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# Equifinality and Multifinality in Psychopathology: Can Cognitive and Emotional Processes Differentiate Internalizing, Externalizing, and Co- Occurring Psychopathology

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Equifinality and Multifinality in Psychopathology: Can Cognitive and Emotional Processes  
Differentiate Internalizing, Externalizing, and Co-Occurring Psychopathology

by

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A thesis submitted in partial fulfillment  
of the requirements for the degree of  
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*We can only be said to be alive in those moments when our hearts are conscious of our treasures. ~Thornton Wilder*

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## ABSTRACT

Despite our knowledge of environmental risk factors for psychopathology, the equifinality and multifinality observed in the extant literature reveals how little is known about the role of these risk factors in the development of psychopathology. The purpose of this study was to identify processes that differentiate internalizing, externalizing and co-occurring psychopathology. Specifically, emotion identification skill and cognitive appraisal style were examined as processes where individual differences may contribute to the development of mental illness. To date no study has been conducted to examine whether emotion identification and appraisal style may differentiate forms of internalizing, externalizing and co-occurring psychopathology and lack of clinically significant problems in one study. A better understanding of predictors or processes that differentiate forms of psychopathology may improve our understanding of developmental psychopathology as well as inform prevention and intervention efforts. One hundred and fifty eight participants were included in this study. Data supported emotion identification skill as important for predicting specific behavioral problem profiles. Implications for conceptualizations of psychopathology and directions for future studies are discussed.

## INTRODUCTION

Despite our knowledge surrounding the identification and progression of mental illness, much remains to be understood regarding the development of different types of mental illness and resilience. It is estimated that one in five children transitioning to formal schooling meet criteria for a psychiatric disorder with impairment (Carter et. al, 2010) and the presence of psychopathology in childhood predicts DSM-IV disorders even 24 years later (Reef et. al, 2010). The economic impact of serious mental illness in the United States is estimated at upwards of \$317 billion per year (Insel, 2008). Understanding the risks, processes and outcomes associated with mental illness is paramount in the pursuit of alleviating the burden of mental illness for individuals and systems (Cicchetti & Rogosch, 1996).

The phenomena known as equifinality and multifinality account for both the common and diverse pathways that connect risk and protective factors to maladaptive and adaptive outcomes and are, therefore, a lens through which the processes integral in the development of psychopathology may be observed and better understood. Equifinality is the understanding that many different pathways, or risk factors, may result in the same outcome (Cicchetti & Rogosch, 1996). Multifinality is the understanding that a specific risk factor may result in a multitude of developmental outcomes (Cicchetti & Rogosch, 1996). While much research has been conducted on the general risk factors for psychopathology (Lengua, Honorado, & Bush, 2007), less is known about the specific processes that determine adaptive or maladaptive outcomes (Cicchetti & Rogosch, 1996) or the processes that differentiate the development of specific pathologies. It is

this understanding of the development of specific disorders that is imperative for prevention and intervention efforts (Marsh et. al, 2003).

Across a great deal of research literature a number of promising models have been proposed for potential mechanisms leading from general environmental risk to psychopathology but there is not one singular accepted model. Many of these models have identified significant correlates or predictors of psychopathology; however, they often ignore significant findings in other fields of study or even within their own field. A behavioral theory that does not account for physiology leaves itself vulnerable to arguments utilizing evidence of physical differences in anatomy or responsivity, likewise, a physiological model that does not account for social influences is limited in its ability to explain the function of physiological reactions in real world settings. The fields of neuroscience, psychology, and medicine have all made great advances in identifying potential mechanisms for the development of psychopathology, however, this has resulted in a complex literature plagued by both conflicting findings and overlapping, yet inconsistent, nomenclature. The lack of integration across medical, neurological, social and behavioral models and terminology contributes to silo effects that hinder the interpretation and utility of findings and limits advances in our understanding of the development of psychopathology. Synthesizing and integrating these fields of study is essential for advancing our knowledge of specific processes that determine adaptive or maladaptive outcomes or the processes that differentiate the development of specific pathologies.

### **Behavior Problems**

In the field of developmental psychopathology, there is a well-established literature on both internalizing and externalizing behaviors present in adolescent psychopathology.

Internalizing problems are characterized by withdrawn, fearful, anxious and depressed behaviors

and externalizing problems are characterized by hyperactive, defiant, delinquent and aggressive behaviors; both of these behavioral and emotional disorder profiles have been linked to poor social, cognitive, academic, functional and mental health outcomes (Achenbach, 1991; Evans & Frank, 2004; Fanti & Henrich, 2010). However, despite the extensive research examining the occurrence of internalizing and externalizing behaviors, there is disagreement on models explaining the co-occurrence of these behaviors (Evans & Frank, 2004; Little & Garber, 2005). Due to the opposing polarity of the behaviors that characterize internalizing and externalizing disorders (e.g. withdrawn behaviors or aggressive behaviors, respectively), models explaining the individual disorders often fail to account for the co-occurrence of these disparate behavior profiles. Contrary to these models explaining the development of either internalizing or externalizing disorders, research on adolescents has shown that not only do these disorders occur within the same individual, they co-occur with great frequency (Fanti & Henrich, 2010). In a study by Achenbach (1991) more than half of youth who were found to have high scores on the Child Behavior Checklist (CBCL) internalizing scale also had high scores on the externalizing scale. This finding extended to externalizers as well, with more than half of the youth with high externalizing scores also having high internalizing scores.

