; this expansion is superior to using only college students, another common sample of convenience. A second drawback is technological variation. Due to the variation in technology capable of accessing and operating Internet services, researchers may find it difficult to ensure that all participants receive the same usable measures. Differences in Internet speed may cause longer completion time, leading to a lack of responding from those participants with a poorly functioning Internet (Best & Krueger, 2004). The third drawback is the possibility of invalid responding. Because participants complete the questionnaire in an uncontrolled environment, they may not respond honestly or individuals may complete the materials more than once (Best & Krueger, 2004).

Based on these drawbacks and the inability to obtain a probabilistic sample, the

results of the current study should be generalized with caution.  The community sample

collected from the Internet may not be representative of the general population due to the

previously mentioned drawbacks and the use of a sample of convenience.  Although the

results may not be able to generalize completely to the general public, Best and Krueger

(2004) state that data drawn from an internet sample can serve to test various instruments,

which is the purpose of the current study.  For the current study, in order to draw a large

and diverse sample size, data will be collected from a sizeable pool of possible

participants from the social media network site, Facebook.

**Collecting Data from Facebook.**

Recently, research has shifted from focusing on those functions that social

networking sites have for those who use them, to utilizing the sites as a tool for research.

Facebook is currently the largest social networking site in the world, and as of April 2012

the site had over 900 million active users across the world (Goldman, 2012).  By using

the social networking site as a population from which to draw a sample, researchers can

reach millions of participants quickly, cheaply, and with minimal support (Bhutta, 2012;

Gjoka, Kurant, Butts, & Markopoulou, 2010).  Facebook is a useful tool with to gather

data due to its size, easy to use features, intensive use by its followers, and its continued

growth.  In 2010, it was reported that more than half of Facebook users returned to the

site daily (Gjoka et al., 2010).  Because of its steady use by a significant portion of the

population, it is possible to obtain a demographically diverse sample.

Another important feature of Facebook is the ability to find or create groups,

which allows researchers to find specific groups of individuals to participate in their

studies.  Bhutta (2012) used Facebook to contact what was defined as an elusive

subpopulation of Catholic females.  Social networking sites now make simple what was

once a difficult task, i.e., to seek out specific groups..  Bhutta was able to collect data

from over 2,500 baptized Catholic females in fewer than five days and reached the goal

of 4,000 participants in less than a month, using few financial resources.  Although

Facebook is able to reach out to millions of possible participants, there are still a number

of disadvantages for using the site.

Similar to any of the other disadvantages when using the Internet to collect data,

researchers cannot reach those individuals who lack computer skills, who do not have the

Internet, or who do not have a Facebook account (Best & Krueger, 2004).  Although this

factor appears to be a major restriction to gathering a representative sample, as stated

previously, Internet use has drastically increased over the past decade and there is a large

and diverse group of people using Facebook (United States Census Bureau, 2010;

Goldman, 2012).  The site is open to the public, allowing its users to vary in age, gender,

ethnicity, level of education and socioeconomic status.  As with most Internet data

collection, social networking sites also do not prevent participants from taking the

questionnaires multiple times; in addition, the readability of questionnaires can vary

across hardware and software (Best & Krueger, 2004).  These are two drawbacks that

must be considered as limitations when gathering data from the Internet.

In summary, although certain problems arise when using Facebook as a means of

gathering data, for the purposes of the current study of examining the properties of the

ICD using a large community sample, it should prove to be effective.  Previous research

examining measures of cognitive distortion and stress often utilized college students and

teachers, which would not necessarily be representative of the population because all of the participants were at the college level (Hollon & Kendall, 1980; Briere, 2000; Weissman, 1979; Cohen et al., 1983). By using Facebook, researchers are technically gathering a non-probabilistic sample, but are still capable of accessing adults from different levels of education, age, ethnicity, and socioeconomic status. A commonly used sampling technique when using Facebook is the snowball or response-driven method. Although snowball sampling is a good method of collecting large numbers of participants, this method is considered a sample of convenience and non-representative of the population.

**Benefits and Limitations of Snowball Sampling.**

Snowball sampling is a form of convenience sampling or non-probability sampling. Much of the existing literature in psychology uses non-probability sampling techniques to obtain participants either for surveys or for experiments (Cozby, 2007). The advantage to convenience sampling is that researchers can obtain participants and data without spending a great deal of money or time on selecting the sample. For example, it is common knowledge that researchers collect data from students in introductory psychology courses because these students are required to participate (Cozby, 2007). An important reason why convenience samples are sufficient in some cases can be stated from the following: "when the research is being conducted to study relationships between variables" (Crozby, 2007, p. 145). It is also important to note that some non-probability samples are more representative than others; one such is drawing a sample from a large population. Snowball sampling involves recruiting an initial group of participants, then having that group pass along information regarding the study to

others in order to gather more participants. Snowball sampling using social networking

sites occurs when electronic versions of the questionnaires are posted to a group on a

website and then the members of that group pass the electronic questionnaires onto others

(Browne, 2005). Thus, snowball sampling uses interpersonal relations and connections

between people to gather data.

Browne (2005) discusses the benefits and limitations of snowball sampling. As

stated previously, the benefits of snowball sampling include cost effectiveness, ease of

data collection, and ability to gather large groups of participants in a short time period.

Snowball sampling has its limitations because it can be viewed as biased; it is not random

and participants are selected, based on social networks (Browne, 2005). Because

participants are selected on the basis of social networks, certain types of people may be

excluded. With the exclusion of various types of people, the characteristics of

participants may not vary nor be representative of the general population (Browne, 2005).

Although this is true, convenience sampling is sufficient when researchers are

investigating a relationship between two variables, such as cognitive distortions and

stress, or examining the factor structure of a new instrument (Cozby, 2007).

Salganik and Heckathorn (2004) discuss how to use snowball sampling to gather

data that are as unbiased as possible. Their methodology is capable of being adapted to

using online social networking sites. One method would be to list all of the friends on a

given person's friend list and pick every other friend as a possible participant. A second

method would be to find a popular group on the social networking site and again pick

every other person from that list. In both methods each person within the group or list of

friends has an equal probability of being selected. This means the snowball method

begins with an unbiased selection of the "seeds" or initial participants (Salganik & Heckathorn, 2004). A third method is to begin a group by describing the topic of the study and then send *invites* to all friends. Encourage the friends to gather more people to join until the group has a substantial number of followers. Finally, use probability sampling with this group of friends and send only every other person on the list the questionnaires. These were three methods of snowball sampling that may reduce bias; they are adapted from methodology described by Salganik and Heckathorn (2004).

**Summary.**

In summary, based on Beck's (1967; 1976) cognitive theory, cognitive distortions play an important role in the progression and maintenance of emotional disorders. By identifying cognitive distortions through the use of a brief measure, clinicians can focus treatment on altering the distortion, therefore changing the maladaptive schema and alleviating symptoms. The purpose of the current study is to (1) further validate the psychometric properties and factor structure of the ICD using a community sample; 2) to investigate how cognitive distortions in a community sample vary as a function of certain demographic characteristics such as gender, age, and level of education, and 3) to investigate whether or not level of distorted thinking can predict level of perceived stress, both of which can be antecedents to emotional disorders (Hammen, 1978; Deal & Williams, 1998). The responses to the ICD will be compared with an already established measure of dysfunctional attitude, the DAS, in order to examine the instrument's convergent validity. The ICD will also be compared with a measure of perceived stress, the PSS, to determine if distorting thinking can predict level of stress. The method of gathering data will be snowball sampling, using the social networking site Facebook.

The large number of members and the diversity of users should allow for a cost efficient method of gathering a sizeable sample.

**Definition of Terms**

Arbitrary Inference / Jumping to Conclusions: involves unwarranted connections between ideas that are unrelated or drawing a negative conclusion in the absence of evidence to support said conclusion (Persons, 1989, Beck et al., 1979).

Absolutistic or Dichotomous Thinking / Black-or-White Thinking: refers to viewing all experiences as falling into one of two categories (e.g. positive or negative), so if an individual's performance falls short, he or she views the self as a total failure (Beck et al., 1979; Burns, 1980, 1989, 1999; Persons, 1989).

Catastrophizing: is the process of evaluating, whereby one believes the worst possible outcome will or did occur (Burns, 1980, 1989, 1999).

Comparison: refers to an individual's tendency to compare him or herself to others in an inferior manner resulting in the conclusion that he or she is worse off than others (Freeman & DeWolf, 1992; Freeman & Oster, 1992).

Discounting the Positive: refers to situations in which an individual rejects positive experiences by insisting that these do not have meaning, for some reason or other (Burns, 1980, 1989, 1999).

Emotional Reasoning: refers to assuming that negative emotions reflect the way things really are (e.g. someone feels something, therefore it must be true) (Burns, 1980, 1989, 1999).

Externalization of Self  Worth: refers to an individual's developing and maintaining self-worth based on how the external world views him or herself (Freeman & DeWolf, 1992; Freeman & Oster, 1992).

Fortuneteller Error: is a situation in which someone anticipates a negative outcome and this anticipation convinces him or her that the prediction is an already-established fact (Burns, 1980).

Labeling: involves attaching a negative or derogatory name to oneself instead of describing his or her error (Burns, 1980, 1989, 1999).

Magnification: is referred to as the "binocular effect" by Burns (1980, 1989, 1999), because magnification is the situation in which an individual exaggerates the importance or consequence of some positive or negative thing, such as personal traits, events, or situations.

Mind Reading: refers to an individual's arbitrarily concluding that someone is reacting negatively to him or her without any evidence (Burns, 1980).

Minimization: is a situation in which an individual discounts or shrinks the importance of things until they seem insignificant (Beck et al., 1979).

Mislabeling: involves the description of an event with words that are inaccurate and have a strong emotional weight (Burns, 1980, 1989, 1999).

Overgeneralization: refers to the process of formulating rules or assumptions based on a single negative event and applying these rules across unrelated situations forming a never-ending pattern of defeat (Beck et al., 1979; Burns, 1980, 1989, 1999).

Perfectionism: is the situation in which someone constantly strives to live up to some internal or external standard of perfection without scrutinizing the reasonableness of such standards (Freeman & DeWolf, 1992; Freeman & Oster, 1992).