This co-occurrence is particularly concerning because outcomes for individuals with co-occurring internalizing and externalizing disorders are even worse than those seen for individuals burdened by either disorder alone. When compared with internalizing or externalizing disorders, individuals with co-occurring disorders demonstrate poorer social, cognitive and functional outcomes and are at increased risk for suicide and substance abuse (Little & Garber, 2005). Despite what is known about the outcomes for those with co-occurring disorders, the pathogenesis of this symptom profile is unknown and it remains unclear whether this is due to an

additive or interactive influence of internalizing and externalizing disorders or if this may be an altogether separate disorder. Examining the differences and commonalities demonstrated by those with internalizing, externalizing or co-occurring disorders, and healthy individuals may help to clarify the relationship between these disorders and their co-occurrence. Additionally examining the differences and commonalities among these four groups may augment our understanding of the pathogenesis of internalizing, externalizing and co-occurring disorders and reveal opportunities for prevention or intervention.

### **Nomenclature in the Study of Internalizing Disorders, Externalizing Disorders and Resilience in Youth**

Historically, research on the psychosocial risk factors for internalizing and externalizing disorders has identified general, putative risk factors that do not differentiate specific outcomes in psychopathology. Nascent research in the field has identified more proximal putative risk factors for psychopathology but has acknowledged that evidence is lacking for the mechanisms of pathogenesis (Shanahan, Copeland, Costello, & Agnold, 2008). As mentioned above, it is unlikely that any one risk factor results in the development of psychopathology and the field has called for research driven by theoretical frameworks that incorporate socio-biological development (Rutter, 2009). Researchers have identified the fields of stress responsivity and self-regulation as areas that are vital to the understanding of the development of psychopathology (Posner & Rothbart, 2000). These areas intersect social and biological systems and have therefore gained attention as areas of study that may shed light on the mechanisms of pathogenesis. Contextual risk factors may indicate a general vulnerability, however, it is processes such as self-regulation that may more clearly differentiate pathways of distinct adjustment outcomes. In line with a process orientation, recent research has demonstrated that

self-regulation is not only predictive of adaptive and maladaptive functioning, but that it has differentiated resilient and non-resilient responses to cumulative indices of contextual risk (Lenua, 2002). Taken together, the general association between psychosocial risk factors and the demonstrated evidence that self-regulation differentiates adaptive and maladaptive responses to such risk, indicate that examining processes involved in the development and functioning of self-regulation may improve our understanding of psychopathology and the equifinality and multifinality observed in the developmental psychopathology literature.

Numerous models have been put forth to explain the role of various risk factors and processes associated with the development of psychopathology, including models informed by emotional competence (see Saarni, 1999), control related beliefs (see Weisz, Weiss, Wasserman, & Rintoul, 1987; and Hann, Weisz, & Weiss, 2001), social information processing (Crick & Dodge, 1994), and cognitive appraisals (see Lazarus & Folkman, 1984). However, research in these areas has yet to demonstrate the presence of differentiating pathways from contextual risk factors to internalizing, externalizing, co-occurring, and resilient outcomes. This may partly be due to the fact that most research on the risk factors and correlates of psychopathology have focused on only internalizing or externalizing disorders, despite evidence of shared risk factors and common co-occurrence of internalizing and externalizing disorders (Garenefski, Kraaij, & van Etten, 2005). Furthermore, although there is evidence that individual differences in emotional competence, control related beliefs, social information processing, and cognitive appraisals influence psychological adjustment, research studies have not incorporated these models and examined their specificity of relations with resilience or internalizing, externalizing, or co-occurring psychopathology. The present study will apply these models to the examination

of the social, emotional, and cognitive aspects of emotion regulation and their association with the development of psychopathology

The present study will first review the relationship between emotion regulation and adjustment. Second, literature on specific social, emotional, and cognitive processes related to emotion regulation and contextual risk factors will be reviewed. A cognitive model of Socio-Emotional Self-Regulation Development will be presented that may be useful for the explication of the development of psychopathology. The proposed study will apply the model presented to examine the extent that contextual risk factors, emotion identification and general appraisal style are 'common' or 'specific' determinants of internalizing, externalizing, co-occurring, and non-clinical behavioral profiles.

### **Risk and Protective Factors Predicting Internalizing Disorders, Externalizing Disorders and Resilience in Youth**

Exposure to stress and adverse experiences has consistently been associated with poor adjustment (Compas et al., 2001; Lengua & Long, 2002; Grant, et al., 2003). Decades of research have illustrated that a connection exists between psychosocial risk factors and the development of psychopathology (Green et al., 2010; Carter et al., 2010). Understanding the role of these risk factors in the development of psychopathology has important implications for both theory and practice. Most models of developmental psychopathology count psychosocial risk factors as important factors in the development and maintenance of internalizing and externalizing disorders (Cicchetti & Toth, 1997; Grant et al., 2003; Oland & Shaw, 2005; Compas et al., 2001) Risk factors like poverty, interparental conflict, maternal depression, parental over-involvement, parental under-involvement, stressful life events, victimization, maltreatment or neglect, personal or parental chronic illness, and neighborhood violence have all demonstrated strong associations

with both internalizing and externalizing disorders (Oland & Shaw, 2005; Compas et al., 2001; Lengua & Long, 2002; Grant et al., 2003). Of the countless potential psychosocial risk factors, childhood adversities (CAs) have emerged as a group of experiences that have repeatedly been demonstrated to have significant associations with mental illness (Green et al., 2010; Kessler, Davis & Kendler, 1997; Kessler, Zhao, Blazer & Swartz, 1997). Consistent with the literature, research on retrospective reports of CAs has shown significant associations with adult mental illness (Green et al., 2010).

Historically most research on developmental psychopathology has examined psychosocial risk factors and CAs in an attempt to identify a specific link between a given risk factor and a disorder. Countless studies look at risk factors and their association with one form of psychopathology like depression, anxiety, conduct disorder or attention deficit hyperactivity disorder (Sander & McCarty, 2005; Merikangas, 2005; Wakschlag, Pickett, Cook Benowitz, & Leventhal, 2002; Banerjee, Middleton, & Faraone, 2007). Many other studies include multiple risk factors, multiple disorders, or both, but still attempt to identify a specific link between a given risk factor and a disorder. In review of the literature, Shanahan and colleagues identified risk factors that had documented associations with individual disorders in six categories: parental risk characteristics, socioeconomic disadvantage, non-intact family structure, stressful life events, family dysfunction, and peer and friendship problems (Shanahan, Copeland, Costello, & Angold, 2008). Shanahan and colleagues identified common risk factors linked with emotional disorders. Parental depression, socioeconomic disadvantage, stressful life events, maltreatment, sexual abuse, and poor family relationships were commonly associated with depression. Socioeconomic disadvantage, parental emotional problems, (threatening) life events, sexual abuse, and overprotective parenting were commonly associated with anxiety disorders

(Shanahan, Copeland, Costello, & Angold, 2008). Behavioral disorders were also reviewed by Shanahan and colleagues, with poor parental supervision, disturbed family relationships, parental criminality, being born to a teenage mother, association with deviant peers, neglect, and maltreatment commonly reported as risk factors for conduct disorder and/or oppositional defiant disorder. General adversity indices composed of poverty, parental psychopathology, family and marital conflict, and stressful life events, but no specific psychosocial risk factors were associated with attention deficit/hyperactivity disorder (Shanahan, Copeland, Costello, & Angold, 2008).

Research on the association between specific risk factors and/or specific disorders, like the studies included in the review by Shanahan and colleagues described above, has shown significant associations, however, those studies were limited in scope. Despite having robust associations with disorders, research has failed to identify developmental pathways between many of these risk factors and forms of psychopathology. Both prospective and retrospective research on risk factors and prevalence rates, incorporating multiple risk factors and disorders, has shown that CAs are general, putative risk factors that do not differentiate specific outcomes in psychopathology (Green et al., 2010; Kessler, Davis & Kendler, 1997; Drabick, Ollendick, & Bubier 2010; Cohen & Park, 1992; Grant et al., 2003). Indeed, research has shown that parental practices, hostility, discipline, psychopathology as well as stressful life events, poverty and peer rejection are all associated with both internalizing and externalizing disorders (Copeland et al., 2009). Furthermore, the National Comorbidity Survey Replication Survey (NCS-R), examining CAs in a nationally representative sample of over 5,000 adults living in the US, found remarkably little specificity with regard to unique effects of CAs on specific psychopathology (Green et al., 2010). Green and colleagues examined the joint associations of 12 retrospectively

reported CAs (i.e.: three types of interpersonal loss (parental death, parental divorce, other separation from parents or caregivers); four types of parental maladjustment (mental illness, substance abuse, criminality, violence); three types of maltreatment (physical abuse, sexual abuse, neglect); and two other CAs (life-threatening respondent childhood physical illness, extreme childhood family economic adversity)) with first onset of four broad classes of 20 specific disorders: Mood disorders (major depressive disorder, dysthymic disorder, bipolar I disorder (BP-I), BP- II, and sub-threshold BPD), anxiety disorders (panic disorder, agoraphobia without a history of panic disorder, generalized anxiety disorder, specific phobia, social phobia, post-traumatic stress disorder, separation anxiety disorder), disruptive behavior disorders (intermittent explosive disorder, attention-deficit/hyperactivity disorder, oppositional-defiant disorder, conduct disorder), and substance disorders (alcohol abuse, alcohol dependence with abuse, drug abuse, drug dependence with abuse) and found that most CAs examined were associated with all of the disorder classes even after controlling for the co-occurrence of CAs and comorbid child-adolescent disorders (2010).