Personalization: occurs when an individual interprets a negative event or situation as being caused by him or herself, that he or she was responsible for a negative occurrence when there is no evidence supporting that conclusion (Beck et al., 1979; Burns, 1980, 1989, 1999; Persons, 1989).

Selective Abstraction / Mental Filter: is a situation in which an individual focuses on one negative aspect of a situation, intensifying the importance of that negative detail, but ignoring possible positive aspects, thereby interpreting the entire situation in a negative context (Persons, 1989, Beck et al., 1979).  Mental filter is similar to selective abstraction because it refers to identifying a single negative detail and dwelling on it exclusively so that one's view of all reality becomes darkened (Burns, 1980, 1989, 1999).

Should Statements: refers to an individual's internal expectations or demands on him or herself, without contemplating the reasonableness of these expectations, dependent on his or her abilities, and often leading to feelings of guilt, anger, and frustration (Burns, 1980, 1989, 1999).

**Chapter 2**

**Research Questions**

Although the Inventory of Cognitive Distortions (ICD) has been validated using clinical samples, does the validation of the psychometric properties of the instrument persist in a community sample?

Do cognitive distortions in a community sample vary as a function of demographic characteristics, such as gender, age, and level of education?

Does the ICD correlate with the DAS in a community sample, further validating the convergent validity of the ICD?

Does overall level of distorted thinking predict level of perceived stress?

**Hypotheses**

**Hypothesis 1.**

$H_1$: The psychometric properties of the ICD will be validated in a community sample as evidenced by high construct validity, determined by factor analysis, strong convergent validity, demonstrated by a .70 correlation with the DAS, and an acceptable level of internal consistency reliability (alpha > .80).

Rationale for $H_1$: Following the initial development of the ICD, Yurica (2002) found acceptable content validity as established by cognitive therapy experts. The principal investigation of the ICD used a sample of 188 patients from two outpatient clinics, with 66 participants composing a control group (Yurica, 2002). The total scale coefficient alpha demonstrated high internal consistency reliability (.98) and test-retest reliability following a five-week interval and it was also found to have a high reliability coefficient (.998). In regard to convergent validity, the ICD correlated significantly with

the DAS ($r = .70$), the BDI ($r = .70$), and the BAI ($r = .59$). These results suggested the

higher the endorsement of cognitive distortions, the higher the frequency of dysfunctional

thinking and the greater the endorsement of depressive and anxiety symptoms (Yurica,

2002). Also, the ICD was able to distinguish between depressed and non-depressed

individuals.

**Hypothesis 2.**

$H_2$: Exploring possible relationship differences of overall scores of cognitive

distortion as measured by the ICD within three demographic characteristics (age, gender,

level of education).

Rationale for $H_2$: The literature regarding cognitive distortions that vary by

certain demographic characteristics is lacking. Throughout the research involving the

study of cognitive distortions, variability in distorted thinking across different participant

characteristics is briefly mentioned. In regard to differences within age groups and levels

of education, the research is almost nonexistent. When comparing gender differences in

cognitive distortions, results are variable. Sowa and Lustman (1984) used the ATQ and

found that men exhibited greater distortions in cognitive content than women. However,

Oliver and Baumgart (1985) used the DAS to investigate gender differences in

dysfunctional attitudes and their results suggest there were no significant differences

between genders. Although the two studies present conflicting results, different cognitive

distortion measures were used, which may have caused the variation in the findings. The

current hypothesis is exploratory in order to investigate how cognitive distortions may

vary across demographic characteristics in a community sample.

**Hypothesis 3.**

$H_5$: The overall level of cognitive distortion as measured by the ICD will predict the overall level of perceived stress as measured by the PSS.

Rationale for $H_3$: According to the diathesis-stress model, individuals' cognitive distortions will influence only their information processing of external stimuli when in the presence of some perceived stressor (Beck, 1967).  When an individual is experiencing stress, underlying cognitive distortions may become more salient and exacerbate feelings of stress.  Researchers have found that cognitive distortions influenced the perceived stressfulness of life events in a sample of adolescents.  Those adolescents with higher levels of cognitive distortion tended to perceive life events as more stressful (Deal & Williams, 1998).  There is a cyclical nature to the relationship between stress and cognitive distortions.  Stressful situations can trigger cognitive distortions, but while processing information through distorted thinking, one can continue to perceive events as stressful.  Although Beck's model states that a stressful event must take place prior to the onset of cognitive distortions, the current study will investigate whether or not cognitive distortions can predict level of perceived stress.

**Chapter 3**

**Methodology**

**Recruitment of Participants.**

In order to collect a sizeable sample that may be representative of the larger community in a cost effective and timely manner, participants were recruited on the Internet from the social networking site, Facebook.  Facebook currently has over 900 million users worldwide and more than half of the users return to the site daily (Goldman, 2012; Gjoka et al., 2010).  Best and Krueger (2004) state that data drawn from an Internet sample can serve to test various instruments, which is the purpose of the current study.

The first method of participant selection involved randomly selecting 100 participants from a list of over 500 individuals using the social media site. The original 100 participants, which are the "seeds" of the snowball sample, were selected using a random digits table. Each individual from the list of 500 was assigned a number and then using the random digits table, the 100 participants were selected. Those selected were then sent the link to the questionnaires and asked to pass along the link to other interested friends, utilizing a snowball sampling method. Although the sample was not a probability sample, participants were selected from a large database, creating a sample that was more representative than using a sample of college students. Also, convenience sampling can be sufficient if researchers are investigating a relationship between two variables, such as cognitive distortions and stress, or examining the factor structure of a new instrument (Cozby, 2007).

The second method of gathering volunteers involved posting the survey link to an online list-serve at the Philadelphia College of Osteopathic Medicine (PCOM). Once

posted under the "PCOM Groups" list-serve, all students were sent an email regarding

participation. These individuals were also requested to forward the survey link on to other

interested individuals. By using these methods of participant selection, the convenience

sample generated a large number of respondents using a cost effective method. IP

addresses were not recorded in order to keep all responses anonymous, thus not allowing

researchers to connect individual participant responses to the participant.

**Inclusion Criteria.**

Participants were required to meet the following conditions to participate in the

study.  Individuals were required to be within the age range of 18 – 85 and have at least

an eighth grade education.  All participants had to speak English fluently and reside in the

United States.

**Exclusion Criteria.**

Those participants who were younger than 18 years of age or older than 85 years

of age were excluded from the study.  Individuals residing outside of the United States or

who could not speak English fluently were excluded.  Lastly, participants were excluded

if they did not have at least an eighth grade education.  Prior to completing the surveys,

each participant completed five eligibility questions.  If they answered "No" to any of the

five questions, they were not eligible to complete the surveys and the survey was

immediately discontinued.  Only 17 individuals did not meet criteria and their data were

omitted from the final analysis.

**Design.**

A correlational design was employed to (1) assess the psychometric properties of

the ICD by comparing total scores on this instrument with total scores on the DAS; (2) to

investigate the relationship between cognitive distortions, as measured by the ICD, and

level of perceived stress, as measured by the PSS, and (3) to examine the relationship

between cognitive distortions and certain demographic characteristics (gender, age, and

level of education).  In regard to specific analyses, a factor analysis with varimax rotation

will be used to identify the factor structure of ICD.  When examining the relationship

between cognitive distortions and demographic characteristics independent sample t-tests

and ANOVAs will be used.  Last, to better understand the ICD's ability to predict levels

of perceived stress, a regression analysis will be used, along with a correlation matrix to

test for multicolinearity.

**Materials.**

Test materials consisted of the ICD (Yurica & DiTomasso, 2001), the DAS-A

(Weissman, 1979), the PSS (Cohen et al., 1983), and a demographic questionnaire to

gather background information, administered in that order.

**Procedure.**

The study included participants who had access to the Internet.  Participants were

contacted through a college list-serve or an online social networking site, which directed

them to complete the previously listed questionnaires on Survey Monkey, a website used

to collect survey data.  When accessing the questionnaires, the participants were initially

informed about the study's purpose and procedures.  All participants had the right to

withdraw from the study at any time without explanation.  Participation in the study was

completely anonymous because the researcher was unable to connect individual

responses to specific participants.  After agreeing to participate in the study, respondents

initially completed the eligibility questionnaire. After participants were deemed eligible

to participate, they proceeded to complete the three measures (ICD; DAS-A; PSS) as well as the demographic questionnaire, which supplied descriptive data including age, gender, ethnicity, level of education, and brief psychiatric history.

**Measures.**

*Inventory of Cognitive Distortions (ICD).*

Based on the cognitive model of anxiety and depression, Yurica and DiTomasso (2011) initially generated 120 self-report statements drawn from research, from related literature, and clinical experience to represent 17 types of cognitive distortions (Yurica, 2002). Based on the clinical literature at the time of the instrument's development, the items were designed to represent the totality of cognitive distortions. Three clinical experts in the field of cognitive behavioral therapy evaluated the original 120 statements. In order for the items to be selected for the inventory, 100% independent agreement from the experts was required. The purpose of this expert rating process was to ensure that the items described the 17 specific distortion constructs and that the withheld items had sufficient content validity. Through random selection, approximately four items per type of distortion were included in the final inventory. The cognitive distortion known as overgeneralization was omitted from the final inventory due to lack of item consensus by expert raters. In the end, 69 items were retained to compose the original ICD form used in the validation study. The inventory's factor structure measured 11 cognitive distortions following the validation study, which involved 188 participants completing the ICD (122 participants were mental health patients with a range of psychological disorders in outpatient treatment; 66 participants made up a control group) (Yurica, 2002; Yruica & DiTomasso, 2011).

The present version of the ICD is a 69-item self-report inventory composed of short sentences reflecting 11 different types of cognitive distortions. The ICD was designed and validated for use with an adult clinical population with symptoms of an emotional disorder (DiTomasso & Yurica, 2011). Items are scored on a five-point Likert scale, ranging from 1 = "Never" to 5 = "Always". Scores on the ICD can range from 69 to 345, with higher scores suggesting greater frequency of cognitive distortions than lower scores. The purpose of the ICD is to present a total score of cognitive distortion as well as scores for each subscale or specific distortion. DiTomasso & Yurica's (2011) initial validation study found a high test-retest reliability coefficient for total scores (.998) following a five-week interval. The instrument also demonstrated high internal consistency reliability with a total scale Cronbach's alpha equaling .98, as well as alphas for the 11 subscales ranging from .56 to .94. In regard to concurrent validity, total scores on the ICD correlated significantly and positively with other widely accepted measures of distorted thinking and psychopathology, such as dysfunctional attitudes, the DAS-A ($r = .70$), depression, the BDI-II ($r = .70$), and anxiety, the BAI ($r = .59$). Yurica (2002) also found good construct validity. Total scores on the ICD were able to differentiate clinical participants from nonclinical participants ($p < .0001$).