In addition to abundant research indicating that most psychosocial risk factors are non-specific in their association, there is evidence that they are often clustered, with multiple risk factors occurring together (Lengua et al., 2007; Copeland et al., 2009; Green et al., 2010). Given the lack of specificity even when controlling for the presence of co-occurrence and the high rates of contextual risk factor co-occurrence, researchers have responded by commonly employing what is known as the cumulative risk model to the examination of psychosocial and contextual risk and psychopathology. Cumulative risk is a single indicator accounting for stable demographic, psychosocial and environmental risk factors like those presented above while accounting for their co-occurrence (Lengua et al., 2007). Research on cumulative risk in

cognitive, social, and behavioral problems in children has consistently demonstrated the relation of youth outcomes with the number of risk factors a child is exposed to rather than an emphasis on a single risk factor alone (Lengua et al., 2007).

Consistent with the theory that individual contextual risk factors are non-specific and that developmental outcomes are better predicted by combinations of risk factors, cumulative risk has been demonstrated to be an equal or better predictor of child outcomes than an individual risk factor approach and is well established as a useful approach for examining psychopathology (Appleyard, Egeland, Van Dulmen, & Sroufe, 2005). Furthermore, the utilization of the cumulative risk approach, summing up numerous CA's, permits for more parsimonious examination of statistical models of psychopathology than the inclusion of a multitude of individual risk factors with no specific association.

Although individual CAs fail to differentiate specific psychopathology, they remain strongly associated with mental illness (Green et al., 2010) and are therefore important to consider in models of psychopathology. It is possible that this strong putative association does not indicate a definitive causal relationship but rather an increased vulnerability to disrupted developmental processes responsible for diminished social and emotional functioning. In fact, many researchers believe it is individual differences in response to the stress of these risk factors and not the risk factors themselves that result in psychopathology. Additionally, psychosocial risk factors such as poverty are often the result of deeply rooted societal inequities that present major obstacles for intervention. Furthermore, the common clustering of these pervasive risk factors and their general association with psychopathology indicates that the prevention or intervention with a given risk factor is unlikely to be effective in the face of multiple risk factors. Examining the processes and mechanisms that predict when exposure to risk results in adaptive

or maladaptive outcomes may be more likely to result in targeted, effective, and feasible preventions and interventions. Examining individual differences in response to the stress of psychosocial risk factors may help us better understand the mechanisms of psychological adjustment or maladjustment.

### **Individual Differences in Stress Responsivity to Psychosocial Stressors**

Understanding developmental processes involved in individual differences in stress responsivity is critical for our understanding of the role of stressful early adversity in psychopathology risk and resilience. Research across medical and social science fields has identified the stress response system (SRS) as an area replete with both between- and within-individual variation that may inform models used in health and mental health research. In fact, the wide variation observed in SRS functioning and responsivity has repeatedly been demonstrated to have strong associations with psychological functioning, social relations and adverse health and mental health outcomes (Del Giudice et al., 2011; Porges & Furman, 2010). Early adverse experiences may disrupt the development of systems related to responsivity to stress or those engaged in self-regulation and therefore impact an individual's functioning.

The SRS is a biological system that is critical for survival and adaptive functioning. The SRS serves two broad functions: (1) coordinating physiological and behavioral responses to threats and opportunities observed in the environment and (2) encoding and filtering information from the environment (both social and physical). Three distinct, hierarchically organized, neuroendocrine circuits comprise the SRS: the sympathetic nervous system (SNS); the parasympathetic nervous system (PNS); and the hypothalamic–pituitary–adrenal axis (HPA). Despite being distinct circuits, these three components of the SRS are well integrated and perform cross-regulation for both rest and stress response processes (Del Giudice et al., 2011).

Depending on the context, intensity, and duration of a given stimulus, the SRS may activate one or more of its neuroendocrine circuits.

The PNS and SNS are both branches of the autonomic nervous system. The SNS is central in “fight or flight” responses and the complementary PNS primarily functions to facilitate “resting and digesting” functions and reduction of physiologic arousal. While sympathetic activity is often alluded to as the “gas” that is the activation system within the body, parasympathetic activity is often likened to a brake that modulates or regulates activity. Release of the parasympathetic brake allows for rapid orientation of attention and increases in arousal in response to environmental threats or opportunities. In contrast, the dampening influence the PNS has on sympathetic activation has been demonstrated to promote sustained attention, self-regulation, and social engagement (Del Giudice et al., 2011). The demonstrated importance of the SNS for self regulation, health and mental health outcomes is why the dysfunctional self-regulation associated with behavioral and emotional disorders is increasingly examined in association with physiological models of cardiovascular and vagal functioning (Forbes, Fox, Cohn, Galles, & Kovacs, 2006; Gentzler, Santucci, Kovacs, & Fox, 2009; Hastings, et al., 2009; Matthews, Salomon, Brady, & Allen, 2003; Rottenberg, Clift, Bolden, & Salomon, 2007; Salomon, 2005). This vagal activity modulating rest and reactivity is conceived of as a process integral to self-regulation and preservation of homeostasis according to Porges’ polyvagal theory (Porges, 1997). This vagal influence on rest and reactivity allows for the conservation of resources while at rest and incremental increases in attentional and behavioral reactivity as needed (Porges, 1997). One can deduce how under-reactive or over-reactive vagal influence in different states could adversely impact an individual, potentially resulting in burnout from

constant vigilance or anxiety even at rest or perhaps diminished motivation or response to a threat like failing to move out the way of an oncoming train.