### *Dysfunctional Attitudes Scale (DAS).*

The DAS is currently available in two forms (A and B), both of which consist of 40-items and are designed to measure dysfunctional attitudes in depressive patients (Weissman, 1979). The DAS consists of single-sentence items answered on a seven-point Likert scale, ranging from 1 = "Totally Agree" and 7 = "Totally Disagree". The DAS provides a single-scaled score ranging from 40 to 280, with lower scores indicating

more adaptive attitudes and higher scores representing more dysfunctional attitudes. Weissman (1979) designed the DAS by utilizing items on Beck's (1967) cognitive theory of depression. The items were constructed to represent seven major value systems, including: approval, love, achievement, perfectionism, entitlement, omnipotence, and autonomy. Weissman (1979) originally validated the measure using 355 undergraduate and graduate students. Form A of the DAS was found to have high internal consistency reliability, with alphas ranging from .84 to .92. The DAS also demonstrated significant test-retest correlations, .80 to .84, over an 8-week period, suggesting excellent stability. In regard to concurrent validity, the DAS was found to correlate significantly with the Beck Depression Inventory (BDI). The DAS also had good construct validity as demonstrated by its ability to distinguish between depressed and non-depressed groups diagnosed by scores on the BDI. Oliver and Baumgart (1985) also found results in support of the DAS in a sample of hospital employees and spouses. High test-retest reliability was found following a 16-week period (.73); the DAS moderately correlated with the BDI (.41).

### *Perceived Stress Scale (PSS).*

The PSS is a 14-item measure of perceived stress (Cohen et al., 1983). The purpose of the PSS is to measure the degree to which individuals appraise certain situations in life as stressful (Cohen et al., 1983). The instrument was designed to measure how unpredictable, uncontrollable, and overloading people find their lives (Cohen, 1978; Seligman, 1975). It was constructed for community use, requiring respondents to have at least a junior high school education. The properties of the PSS were originally examined with two samples of college students and a sample of

participants in a smoking cessation program.  Coefficient alpha reliability for the scale

was .84 and .85 in the college samples and .86 in the smoking cessation sample,

demonstrating good reliability (Cohen et al., 1983).  The PSS was a better predictor of

depressive and physical symptomatology than were the scores on a stressful life events

measure.  Scores on the PSS predicted utilization of health services, positively correlated

with social anxiety, and positively correlated with cigarette smoking behavior (Cohen et

al., 1983).  The scale also demonstrated good convergent validity by relating to a life-

event impact score.

Currently the PSS was shortened to a 10-item version, which consists of self-

report questions pertaining to how often respondents have had certain feelings and

thoughts over the past month (Cohen & Williamson, 1988).  Responses are recorded on a

five-point Likert scale, ranging from 0 = "Never" to 4 = "Very Often".  The PSS-10 was

standardized using a probability sample of 2,387 respondents in the U.S.  The scale

showed strong concurrent validity following significant correlations with self-reported

health and health services measures, health behavior measures, smoking status, health

seeking behavior, and stress measures.  Higher PSS-10 scores were also associated with

greater vulnerability to depressive symptoms based on perceived stress, more frequent

colds, and the inability to quit smoking (Cohen & Williamson, 1988).

**Chapter 4**

**Results**

**Participants.**

To investigate the psychometric properties of the ICD in a nonclinical sample, a group of volunteer participants was collected, using online social networking sites and through an online list-serve from a medical college.  The initial participant "seeds" for the snowball sample were either Facebook users or students from the Philadelphia College of Osteopathic Medicine.  The snowball collection method was initiated by sending out the survey via a Survey Monkey Internet hyperlink to the randomly selected seed participants.  The survey was posted online for five and half months. After closing the survey, 793 individuals had opened the survey link. Of the 793 respondents, 17 individuals did not meet inclusion criteria and 183 did not complete the surveys or omitted items.  The data for these 200 participants were omitted from the data analyses due to missing data and not meeting inclusion criterion, thus leaving 593 individuals who completed at least the Inventory of Cognitive Distortions (ICD).  The data from these 593 participants were utilized for the investigation of the ICD factor structure and internal consistency reliability analysis.  However, 103 of these participants did not complete the Dysfunctional Attitude Scale (DAS) and 14 did not complete the Perceived Stress Scale (PSS).  Last, two individuals did not complete the demographic questionnaire. In order to make accurate conclusions regarding correlations between the ICD and the DAS and PSS scales, only the data from those who completed all of the surveys and the demographic questionnaire were utilized. Subsequently, 119 more responses were omitted for correlational analyses between scales, leaving 474 participants.  The data from the 474

participants were also utilized when investigating the second hypothesis, differences in ICD scores across differing demographic variables.

An analysis of the demographic characteristics of all those individuals who completed only the ICD could not be performed because those individuals did not complete all required study materials. The questionnaire involving collection of demographic information was at the end of the procedure, so if participants withdrew from the study prior to finishing all study materials, demographic information was not collected. Of the 474 participants who completed all surveys and demographic questionnaire, 108 were male (23%) and 366 were female (76%), which is approximately a 3:1 ratio of females to males. In regard to age, 221 fell into the 18-29-age range (47%); 125 fell in the age 30-40 range (26%), and 128 fell in the age 41-85 range (27%). The sample yielded a variety of levels of education including 30 participants who had a high school education (6%); 37 who had graduated from a two-year college (8%); 163 who had graduated from a four-year college (34%), and 244 who had obtained a graduate degree (52%). No participants endorsed having less than a high school education. In regard to ethnicity, 19 participants indicated that they were African American (4%); nine endorsed Asian American/Pacific Islander (2%); 14 endorsed Latino-a/Hispanic (3%); one endorsed American Indian/Alaska Native (0.2%); 13 endorsed Bi-racial/Multi-racial (3%), and last, 418 indicated they were of European Origin or White (88%). As evident by the demographic statistics, the sample was not as diverse as researchers had hoped. The sample consisted predominantly of more highly educated European or White Americans, with little diversity in ethnicity and level of education.

In regard to previous psychiatric history, 217 (45.8%) of participants had previously sought treatment from a therapist or counselor for a mental health issue. Two hundred and fifty-seven participants (54.2%) had not previously sought treatment. Of all 474 participants, 139 (29.3%) sought treatment for depression, 110 (23.2%) for an anxiety disorder, 1 (0.2%) for a personality disorder, 11 (2.3) for an eating disorder, 16 (3.4%) for attention deficit hyperactivity disorder (ADHD), 2 (0.4%) for a phobia, 14 (3%) for panic disorder, 7 (1.5%) for bipolar disorder, and 1 (0.2%) for schizophrenia. Forty-five participants (9.5%) endorsed "Other" for the type of mental health issue for which they sought treatment.

Participation in the study was on a voluntary basis and all participants remained anonymous. The only identifying information that was gathered was the previously mentioned demographic data.

**Hypothesis One.**

*Factor Analysis of ICD*

In order to test whether or not the ICD demonstrated construct validity and to further investigate the factor structure of the measures, a principal components factor analysis with varimax rotation was conducted. The 69 items from the ICD were analyzed and 14 factors with rotated eigenvalues greater than 1 were extracted. Using the factor loading criterion of .40 and more for items in each factor, 12 factors were retained. This factor loadings criterion accounted for 65.77% of the total variance. Table 1 presents the description and distribution of item's corresponding factors, along with each item's factor loading. A Keiser-Meyer-Olkin (KMO) statistic was found to be strong (KMO = 0.96), suggesting the inter-item correlations are relatively compact and thus the factor analysis

should yield distinct and reliable factors. Also, the Barlett's test of sphericity was found

to be significant ($p < .001$). This suggests that each item correlates significantly with

other items and a factor analysis is appropriate for this dataset.

In regard to individual factors, only items that loaded uniquely to one factor were

included; therefore, items that loaded on 2 or more factors were omitted unless otherwise

noted.  Results indicate that items, which loaded on individual factors, closely reflect 8 of

the 11 hypothesized subscales of cognitive distortions identified following the original

study investigating the psychometric properties of the ICD using a clinical sample

(Yurica, 2002).  The eight factors included magnification, fortune-telling, externalization

of self worth, perfectionism, emotional reasoning, minimization, comparison with others,

and emotional reasoning and decision-making.

In comparison with the original ICD investigation (Yurica, 2002), the Labeling,

Arbitrary Inference/Jumping to Conclusions, and Mind Reading factors were not

supported when using a community sample. However, it is of some interest that four new

subscales were identified, which were similar to other previously identified cognitive

distortions: Discounting the Positive and Personalization, Absolutistic or Dichotomous

Thinking, Should Statements, and Catastrophizing (Burns, 1980, 1989, 1999; Beck et al.,

1979).  The factor structure and item loadings are listed in Table 1.

Factor 1, Discounting the Positive and Personalization, included 14 items.  This

factor involved a combination of items that described two types of previously determined

cognitive distortions.  The cognitive distortions were combined because items that loaded

onto this factor were variable, but appeared consistently to describe features of both

discounting positive aspects of oneself and self-blame for negative life events.  These

items generally reflect the degree to which individuals reject positive experiences by insisting that they do not have meaning.  This factor accounted for the largest single variance of all factors in the scale (12.59%).  In addition, items reflecting self-blame for negative occurrences or life situations were included in this factor.  Discounting the Positive and Personalization refers to one's processing of information through a mental filter in which he or she downplays personal accomplishments and compliments as being unimportant, and at the time emphasizes his or her role in causing a negative event or situation, even if there is no evidence supporting this conclusion.  These individuals may have difficulty accepting praise or approval from their support system, as well as feeling they are to blame for negative life events.  Also, few items loading on this factor reflected negative self-comparison with others.  This suggests individuals who score high on Factor 1 engage in frequent upward social comparison with others, often processing information in such a way that they seem worse than those with whom they compare themselves.