Although the current research associating individual differences in SRS is encouraging for advancing our understanding of psychopathology, it has not been demonstrated to be predictive of different forms of psychopathology on its own. Although grounded in biological structures, the SRS is tightly linked to psychological processes. For example, the SRS not only responds to physical threats but responds to psychosocial stressors as well. Individual differences in physiological profiles may be influenced by appraisals of events or emotions. Examining the cognitive, social and environmental processes that influence the SRS are essential for understanding its adaptive and maladaptive functioning. The SRS is therefore commonly expanded upon in models of stress and coping, temperament, and self-regulation.

### **Stress and Coping**

As noted above, stress responsivity is not purely physiological. Most models of stress that account for the interaction between the individual and their environment are called interactional stress models (Folkman & Lazarus 1985; Folkman, Lazarus, Gruen, & DeLongis, 1986). These interactional models often emphasize the role of cognition. Cognitive theorists posit that reactivity to demanding or stressful situations is the result of cognitive appraisals of demands of a given task or situation and appraisals of associated potential impact on an individual's well being (Smith & Lazarus, 1993). Lazarus and Folkman expanded on cognitive appraisal theories with their transactional stress model (Lazarus and Folkman, 1984). The Lazarus and Folkman model describes stress as “an evaluative process that determines why, and to what extent a particular transaction or series of transactions between the individual, and the environment is stressful” (Lazarus & Folkman, 1984,p. 19). The transactional stress model holds that cognitive

appraisals of a situation and its potential impact on an individual are evaluated in the context of an individual's perception of the availability and adequacy of resources for coping with situational demands (Lazarus and Folkman, 1984). An individual's coping response to stress is initially determined by the subjective appraisal of the stressful event, and how an individual responds and adapts to stress (Durak, 2007; Karademas, & Kalantzi-Azizi, 2004). Following this model, the perception and management, of stress are all dependent on an individual's appraisal (Durak, 2007; Largo-Wight et al., 2005).

In the transactional stress model the appraisal process is broken down into *Primary Appraisals* and *Secondary Appraisals*. Primary Appraisals concern evaluations of physical and psychological demand and personal relevance of a given situation ( e.g., “Is this a threat to my physical or emotional well being?”). Secondary Appraisals concern evaluations of the resources required to meet a situational demand and an individual's available resources to effectively meet those demands.

There are three types of primary appraisals related to the relevance and potential stress for an individual: irrelevant, benign-positive, and stressful (Lazarus and Folkman, 1984). Situations that are not perceived as having the potential to impact an individual, and therefore carry no implications for their well being, are appraised as irrelevant. Situations that are perceived as having the potential to impact an individual but with positive implications for their well-being are deemed benign-positive attributions. Benign-positive appraisals are typically associated with positive emotions (e.g., joy or contentment). Lastly, situations that are perceived as having the potential to impact an individual but with potential risk for one's well-being, or the well-being of a loved one are appraised as stressful.

Stress appraisals are further broken down into appraisals of harm/loss, threat or challenge, which incorporate the adequacy of personal resources. An individual's response to a stressor is influenced by their perception of a stressor as a threat or a challenge (Lazarus and Folkman, 1984). The anticipation of harm or loss is associated with threat appraisals while the anticipation of gain or growth resulting in a positive outcome, despite being stressful, is associated with challenge appraisals. Threat appraisals are commonly associated with negative emotions (e.g., fear, anxiety, anger, frustration, etc.) whereas challenge appraisals are more commonly associated with positive emotions (e.g., excitement, eagerness, etc.).

Primary appraisal has been categorized and defined in different ways. Lazarus and Folkman pointed to the three categories of harm/loss, challenge, and threat (1984). However, Peacock and Wong removed the harm/loss category when they developed the most frequently used scale for assessing cognitive appraisals of events, the Stress Appraisal Measure (SAM; 1990). The harm/loss category was removed, as it was not considered an anticipatory measure, but rather the evaluation of a past event (Durak, 2007; Peacock & Wong, 1990). The dimension of centrality was added to assess perceptions of the importance of an event (Durak, 2007; Peacock & Wong, 1990). Centrality is an appraisal related to goals, beliefs, and commitments which may have consequences for an individual (King, 2005). Centrality is an appraisal of how significant or important an event is for one's self. Events evaluated as highly significant are more likely to result in stress reactions (Durak, 2007; King, 2005).

Evaluations of one's ability related to secondary appraisals center around what can be done to overcome the stressor or to obtain benefit. The three secondary appraisal dimensions are: self-control, other-control, and uncontrollability. Self-control refers to one's ability to overcome a stressor by oneself, while other-control refers to available resources, like sufficient social

support, to assist overcoming a stressor (Roesch & Rowley, 2005; Rowley et al., 2005).

Uncontrollability refers to an individual's evaluation of outcomes as attributable to internal or external resources or the predictability of an event and is associated with feelings of helplessness (Durak, 2007; Roesch & Rowley, 2005; Rowley et al., 2005).

Coping options are evaluated in the context of the individual's physical, cognitive, and social resources (Folkman & Lazarus, 1984) as well as memory of prior coping attempts, self-esteem and control related beliefs (Sarason, Levine, Basham, & Sarason, 1983; Han, Weisz & Weiss, 2001). Notably, individuals with psychopathology have poor recollection of positive coping attempts and positive events and report lower levels of anticipated pleasure when forecasting events (Kring & Caponigro, 2010) as well as dysfunctional beliefs related to their self-esteem and control (Han, Weisz & Weiss, 2001).

It is believed that these cognitive appraisals of events in the environment have greater influence over subsequent coping behavior than the events themselves (Lazarus and Folkman, 1984). It is therefore important to examine the link between cognitive appraisals and behavioral disorders. Individual differences in cognitive appraisals and factors contributing to appraisal processes may shed light on the multifinality observed in those exposed to common environmental risk factors.

Two major areas of study related to adjustment to psychosocial stressors, which contribute to individual differences in cognitive appraisals, are the study of self-regulation and emotionality. The closely related domains of self-regulation and emotionality have been identified as important potential influencers of appraisal and coping styles in response to stress.

## **The Role of Temperament, Self-Regulation and Emotionality in Stress Responsivity.**

The self-regulation literature overlaps considerably with the stress and coping literature and a singular, accepted process model does not yet exist. As described below, temperament, self-regulation and emotionality have been demonstrated to influence appraisals and subsequent coping behaviors.

Broadly defined, temperament is the behavioral and emotional style of an individual that is relatively stable across time and context (Rothbart & Bates, 1998). Temperament is thought to have a biological basis in systems like the SRS but can be modified by environmental influences (Rothbart & Bates, 1998). Temperament is conceptualized as neurobiological tendencies to react to surroundings, indicated by reactivity (similar to SRS term responsivity) or emotionality, which influence behavioral styles. As it relates to responsivity to psychosocial stressors, temperament may alter responsivity by moderating emotional states and coping efforts (Strelau, 1995). Furthermore, it has been asserted that characteristics of temperament may influence the development of cortical structures involved in the interpretation of both external information and internal stimuli and the establishment of interpretive patterns (Derryberry and Rothbart, 1997; Lengua & Long, 2002), or cognitive appraisals of events or emotion. Individual differences associated with temperament characteristics may influence appraisals of events and emotional reactions to events in response to stressors (Lengua & Long, 2002). However, the encoding and interpretation of both internal and external stimuli, as well as access to and choice of coping are impacted by emotionality and self-regulation (Lengua & Long, 2002). Self-regulation, therefore, is believed to modulate the influence of reactivity and emotionality on behavior.

## **Self-Regulation Processes Developing and Maintaining Psychopathology**

Recent research on the development of psychopathology has emphasized the importance of self-regulation (*see* Boekaerts et al., 2000). Self-regulation is a broad term that has been defined as psychological processes modulating physiological, affective, cognitive, and behavioral states in response to stressors or changes in the environment that enable an individual to guide goal directed behavior (Rothbart & Bates, 1998; Karoly, 1993). It is believed that self-regulatory processes are evolutionarily adaptive systems that develop over time to promote adaptive responses to the environment (Rothbart & Bates, 1998; Bronstein & Suess, 2000). Theorists posit that in order to successfully function within their environment and meet the basic physiological needs of internal systems, like respiration and digestion, individuals must develop regulatory skills to process the demands of both internal and external stimulation (Rothbart & Bates, 1998; Bronstein & Suess, 2000). Physiological and psychological activation in response to signals from internal systems and external processing systems is often called arousal. Self-regulation is defined as the processes by which this arousal or reactivity is modulated and when this process is deliberate it is often called self-control or effortful control (Vohs, 2010). Self-regulatory processes are engaged when there is a balance shift between internal and external demands or when goal directed behavior becomes significant (e.g. the maintenance of long-term goal related behavior despite short-term physical discomfort, the emergence of a threat or challenge).

In fact, many neurobiological models assume that early adverse experiences stemming from the environment disrupt the development of the SRS and self-regulation (Boyce and Ellis, 2005; Del Giudice et al., 2010; Davies, Winter, & Cicchetti, 2006). According to these models, early adverse experiences may impact the functioning of multiple physiological systems; either

fortify existing over- or under- reactive SRS tendencies or contribute to their development (Boyce and Ellis, 2005; Del Giudice et al., 2010; Davies et al., 2006). Perhaps the early adverse experiences that are associated with general psychopathology are risk factors for the SRS and self-regulation systems which then influence the development of more specific forms of psychopathology.