Factor 2, Magnification, consisted of seven items and accounts for 8.54% of the total cumulative variance.  Burns (1980, 1989, 1999) referred to this cognitive distortion as the "binocular effect."  This is a situation in which an individual exaggerates or magnifies the positive or negative importance or consequence of some personal trait, event, or situation.  Those participants who scored high on this distortion may exaggerate or amplify small events into more significant problems than they truly are.  At times they may assign greater significance to a personal trait of life event, often in a negative manner.

Factor 3, Fortune-Telling, included five items and accounted for 7.56% of the overall variance. This factor measures an individual's tendency to anticipate some negative outcome and then convince him or herself that the prediction is an established fact or unchangeable. Fortune-Telling is the process in which someone truly believes a negative event is going to take place and his or her prediction is absolute.

Factor 4, Externalization of Self-Worth, consisted of five items and accounted for 7.19% of the total cumulative variance. This cognitive distortion refers to the need for approval and validation from others in order to maintain one's self-worth. Externalization of Self-Worth is the development and maintenance of self-worth based on how one's external environment views him or herself. This factor appears to measure an individual's locus of control, specifically an external locus of control. This suggests that individuals who score high on this factor tend to view their self-worth as stemming from the external world or feel they have little control over what happens in their lives.

Factor 5, Perfectionism, consisted of three items and accounted for 4.94% of the overall variance. This cognitive distortion occurs when someone constantly strives to live up to some internal or external standard of perfection. These individuals tend to have high standards for themselves in order to be perfect, without examining the reasonableness of such standards.

Factor 6, Absolutistic or Dichotomous Thinking, included four items accounting for 3.96% of the total cumulative variance. This factor refers to the tendency of individuals to view all experiences as falling into one of two categories (e.g. positive or negative). Individuals who score high on this cognitive distortion tend to see things as "black or white" with no grey area. Often times if an individual's performance falls

short, he or she views the self as a total failure, instead of identifying the good features

about the performance.

Factor 7, Emotional Reasoning, consisted of three items and accounted for 3.55%

of the total cumulative variance.  Individuals who score high on this factor tend to assume

their emotions reflect the way things really are. In other words, if someone feels

something, it must be true, allowing his or her emotional states to generate conclusions

about himself or herself, others, or life events.

Factor 8, Minimization, included three items accounting for 3.15% of the overall

variance.  Minimization refers to times when an individual discounts or diminishes the

importance of things until they appear insignificant.  Individuals who score high on this

cognitive distortion tend to minimize the importance of some personal trait or life event.

Factor 9, Comparison With Others, included two items and accounted for 2.86%

of the overall variance.  Comparison With Others is the tendency to compare oneself with

others as an inferior, resulting in a feeling of being worse or less than others in a

meaningful way.  Individuals who score high on this factor tend to compare themselves

with others and often reach negative conclusions about themselves.

Factor 10, Should Statements, consisted of three items, accounting for 2.79% of

the total cumulative variance.  Should Statements refer to the internal demands or

expectations that someone has for him or herself.  Those who score high on this factor

tend to place immense pressure on themselves in determining how they "should" have

performed, without contemplating the reasonableness of these expectations, dependent on

their abilities.  This cognitive distortion often leads to feelings of regret, guilt, anger, and

frustration.

Factor 11, Catastophizing, consisted of two items and accounted for 2.41% of the overall variance. This factor is made up of two questions that could possibly be placed within other cognitive distortion subscales, but when combined, can be interpreted as the Catastrophizing distortion. This factor refers to the process of evaluating a past or present situation, in which one believes the worst possible outcome did or will occur. Individuals who score high on this distortion tend to interpret current or past situations as catastrophic, believing that these situations could not have been worse.

Factor 12, Emotional Reasoning and Decision Making, included two items accounting for 2.29% of the total cumulative variance. Following the initial investigation of the measure, this was an unexpected, new factor. The current results confirm this subscale as accurately describing the items that loaded on this factor. Individuals who score high on this distortion tend to rely on their emotions to make decisions. This appears to relate to what most people define as "relying on their gut feeling". Emotional reasoning is a situation in which one uses emotional states to validate experiences in the world.

Table 2 lists variance data for the individual ICD factors using rotation sums of squared loadings. The percentages of variance, as well as the cumulative percentage variance, are presented for each factor.

### *Correlation of ICD Factors*

Pearson correlation coefficients were computed for each relationship between factors. Table 3 presents the intercorrelations for each ICD factor. Pearson correlation coefficients for a majority of the factors were significantly and positively correlated ($p <$ .01). The correlation coefficients of those factors that were significantly correlated

ranged from .113 to .696, suggesting strong relationships between most factors.

However, the relationships are not strong enough to suggest multicolinearity, meaning

each factor can be considered to measure its own individual construct.

The relationship between Factor 5 and Factor 9 was significant at the .05 level.

However, some correlations were found to be insignificant. The relationship between

Factor 5 and Factor 8 was not significant, $r(591) = -.039$, $p = .34$, as was the relationship

be Factor 5 and Factor 12, $r(591) = 0.57$, $p = .17$. Last, no relationship was found

between Factor 7 and Factor 9, $r(591) = .025$, $p = .55$. This suggests those individuals'

endorsements of items pertaining to the perfectionism cognitive distortion is not related

to the cognitive distortions of minimization and emotional reasoning and decision-

making. Also, those individuals who scored high on the emotional reasoning distortion

did not tend to score high on the comparison to others factor.

### *ICD Coefficient Alpha Reliability*

To investigate the internal consistency reliability of the ICD, a total scale estimate

of internal reliability was calculated using Cronbach's coefficient alpha. Also, subscale

estimates of internal consistency were also calculated for each factor. Coefficient alpha

data for the total scale and each factor are listed in Table 4. The total scale Cronbach's

alpha was suggestive of strong internal consistency reliability ($\alpha = .97$). This finding

confirmed the current predicted hypothesis and was consistent with Yurica's (2002)

original findings ($\alpha = .98$).

### *ICD Content Validity Analyses*

To examine whether or not the ICD correlated with a previously established

measure of cognitive distortions as well as a measure of perceived stress, analyses using

the Pearson Coefficients of Correlation were conducted.  Total score for the ICD, the

DAS, and the PSS were calculated and correlations were then computed.  Results are

presented in Table 5.

*ICD and DAS*:  Total scores on the ICD and the DAS were found to be

significantly and positively correlated, $r$ (472) = .75, $p < .001$.  The results indicate the

lower the total ICD score (e.g. lower overall frequency of cognitive distortions), the

lower the endorsement of dysfunctional attitudes.  Conversely, as participants'

endorsements of cognitive distortions increased, so did their endorsements of frequency

of dysfunctional attitudes.  These results suggest strong convergent validity as

demonstrated by a .75 correlation between the ICD and DAS (Figure 1).

*ICD and PSS*:  Total scores on the ICD and the PSS were found to be significantly

and positively correlated, $r$ (472) = .63, $p < .001$.  The results indicate that the greater the

frequency of cognitive distortions, the greater the endorsement of perceived stress.

Conversely, as participants' endorsements of cognitive distortions decreased, so did their

endorsements of intensity of perceived stress from environmental factors.

**Hypothesis Two.**

***Difference in Cognitive Distortions Across Demographics as Measured by the
ICD***

*Gender*:  To examine whether or not male and female participants differed on

total levels of cognitive distortions as measured by the ICD, an independent samples t-

test was computed.  Due to an insignificant Levene's test, equal variances between

groups were assumed ($p = .68$).  A statistically significant difference was found between

male and female overall level of endorsement of cognitive distortions, $t$ (472) = -2.75, $p =$

.006. However, the effect size for this relationship was in the small to moderate range

(Cohen's $d$ = -0.30). This suggests that although a significant difference exists between

males and females overall endorsements of cognitive distortions, the magnitude of the

effect is relatively small. On average, females (M = 176.18, SD = 33.12) endorsed a

statistically greater level of distorted thinking than males (M = 166.26, SD = 32.31). In

this sample, females had a tendency for a significantly greater use and frequency of

cognitive distortions in comparison with males. Means and standard deviations are

presented in Table 6.

　　　*Age*: To investigate whether or not overall level of cognitive distortions varied

depending on a participant's age, a one-way analysis of variance (ANOVA) was

computed. Due to an insignificant Levene's test, equal variances between groups were

assumed ($p$ = .84). An overall significant difference was found for participants' total

level of cognitive distortions as measured by the ICD, depending on participants' age, $F$

(2, 471) = 8.50, $p$ < .001. The overall effect size for this relationship between age and

level of cognition distortions was large ($\eta^2$ = 0.35). A Tukey post hoc analysis revealed

significant differences between those participants in the 18-29 age range and those in the

41-85 age range ($p$ < .001). However, the effect size for this relationship was moderate

(Cohen's $d$ = 0.46). This suggests the magnitude of the difference in overall level of

cognitive distortions between individuals who are 18-29 years old and 41-84 years old is

moderate. There were no other significant differences noted between the remaining age

ranges. Those participants in the 18-29 age range (M = 179.82, SD = 32.99) endorsed a

significantly greater use and frequency of cognitive distortions than participants in the

41-85 age range (M = 164.98, SD = 31.86). Those individuals in the 30-40 age range (M

= 172.65, SD = 32.82) did not significantly differ in level of cognitive distortions from either of the other age ranges.  In this sample, the level of use and frequency of cognitive distortions seemed to decrease over the lifespan as individuals grow older.  Means and standard deviations are presented in Table 7.

*Level of Education*: To investigate whether or not overall level of cognitive distortions varied depending on a participant's level of education, a one-way analysis of variance (ANOVA) was computed.   Due to an insignificant Levene's test, equal variances between groups were assumed ($p = .60$).  No significant differences were found for participants' total level of cognitive distortions as measured by the ICD depending on participants' level of education, $F (3, 270) = 0.51$, $p = .68$.  Also, as would be expected, the overall effect size of this relationship was small ($\eta^2 = 0.003$).  No significant differences in overall use and frequency of cognitive distortions were noted between those participants with a high school education (M = 174.10, SD = 30.71), a two-year college degree (M = 179.89, SD = 39.33), a four-year college degree (M = 174.31, SD = 33.08), or a graduate degree (M = 172.74, SD = 32.58).  Means and standard deviations are presented in Table 8.

**Hypothesis Three.**

***ICD Predicting Scores on PSS***

To investigate if total scores on the ICD can predict participants' endorsements of level of perceived stress from environmental and situational factors, a simple regression was computed.  Prior to the regression analysis, a correlation analyses was computed between overall scores on the PSS and overall scores on the ICD in order to test for multicolinearity.  The results of the correlation were significant, $r (472) = .63$, $p < .001$,

but *not* significant enough to suggest multicolinearity.  The results were found to be

statistically significant, $F (1, 472) = 315.30, p < .001$, suggesting that overall level of

cognitive distortions can predict participants' overall levels of perceived stress.  The

identified equation to understand this relationship was PSS Total Score = (-6.19) +

0.133*(ICD Total Score).  The adjusted $R$ squared value was .399, which suggests that

participants' levels of endorsement of cognitive distortions can explain approximately

40% of the variance in levels of perceived stress.  Participants' perceptions of stress from

the environment can be predicted by their frequency and use of cognitive distortions or

distorted thinking.  Results are presented in Figure 2 and Table 9.

**Chapter 5**

**Discussion**

      Cognitive theory suggests that cognitive distortion is one commonality among the etiology and pathology of emotional disorders (Beck, 1967).  Cognitive distortion occurs when individuals process or interpret external information or situations based on maladaptive rules, assumptions, or schema (Beck, 1967; 1976; Young et al., 2003; Kendall, 1992).  The ICD was developed in response to a need for better conceptualization of cognitive distortion within a clinical population suffering from emotional disorders.  Presently, other measures of cognitive distortion tend to lack specificity of the terms used to describe cognitive distortions; they also result in variable measurement across instruments, are outdated, and have limited applicability and scope (Yurica, 2002; DiTomasso & Yurica, 2011).  The utility of the ICD was originally examined using only clinical populations (Yurica, 2002; Rosenfield 2004; Uhl, 2007).  The current study seeks to examine the standardization and properties of the ICD using a nonclinical, community sample, similar to the development of previous measures of cognitive distortion.  The purpose of the study was threefold: 1) to further validate the psychometric properties and factor structure of the ICD using a community sample; 2) to investigate how cognitive distortions in a community sample vary as a function of certain demographic characteristics such as gender, age, and level of education, and; 3) to investigate whether or not level of distorted thinking can predict level of perceived stress, both of which can be antecedents to emotional disorders (Hammen, 1978; Deal & Williams, 1998).

**Psychometric Properties.**

A factor analysis of the ICD revealed statistically significant results for the internal structure of the scale. To investigate the individual subscales of the ICD, a principal components factor analysis with varimax rotation was computed. A total of 14 factors with eigenvalues greater than one were found. Using a loading criterion of .40 or more, 12 factors were retained. The current results were slightly inconsistent with previous findings. The original study found 11 factors, instead of 12, when using a clinical sample (Yurica, 2002). The current study used a loading cut-off of .40 instead of .45, as was used in the original study, due to the use of a nonclinical sample who, in theory, would not endorse a level of cognitive distortions as high as that of a clinical sample. Of the original 69 items, 51 loaded uniquely onto the 12 factors and accounted for 65.77% of the total cumulative variance. This is similar to the 2002 study, which found 57 items loading on 11 factors, accounting for 66.24% of the total variance (Yurica, 2002).

Of the 12 factors, eight reflect similar subscales identified in the original study (Magnification, Fortune-Telling, Externalization of Self-Worth, Perfectionism, Emotional Reasoning, Minimization, Comparison to Others, and Emotional Reasoning and Decision-Making). However, after administering the ICD to a nonclinical sample in the current study, four of the identified factors (Discounting the Positive / Personalization, Absolutistic or Dichotomous Thinking, Should Statements, and Catastrophizing) were novel in comparison with the original factor structure following the initial investigation (Yurica, 2002). The following describes each factor.

Factor 1, Discounting the Positive and Personalization, included 14 items, and accounted for the largest single variance of all factors in the scale. This factor consisted of a combination of items that described two types of previously determined cognitive distortions. These items generally reflect the degree to which individuals reject positive experiences by insisting that they do not have meaning. In addition, items reflecting self-blame for negative occurrences or life situations were included in this factor. This subscale refers to one's processing of information through a mental filter in which he or she downplays personal accomplishments and compliments as being unimportant, and at the time emphasizing his or her role in causing a negative event of situation, even if there is no evidence supporting this conclusion. Also, few items loading on this factor reflected negative self-comparison with others. Factor 1 correlated significantly ($p <$ .001) with all other subscales. Results suggest that this cognitive distortion is the most prevalent type of distorted thinking amongst the general population or a nonclinical sample.

Factor 2, Magnification, consisted of seven items. This factor refers to a situation in which an individual exaggerates or magnifies the positive or negative importance or consequence of some personal trait, event, or situation. Those participants that scored high on this distortion may exaggerate or amplify small events into more significant problems than they truly are. This factor accounted for the second largest variance of all factors in the scale. This factor, too, correlated significantly with all other subscales.

Factor 3, Fortune-Telling, included five items. This factor measures an individual's tendency to anticipate some negative outcome and then convince him or

herself that the prediction is an established fact, unchangeable, or absolute. Again, the relationship between this factor and all other factors was statistically significant.

Factor 4, Externalization of Self-Worth, consisted of five items and referred to the need for approval and validation from others in order to maintain one's self-worth. Externalization of Self-Worth is the development and maintenance of self-worth based on how one's external environment views him or herself. Individuals who score high on this factor tend to view their self-worth as stemming from the external world or feel they have little control over what happens in their lives. This factor also correlates significantly with all other factors.

Factor 5, Perfectionism, consisted of three items. This cognitive distortion occurs when someone constantly strives to live up to some internal or external standard of perfection. These individuals tend to have high standards for themselves in order to be perfect, but they do not examine the reasonableness of such standards. It is of some interest that this factor did not correlate significantly with all other subscales. The ratings for the Perfectionism distortion were unrelated to individual's ratings of the Minimization and Emotional Reasoning and Decision-Making distortion ($p = .34$ and $p = .17$ respectively). A possible explanation for this may be that individuals who endorse the perfectionism distortion may have more significant anxiety symptoms, arising from fear of things not being perfect. However, those who minimize important details or accomplishments in their lives or use emotional reasoning and decision-making when examining past mistakes or failures may be more prone to depressive symptoms. As stated in the literature review, those individuals coping with depression tend to have an interpretational framework that is absolutist or revolves around themes of loss

deprivation, and personal inadequacy, but those coping with anxiety tend to use cognitive

distortions that are probabilistic in nature and consist of perceptions of possible future

psychological or physical harm (Burns and Eidelson, 1998).

Factor 6, Absolutistic or Dichotomous Thinking, included four items and refers to

the tendency of individuals to view all experiences as falling into one of two categories

(e.g. positive or negative). Often, if an individual's performance falls short, he or she

views the self as a total failure instead of identifying the good features about the

performance. The dichotomous thinking distortion correlated significantly with all other

identified cognitive distortion subscales.

Factor 7, Emotional Reasoning, consisted of three items. Individuals who score

high on this factor tend to assume that their emotions reflect the way things really are. In

other words, if someone feels something, it must be true, allowing his or her emotional

states generate conclusions about him or herself, others, or life events. Although this

factor correlated significantly with a majority of the other subscales, it did not correlate

with the Comparison to Others distortion ($p = .55$). This suggests that in a nonclinical

sample, individuals who use their current emotional states to interpret life situations do

not also compare themselves to others in a negative manner.

Factor 8, Minimization, included three items and refers to a situation in which an

individual discounts or diminishes the importance of things until they appear

insignificant. This factor correlated significantly with all other subscales, except for the

factor five (Perfectionism).

Factor 9, Comparison to Others, included two items. This factor describes the

tendency to compare oneself with others, as if the self were inferior, resulting in a feeling

of being worse or less than others in a meaningful way.  Individuals who score high on

this factor tend to compare themselves with others and often reach negative conclusions

about themselves.  One item that loaded on this factor also loaded on Factor 1

(Discounting the Positive / Personalization), which had other items that describe the

comparison with others distortion.  Factor nine was significantly related to all other

factors at the .05 level.

Factor 10, Should Statements, consisted of three items and referred to the internal

demands or expectations someone has for him or herself.  Individuals may feel immense

pressure about how they "should" have performed, without contemplating the

reasonableness of these expectations, dependent on their abilities.  Often this leads to

feelings of regret, guilt, anger, and frustration.  Again, factor ten correlates significantly

with all other subscales.

Factor 11, Catastophizing, consisted of two items.  This factor is made up of two

questions that could possibly be placed within other cognitive distortion subscales, but

when combined, can be interpreted as the Catastrophizing distortion.  Catastrophizing is

the process of evaluating a past or present situation, and believing that the worst possible

outcome did or will occur.  Combined items for this factor are significantly related to all

other subscales.

Factor 12, Emotional Reasoning and Decision Making, included two items.  This

was an unexpected, new factor following the initial investigation of the measure.  The

current results confirmed this subscale.  This factor describes the reliance on emotions to

make decisions.  It relates to occurrences that most people define as "relying on their gut

feelings".  Emotional reasoning occurs when one uses emotional states to validate

experiences in the world.  This subscales correlates significantly with all other factors

except for Factor 5 (Perfectionism).

Internal consistency reliability was examined using Cronbach's alpha to

determine if the self-statement items reliably measure overall level of cognitive distortion

as well as reliably measure each individual subscale.  The total scale estimate of internal

reliability consistency was strong ($\alpha = .97$).  This finding confirmed the current predicted

hypothesis and was consistent with Yurica's (2002) original findings ($\alpha = .98$).  As for

each individual subscale, the Cronbach's alphas ranged from .47 to .94.  Factor 12

(Emotional Reasoning and Decision-Making) had the smallest alpha, suggesting weaker

internal consistency, but the internal reliability of Factor 1 (Discounting the Positive /

Personalization) was the strongest of all factors.