The dysfunctional behavior that characterizes internalizing, externalizing and co-occurring behavioral disorders is strongly associated with self-regulation and theorists believe psychopathology is a result of self-regulatory failure (Bronstein & Suess, 2000; Eisenberg, et al., 2000; Porges & Furman, 2010). Aspects of self-regulation, such as effortful control, have even been demonstrated to differentiate, generally, resilient and non-resilient responses to socioeconomic, maternal, and environmental risk factors as well as indices of cumulative risk (Lengua et al., 2008; 2007; Lengua, 2001). The ability of an individual to regulate behavior in a socially adaptive way is essential for meeting their internal needs throughout the lifespan but especially important during early development (Porges & Furman, 2010). At birth, infants cannot care for themselves and require a caregiver to provide food and protection for survival. However, self-regulatory attempts to control arousal can already be seen early in development such as behaviors like gaze aversion and self-stimulation observed in infants, and continue to develop in early life (Thompson, 1998; Porges & Furman, 2010). As infants develop self regulatory skills they do not cease the need for social connection, their social connection needs shift as they develop greater cognitive and motor capacities that increase their own abilities to meet their needs as well as social engagement abilities (Porges & Furman, 2010). Diversification of social connections decreases dependency on a single biologically connected caregiver and permits multiple environmental influences on development, which may diminish deleterious effects of a

deficient biological caregiver or mitigate effects of loss of a caregiver. Social engagement remains important throughout development and social engagement and self-regulation are closely linked. In fact, disrupted social engagement has been associated with poor mental, physical health across the lifespan (Porges & Furman, 2010). The vital ability to regulate behavioral state is directly related to cognitive, physiological, social and emotional development and regulation (Zimmerman, 2000; Porges & Furman, 2010; Thompson, 1998; Cole, 2004).

### **Social Cognitive Models of Self-Regulation**

Social cognitive models of self-regulation emphasize the importance of incorporating both information from the external environment and internal information from the self to adjust and regulate accordingly in pursuit of goals. Social cognitive models of self-regulation uniquely account for the interaction of personal, behavioral, and environmental processes while additionally going beyond conceptualizations limited to only behavioral skill, by accounting for knowledge and sense of agency to employ skills in appropriate contexts (Bandura, 1986; Zimmerman, 2000). From this perspective, there is cyclical adaptation of the self-generated thoughts, feelings and actions comprising self-regulation in the pursuit of personal goals (Zimmerman, 2000). This cyclical adaptation uses feedback from three self-oriented feedback loops that process information regarding personal, behavioral and environmental factors to adjust performance (Zimmerman, 2000). *Behavioral self-regulation* involves monitoring and adjusting performance processes, such as social interactions, whereas monitoring and adjusting cognitive and affective states is part of *covert self-regulation* (Zimmerman, 2000). Monitoring and adjusting environmental conditions, such as noise level when trying to concentrate or the reactions of peers, is part of environmental self-regulation (Zimmerman, 2000). Zimmerman

asserts that the accuracy of self-monitoring these triadic self-control domains directly influences an individual's self-regulation and self-efficacy beliefs (2000).

These self-regulatory processes and related beliefs are thought to cut across three cyclical phases and this framework is useful for understanding how triadic processes regulating behavior, cognition and affect relate to the development and maintenance of psychopathology. The first of the three cyclical phases is forethought. Forethought involves the processes that influence efforts to act, like interpretation of social and emotional information, cognitive appraisals and control related beliefs. The performance (or volitional control) phase refers to the actual regulatory attempts like physical efforts that affect attention and behavior. The self-reflection phase refers to processes evaluating performance efforts once they have concluded and, subsequently, impact an individual's response to stimuli. These self-reflections then continue the self-regulatory cycle by contributing to forethought processes and corresponding performance efforts (Zimmerman, 2000). Though a cyclical process, the forethought phase sets the stage for subsequent efforts and their accompanying reflection phase. It may be that the interpretation of social and emotional information, the cognitive appraisals and control related beliefs of the forethought phase of self-regulation, are the critical individual differences contributing to the development of psychopathology.

### **Emotion Regulation Processes in Development and Maintenance of Psychopathology**

Recent research on the development of psychopathology has emphasized the importance of a particular aspect of self-regulation termed emotion regulation (recent Garber REF and Cichetti REF). Broadly, emotion regulation is conceptualized as “processes responsible for monitoring, evaluating, and modifying emotional reactions... to accomplish one's goals” (Thompson, 1994). Emotion regulation deficits have been linked to poor psychological

(Garnefski et al., 2005), social (Ciarrochi et al., 2008), academic (REF), and health outcomes (REF). Psychopathology associated with self-regulation deficits has been demonstrated to result from either misregulation or underregulation of emotional reactions (Baumeister et al., 1994). Internalizing problems are thought to be associated with overcontrol or misregulation of emotion, while externalizing problems are associated with undercontrol (Zemen et al., 2002).