Correlational findings suggested that the ICD has good convergent validity based

on its comparison with the DAS ($r = .75$).  The ICD correlated significantly and

positively with the DAS; however the correlation is not strong enough to say that both

measures are identical.  This suggests that the ICD and DAS are measuring a similar

construct, but the ICD is measuring slightly different features of said construct. This

finding suggests that the greater the endorsement of cognitive distortion as measured by

the ICD, the greater the endorsement of dysfunctional attitudes as measured by the DAS.

Yurica (2002) found similar results when collecting ICD data from a clinical population,

because the correlation between the ICD and DAS following her study was similar to the

current findings ($r = .70$).  The current research lends further support for the convergent

validity of the ICD using a large community sample, because similar results were found

in comparison with previous research using a smaller clinical sample (Yurica, 2002).

In regard to the diathesis-stress model of emotional disorders, the current findings lend support to the relationship between stress and cognitive distortions (Beck, 1967). Deal and Williams (1998) found that cognitive distortions influenced the perceived stressfulness of life events. Those adolescents with higher levels of cognitive distortion tended to perceive life events as more stressful (Deal & Williams, 1998). The researchers suggested that individuals with high levels of cognitive distortion tend to interpret life situations as more stressful and are more susceptible to depressive symptoms. The current research found similar results because the PSS scale correlated significantly with the ICD ($r = .63$). This suggests that as the frequency and intensity of cognitive distortions increase, so does an individual's level of perceived stress. Without the underlying cognitive distortions to mediate individuals' experiences, life events may not be interpreted to be stressful and depressive symptoms may not subsequently develop.

**Demographic Characteristics.**

There is currently a dearth of literature examining the variability of cognitive distortion across certain demographic characteristics. The nature of the present hypothesis was exploratory and investigated the differences in cognitive distortion, depending on gender, age range, and level of education. In regard to differences within age groups and levels of education, the research is almost nonexistent. The current clinical literature has varying results when comparing gender differences in cognitive distortions. Sowa and Lustman (1984) found that men tended to have greater distortions in cognitive content than do women. However, Oliver and Baumgart (1985) investigated gender differences in dysfunctional attitudes and the results suggested there were no significant differences between genders. The conflicting results found by the studies are

most likely due to the utilization of different cognitive distortion measures. When validating a measure, it is crucial to understand whether or not scores on the instrument vary because of different demographic characteristics; this is necessary in order to be aware of the measures limitations.

The current findings revealed that a significant difference in frequency and intensity of cognitive distortions does exist between males and females. On average, the females in the present sample endorsed significantly greater levels of cognitive distortions than males ($p = .006$). However, the ratio of females to males in the sample was approximately 3:1, suggesting there were far more females who completed the study. This may have led to less variability in responding from the males as compared with variability in responding from the females. The current findings were expected because of the number of females who experience symptoms of depression being significantly greater than the number of males who experience these symptoms. The National Institute of Mental Health estimates that women are 70% more likely than men to experience depression during their lifetimes (National Institute of Mental Health). In 2012, among adults, 8.4% of females experienced symptoms of major depression, whereas only 5.2% of males experienced these symptoms. In that same year, among adolescents 13.7% of females experienced an episode of major depression, whereas 4.7% of male adolescents experienced similar episodes (National Institute of Mental Health, 2012). Based on these statistics, it was expected that female participants would be experiencing more symptoms of depression than male participants; this suggests that based on the cognitive model of depression, females should also be experiencing greater levels of cognitive distortions than males. Even though the current study utilized a community sample, it is expected

that previous statistics suggesting that females experience depression at a great level than males will carry-over into a nonclinical sample, but at a subclinical level (National Institute of Mental Health, 2012).

The current researchers could not find any research investigating rates of cognitive distortions that were based on age and level of education. The current exploratory findings found a significant difference in levels of cognitive distortion based on a participant's age ($p < .001$). Those individuals who were 18 to 29 years old had significantly greater levels of cognitive distortions than individuals who were 41 to 85 years old. Interestingly, a qualitative review of the means and standard deviations of all three age groupings revealed a gradual decline in levels of cognitive distortions across the lifespan. It appears that as human beings age, the frequency and intensity of cognitive distortions decrease. A possible explanation for this trend may be due to individuals maturing as they age, leading to a reduction in reactivity to life events. Previous research suggests possible factors for the reduction of depression symptoms across the lifespan include decreased emotional responsiveness with age, increased emotional control, and psychological immunization to stressful experiences (Jorm, 2000).

In regard to cognitive distortions varying, based on level of education, the current results did not suggest any significant differences ($p = .68$). There were no significant differences in overall use and frequency of cognitive distortions, as measured by the ICD, which depended on the participants' levels of education. All those individuals with a high school education, a two-year college degree, a four-year college degree, or a graduate degree endorsed similar levels of cognitive distortions. This may be due to unequal representation of groups within the sample. There were significantly more

individuals with a graduate degree than there were with any other level of education, and there were no participants who endorsed having less than a high school degree.

**Stress and Cognitive Distortion.**

The final hypothesis predicted that the overall level of cognitive distortion would predict overall level of perceived stress. Based on the diathesis-stress model, some individuals have a predisposition (diathesis) or vulnerability to developing a form of psychopathology. When the predisposition is combined with a perceived stressful event, the individual becomes even more susceptible to developing a disorder (Sigelman & Rider, 2009). For example, someone with a family history of depression has a predisposition to develop such a disorder following a stressful event. The current study suggests that a vulnerable predisposition may include early maladaptive schema that developed into cognitive distortions, thus causing the individual to process a stressful situation in a dysfunctional way, leading to an emotional disorder. If cognitive distortions exacerbate the perceived stressfulness of life events, it would be useful to understand the relationship between cognitive distortion and stress in a clinical setting because both factors play a role in the etiology of psychopathology. Studies have found a significant relationship between stress, cognitive distortion, and depression (Smith, O'Keefe, & Christensen, 1994; Lefebvre, 1981; Deal & Williams, 1998). To demonstrate the utility of the ICD, it was imperative that the measure be related to a measure of perceived stress because the constructs are related in regard to emotional disorders.

The current findings suggest that an individual's overall level of cognitive distortion can predict his or her tendency to perceive life events as stressful. Participants'

endorsements of cognitive distortions were able to predict, significantly, their levels of

perceived stress ($p < .001$). The results suggested that his or her level of endorsement of

cognitive distortions as measured by the ICD could explain approximately 40% of the

variance in a participant's level of perceived stress as measured by the PSS. Although

cognitive distortions were able to account for a significant amount of the variance of

participants' perceived stress, there is still variance that was unaccounted for. Across all

hypotheses, cognitive distortions do not account for all variance in participants' scores

across measures. Research suggests although cognitive distortions play a large role in the

development and maintenance of depression, in other mood disorders and in stress, there

are certainly other risk factors that might account for the remaining variance. Other

possible factors include certain personality traits, such as temperament and low self-

esteem, serious or chronic illness, certain medications, traumatic life events, genetics or

family history of mood disorder, and other environmental stressors (Mayo Clinic, 2014;

Beck & Young, 1985; Beck & Clark, 1988).

**Implications of Findings**

The ICD is able to give clinicians the ability to assess and identify quickly those

specific cognitive distortions that tend to exacerbate individuals mental illness. Previous

measures of cognitive distortion are incapable of identifying more than four types of

distorted thinking. Research has demonstrated the utility of the ICD in identifying

cognitive distortions and has also supplied evidence of its value in the clinical setting

(Yurica, 2002; Rosenfield, 2004: Uhl, 2007). The current study demonstrated the

incremental validity of the ICD in comparison with the DAS in regard to applicability

and scope. The ICD has the capability of measuring specific cognitive distortions, which

will add significant value to the clinical literature regarding detailed measurement of distorted thinking. The implications of the current research provide further support for the psychometric properties of the ICD.  The study examined the factor structure, reliability, and validity of the ICD, using a larger sample size to provide evidence for the utility of the measure.  Also, by utilizing a larger, more diverse sample, the current research increased the ecological validity.

The current study has attempted to understand the variability of cognitive distortions, if any, based on background characteristics.  Results suggested that, in this nonclinical population, females tended to have higher levels of cognitive distortions than males, and that the level of cognitive distortions decreases slightly with age.  This implies the idea that as individuals age, they develop a more realistic thinking process, which leads to a decreased rate of mood or anxiety symptoms. Also, based on the current findings, cognitive distortions do not tend to vary due to level of education.  The more clinicians understand distorted information processing and recognize those who are more likely to have greater levels of cognitive distortion, the more symptom-focused the treatments can be, and thus can become more efficient.

Lastly, the current research generated further evidence for the relationship between cognitive distortion and perceived stress in a nonclinical population.  Those individuals who have greater levels of cognitive distortion tend to also perceive life events as more stressful.  This finding suggests that if treatment can efficiently identify and alter an individual's specific cognitive distortions, he or she is also likely to find a decrease in level of perceived stress.

An implication for clinical psychology in general is the importance of using well-validated and empirically supported measures in clinical practice.  The more research that is conducted on a specific measure serves only to increase its utility to the practicing clinician as well as its benefits to individuals suffering from mental illness. Also, the ICD could be used as a tool in therapy as a means of psychoeducation. Clinicians can use the ICD and its questions to discuss specific cognitive distortions with the patient. It allows patients to see and understand the types of distorted thinking which may be influencing or maintaining their mood disorders.

**Limitations**

Several limitations for the current study should be noted.  First, the method for collecting data resulted in a nonprobability sample.  Although the sample was thought to be more representative than most samples of convenience, such as using college students, the current results should be generalized to the larger population with caution because of little variation in ethnicity and level of education.  By collecting data via online social networking and on a graduate school campus, the sample does not quite represent the same diversity present in the overall population.

Second, the sample size, although larger than most previous studies, was not as large as many other samples used to evaluate other self-report clinical instruments.  Most clinical measures were developed and standardized using much larger sample sizes, such as 1,000-2,000 participants.  However, the current sample size did allow for sufficient power to draw accurate conclusions.

Third, the researchers did not account for those individuals currently receiving psychotherapy or other treatments for mental health issues.  Thus, some individuals who

participated in the study may fall under the category of "clinical", suggesting the sample

may not be entirely composed of "nonclinical" participants.

Fourth, a factor-loading cutoff of .40 was used for the current study, in

comparison with the original study's cutoff of .45. Because the current study utilized a

nonclinical, community sample, a slightly less strict criterion was used in order to allow

more variability in item loadings. Future research could examine the sample population

data using the same cutoff as in previous studies.

Last, the methodology of the current study did not allow individuals without

access to the Internet to participate. Only individuals with access to the Internet were

able to complete the study, which again questions the diversity of the sample. As with

most online data collection methodology, this is a limitation that must be considered.

**Future Studies**

The current study used a significantly larger sample size than previous studies,

but the current participants were selected from a community sample. Future research

should include continued testing of the ICD with a larger clinical population. Also, the

ICD has the potential to assess changes in cognitive distortions over time, but this has yet

to be investigated. Using a clinical sample, future studies should examine the capabilities

of the ICD of tracking changes in cognitive distortions pre-, during, and post-treatment.

Another interesting investigation may want to examine the variability in the levels of

cognitive distortion based on socioeconomic status or income. This would allow

researchers to examine whether or not cognitive distortions decrease as one's income

increases. Last, studies should examine the overall utility of the ICD to the practicing

clinician. The use of the ICD as a clinical tool in aiding patients in the process of

identifying and changing particular distortions to resolve emotional disorders should be

investigated.

Table 1: *ICD Factor Loadings*

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Factor 1:     Discounting the Positive / Personalization

| Item | Loading |
|---|---|

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| Item | Loading |
|---|---|
| Item 4: I tend to discount the good things about me. | 0.66 |
| Item 10: What others think about me is more important than what I think about myself. | 0.49 |
| Item 17: I have a tendency to blame myself for bad things. | 0.57 |
| Item 18: Without even asking, I think other people see me in a negative light. | 0.49 |
| Item 20: I hold myself responsible for things that are beyond my control | 0.51 |
| Item 21: I tend to disqualify the positive traits I have. | 0.73 |
| Item 28: I downplay my accomplishments. | 0.76 |
| Item 35: Compared with other people like me, I find myself lacking. | 0.53 |
| Item 50: I find myself assuming blame for things. | 0.61 |
| Item 52: The positive things in my life just do not count for much at all. | 0.49 |
| Item 58: I tend to downplay compliments. | 0.71 |
| Item 62: When I compare myself with others, I come up short. | 0.54 |
| Item 63: I put myself down. | 0.70 |
| Item 65: I tend to dwell on things I do not like about myself. | 0.60 |

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Factor 2:     Magnification

| Item | Loading |
|---|---|

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Item 8: I amplify things well beyond their importance in life.                          0.65

Item 24: I have a tendency to exaggerate the importance of minor things.        0.71

Item 30: I have been known to make a mountain out of a molehill                   0.73

Item 32: I have a tendency to exaggerate the importance of even small events.   0.68

Item 43: I typically make judgments without checking out all of the facts
beforehand.                                                                             0.45

Item 47: I jump to conclusions without considering alternative points of view.   0.49

Item 69: I blow things out of proportion                                              0.72

Factor 3:      Fortune-Telling

| Item | Factor |
|------|--------|

Item 2: I feel like a fortuneteller, predicting bad things will happen to me.      0.81

Item 9: I act as if I have a crystal ball, forecasting negative events in my life.  0.79

Item 26: I have a habit of predicting that things will go wrong in any
given situation.                                                                        0.67

Item 36: I believe that my negative forecasts about my future will come
to pass.                                                                                0.66

Item 55: My negative predictions usually come true.                                  0.58

Factor 4:      Externalization of Self-Worth

| Item | Loading |
|------|---------|

Item 1: I need others to approve of me in order to feel that I am worth
something.                                                                              0.76

Item 7: I compare myself with  others all the time.                                                0.43

Item 15: To feel good, I need others to recognize me.                                       0.79

Item 41: I need a lot of praise from others to feel good about myself.               0.75

Item 46: I find that I frequently need feedback from others to obtain a
sense of comfort about myself.                                                                            0.74

| Factor 5: | Perfectionism |
| --- | --- |
| Item | Loading |

| Item 25: I attempt to achieve perfection in all areas of my life. | 0.86 |
| --- | --- |
| Item 39: When I think about it, I am quite perfectionistic. | 0.85 |
| Item 57: It is important to strive for perfection in everything I do. | 0.86 |

| Factor 6: | Absolutistic / Dichotomous Thinking |
| --- | --- |
| Item | Loading |

| Item 5: I either like a person or do not; there is no in between for me. | 0.73 |
| --- | --- |
| Item 22: Things seems to go all right or all wrong in my world. | 0.54 |
| Item 42: In my mind, things are either black or white; there are no grey areas. | 0.66 |
| Item 48: As far as my life goes, things are either great or horrible. | 0.55 |

| Factor 7: | Emotional Reasoning |
| --- | --- |
| Item | Loading |

| Item 40: If I feel a certain way about something, I am usually right. | 0.50 |
| --- | --- |

| | |
|---|---|
| Item 56: My feelings reflect the way things are. | 0.81 |
| Item 60: My feelings are an accurate reflection of the way things really are. | 0.85 |

Factor 8:      Minimization

| Item | Loading |
|---|---|
| Item 6: I minimize the importance of even serious situations. | 0.71 |
| Item 45: I find I have a tendency to minimize the consequences of my actions, especially if they result in negative outcomes | 0.64 |
| Item 68: I underestimate the seriousness of situations. | 0.68 |

Factor 9:      Comparison to Others

| Item | Loading |
|---|---|
| Item 19: I do few things as well as others. | 0.69 |
| Item 31: Most people are better at things than I am.<br>    (* This item also loaded on Factor 1) | 0.62 |

Factor 10:      Should Statements

| Item | Loading |
|---|---|
| Item 11: Regrets in my life stem from things I should have done, but did not do. | 0.70 |
| Item 16: I motivate myself according to how I should be. | 0.41 |
| Item 27: I have a lot of shoulds, oughts, and musts in my life. | 0.42 |

| Factor 11: | Catastrophizing |
|---|---|
| Item | Loading |

| Item | Loading |
|---|---|
| Item 33: When a new rule comes out at work, school, or home, I think it must have been made because of something I did. | 0.42 |
| Item 59: When something negative happens, it is just terrible. | 0.41 |

| Factor 12: | Emotional Reasoning and Decision Making |
|---|---|
| Item | Loading |

| Item | Loading |
|---|---|
| Item 12: I make decisions on the basis of my feelings. | 0.74 |
| Item 66: I go with my gut feeling when deciding something. | 0.71 |

Table 2: *Explanation of Variance by Factor*

| Factor | Total | % of Variance | Cumulative % |
|--------|-------|---------------|--------------|
| 1 | 8.68 | 12.59 | 12.59 |
| 2 | 5.90 | 8.54 | 21.13 |
| 3 | 5.21 | 7.56 | 28.69 |
| 4 | 4.96 | 7.19 | 35.87 |
| 5 | 3.41 | 4.94 | 40.81 |
| 6 | 2.72 | 3.96 | 44.76 |
| 7 | 2.45 | 3.55 | 48.32 |
| 8 | 2.18 | 3.15 | 51.47 |
| 9 | 1.97 | 2.86 | 54.32 |
| 10 | 1.92 | 2.79 | 57.11 |
| 11 | 1.67 | 2.41 | 59.53 |
| 12 | 1.58 | 2.29 | 61.82 |

Table 3: *Pearson Inter-Correlation Matrix of ICD Factors*

|  |  | F1 | F2 | F3 | F4 | F5 | F6 | F7 | F8 | F9 | F10 | F11 | F12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| F1 | *r* |  | .619 | .637 | .696 | .238 | .484 | .122 | .215 | .573 | .550 | .568 | .166 |
|  | p</= |  | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 |
| F2 | *r* |  | 1 | .591 | .590 | .300 | .561 | .128 | .239 | .376 | .460 | .571 | .324 |
|  | p</= |  |  | .0001 | .0001 | .0001 | .0001 | 0.002 | .0001 | .0001 | .0001 | .0001 | .0001 |
| F3 | *r* |  |  | 1 | .487 | .192 | .485 | .199 | .235 | .403 | .447 | .533 | .155 |
|  | p</= |  |  |  | .0001 | .0001 | .0001 | 0.001 | .0001 | .0001 | .0001 | .0001 | .0001 |
| F4 | *r* |  |  |  | 1 | .270 | .401 | .138 | .221 | .393 | .514 | .501 | .223 |
|  | p</= |  |  |  |  | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 |
| F5 | *r* |  |  |  |  | 1 | .300 | .266 | -.039 | .086 | .301 | .234 | .057 |
|  | p</= |  |  |  |  |  | .0001 | .0001 | .339 | .036 | .0001 | .0001 | .167 |
| F6 | *r* |  |  |  |  |  | 1 | .259 | .249 | .324 | .333 | .460 | .229 |
|  | p</= |  |  |  |  |  |  | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 |
| F7 | *r* |  |  |  |  |  |  | 1 | .132 | .025 | .182 | .174 | .236 |
|  | p</= |  |  |  |  |  |  |  | .001 | .545 | .0001 | .0001 | .0001 |
| F8 | *r* |  |  |  |  |  |  |  | 1 | .142 | .195 | .169 | .173 |
|  | p</= |  |  |  |  |  |  |  |  | .001 | .0001 | .0001 | .0001 |
| F9 | *r* |  |  |  |  |  |  |  |  | 1 | .389 | .341 | .113 |
|  | p</= |  |  |  |  |  |  |  |  |  | .0001 | .0001 | .006 |
| F10 | *r* |  |  |  |  |  |  |  |  |  | 1 | .438 | .130 |
|  | p</= |  |  |  |  |  |  |  |  |  |  | .0001 | .002 |
| F11 | *r* |  |  |  |  |  |  |  |  |  |  | 1 | .245 |
|  | p</= |  |  |  |  |  |  |  |  |  |  |  | .0001 |
| F12 | *r* |  |  |  |  |  |  |  |  |  |  |  | 1 |
|  | p</= |  |  |  |  |  |  |  |  |  |  |  |  |

Table 4: *Coefficient Alpha Reliability for Individual ICD Factors*

| Factor | Description | Coefficient Alpha |
|--------|-------------|-------------------|
| 1 | Discounting the Positive / Personalization | 0.935 |
| 2 | Magnification | 0.880 |
| 3 | Fortune-Telling | 0.874 |
| 4 | Externalization of Self-Worth | 0.881 |
| 5 | Perfectionism | 0.890 |
| 6 | Absolutistic / Dichotomous Thinking | 0.745 |
| 7 | Emotional Reasoning | 0.712 |
| 8 | Minimization | 0.581 |
| 9 | Comparison to Others | 0.682 |
| 10 | Should Statements | 0.583 |
| 11 | Catastrophizing | 0.540 |
| 12 | Emotional Reasoning / Decision Making | 0.470 |

Total ICD Scale Coefficient Alpha = .966

Table 5:  *Correlations Between ICD, DAS, and PSS*

|  | ICDTotal | DASTotal | PSSTotal |
|---|---|---|---|
| ICDTotal Pearson Correlation | 1 | 0.754 | 0.633 |
| Sig. (1-tailed) |  | 0.0001 | 0.0001 |
| N | 474 | 474 | 474 |
| DASTotal Pearson Correlation | 0.754 | 1 | 0.572 |
| Sig. (1-Tailed) | 0.0001 |  | 0.0001 |
| N | 474 | 474 | 474 |

Table 6: *Means and Standard Deviations for ICD Scores based on Gender (N = 474)*

|  | n | Mean | Standard Deviation |
|---|---|---|---|
| Males | 108 | 166.26 | 32.31 |
| Females | 366 | 176.18 | 33.12 |

Table 7:  *Means and Standard Deviations for ICD Scores based on Age (N = 474)*

|        | n   | Mean   | Standard Deviation |
|--------|-----|--------|--------------------|
| 18-29  | 221 | 179.82 | 32.99              |
| 30-40  | 125 | 172.65 | 32.82              |
| 41-85  | 128 | 164.98 | 31.86              |

Table 8: *Means and Standard Deviations for ICD Scores based on Level of Education*

*(N = 474)*

| | n | Mean | Standard Deviation |
|---|---|---|---|
| Less than High School | 0 | X | X |
| High School Graduate | 30 | 174.10 | 30.71 |
| Two-Year College | 37 | 179.89 | 39.33 |
| Four-Year College | 163 | 174.31 | 33.08 |
| Graduate Degree | 244 | 172.74 | 32.58 |

Table 9: *Summary of Regression Analysis for Participant's ICD Total Score Predicting*

*PSS Total Score (N = 474).*

| Variable | B | SE(B) | β | *t* | Sig. (*p*) |
|----------|-----|-------|------|-------|---------|
| ICD Total | .133 | .008 | .633 | 17.76 | < .001 |

*Constant = -6.19*

$R^2 = .40$

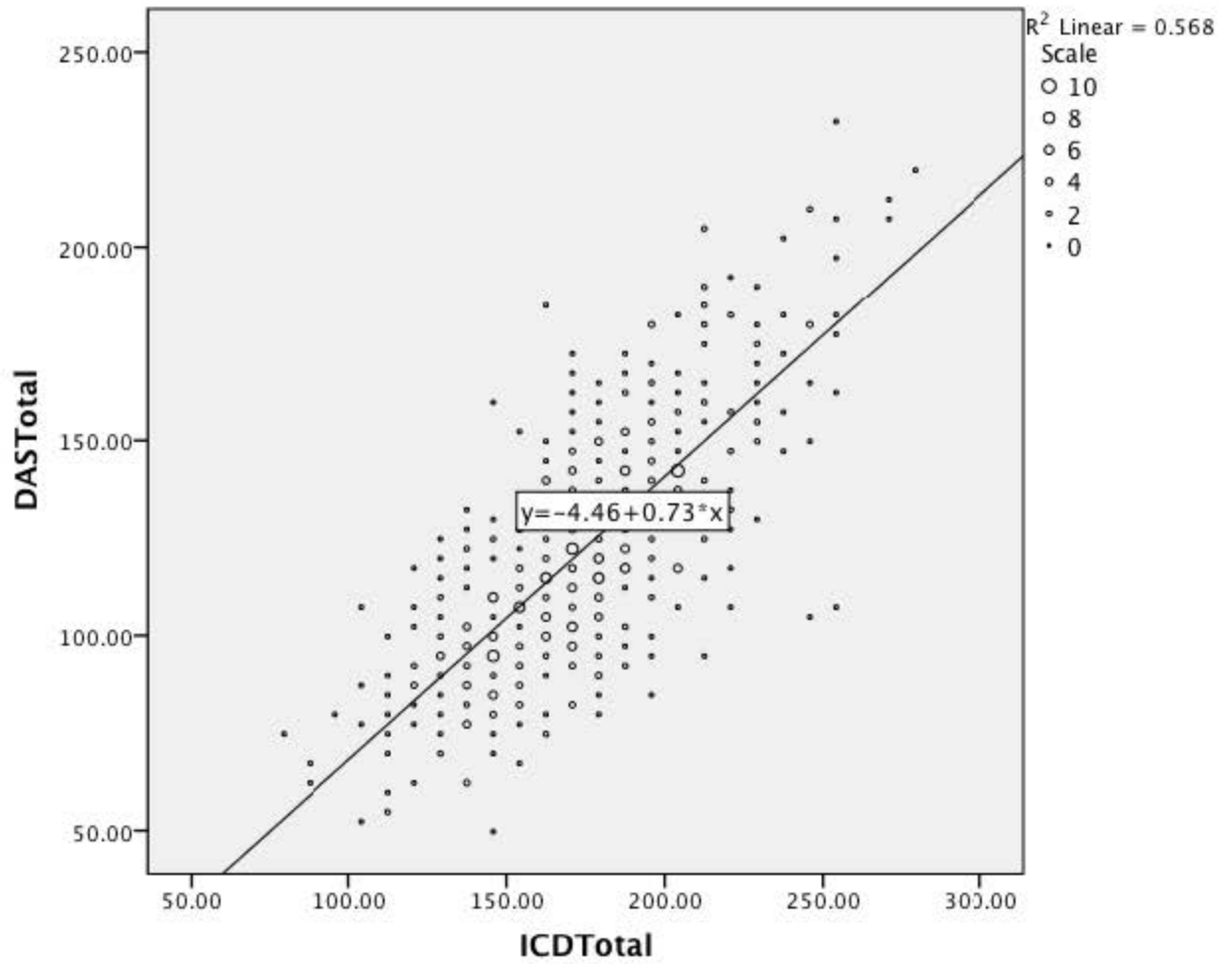Figure 1: *Relationship Between ICD and DAS*
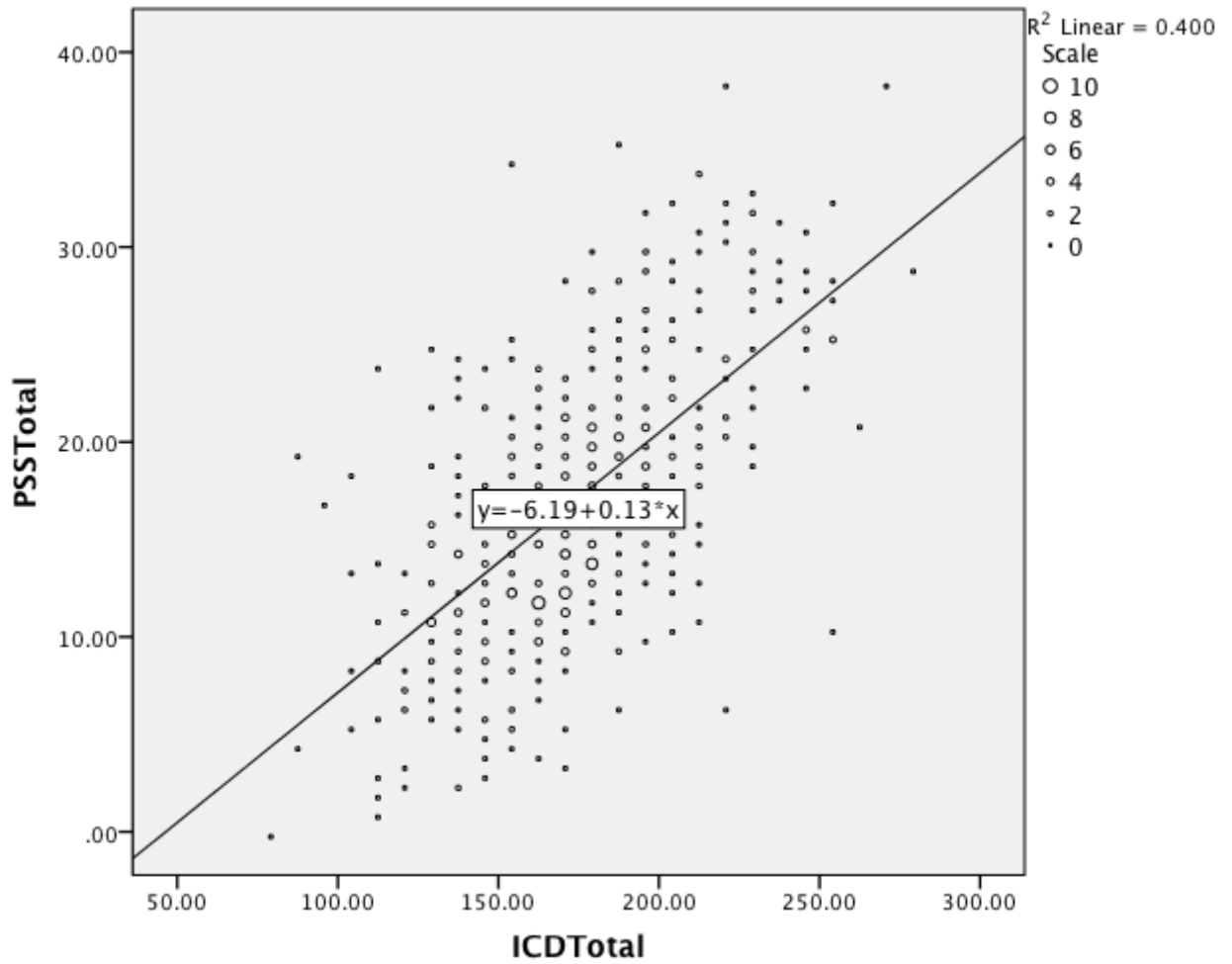
Figure 2: *Relationship Between ICD and PSS*

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