Despite the established importance of emotion regulation, this body of research has not been demonstrated to differentiate pathways leading to development of distinct profiles of behavioral dysfunction such as internalizing, externalizing or co-occurring disorders. Identifying individual differences involved in emotion regulation processes and the mediators of those processes may improve our understanding of the development of psychopathology and potentially improve diagnostic and treatment services.

### **Emotion Competence and Social Cognition**

There are three processes involved in emotion-regulation that have been identified as integral to emotion regulation: emotion identification, emotion expression management and emotion coping (Zemen et al., 2002). Emotional identification, also referred to as emotional awareness or emotional perception, is the ability to identify emotional experience of self or others (Zemen et al., 2002). Emotion expression management refers to one's attempts to inhibit or intentionally engage in emotion display (Zemen et al., 2002). Emotion coping refers to attempts to manage emotional experience (Zemen et al., 2002). Emotional identification is critical for the subsequent phases of emotion regulation.

For an individual to effectively engage in emotion regulation, emotion identification is required. Research on emotion identification skills has demonstrated that a distinct association exists between emotion identification difficulties and maladaptive outcomes in multiple stages of

development. Zemen and colleagues found that emotional state identification deficits were predictive of externalizing behavioral problems in children (2002). Poor emotion identification skills have also been demonstrated to predict increases in negative affect, decreases in positive affect and decreases in the quantity and quality of social support in adolescents (Ciarrochi et al., 2008). The study by Ciarrochi and colleagues was influenced by and consistent with previous work illustrating that emotion identification deficits in adults have been associated with difficulties in emotion regulation and the establishment and maintenance of social relationships (Taylor, Bagby, & Parker, 1997; Ciarrochi, Scott, Deane, & Heaven, 2003; Kauhanen, Kaplan, Julkunen, Wilson, & Salonen, 1993). Furthermore, difficulties identifying and expressing emotions have also been associated with higher levels of psychological distress and behavioral problems in adults (Kerr, Johnson, Gans, & Krumrine, 2004; Zeitlin & McNally, 1993; Taylor, 2000).

In addition to the established literature demonstrating associations between emotion identification deficits within the self and psychopathology, research has demonstrated similar deficits in individuals' ability to correctly identify the emotions of others. There is a well-established literature on the associations between perceptions of the emotional behavior of others and internalizing and externalizing problems (Orobio de Castro, Veerman, Koops, Bosch, & Monshouwer, 2002). Similarly, individuals with mood disorders also exhibit deficits in facial emotional expression recognition (Leppanen, 2006).

A theory of emotional competence development by Saarni and colleagues, asserts that multiple competence dimensions evolve throughout the lifecycle (Saarni, 2000; Bukley & Saarni, 2006). Two of these social competence dimensions, awareness of one's emotional states and skill in using the vocabulary of emotion and emotion expression, are particularly relevant to

emotional identification. According to this framework, development of emotional competence progresses from an awareness of emotional responses, to an ability to communicate emotions and precipitants, then to an ability to evaluate the self and experienced emotions, to an awareness of mixed or multiple emotions, and finally, to an awareness of emotional cycles involving emotions in response to the experience of emotions (e.g., anger about experiencing feelings of shame) (Ciarrochi et al., 2008; Saarni, 2000; Bukley & Saarni, 2006). Poor emotion awareness and identification may alter an individual's appraisal of a situation and negatively impact their performance and self-reflection phases of self-regulation.

A similar, cognitive, model posited by Lane and colleagues extends emotional identification beyond self-awareness to the awareness of others (Lane et al., 1990). This model follows a similar progression from lack of awareness, to awareness of general, undifferentiated states of positive and negative affect, to identification of specific feelings, then to awareness of mixed or multiple emotions, to identification of mixed or multiple emotions in the self and others, and ultimately to the differentiation of feelings experienced in the self from those in others (Ciarrochi et al., 2008; Lane et al., 1990). Poor emotion identification or differentiation may alter an individual's appraisal of a situation and negatively impact their performance and self-reflection phases of self-regulation. If an individual inaccurately perceives the emotion displays of others as more critical or threatening they may perceive a social interaction as threatening and engage in withdrawal behaviors or aggressive behaviors. As emotionality and self-regulation processes are thought to be critical aspects of individual differences in response to stress due to their assumed role in the appraisal and coping styles associated with maladaptive or resilient adjustment (Lengua, 2002), understanding contributors to those individual differences is

essential. Cognitive and skills deficits in emotion identification may contribute to individual differences in self-regulation processes and associated psychopathology.

Despite the recognized importance of emotion identification and its association with psychopathology, the differential predictive ability of emotion identification and its specificity of relations with internalizing, externalizing, co-occurring, and non-clinical behavioral profiles have not been established. Examining individual differences in emotion identification may help to identify differential processes of self-regulation involved in psychopathology.

If delays or deficits occur across the developmental stages of emotional identification, there may be repercussions in the subsequent emotion regulation processes contributing to maladaptive outcomes. Consistent with this formulation is the two-stage model of emotion regulation developed by Larsen, asserting that identification of an emotion is the precursor to the subsequent engagement of cognitive and behavioral processes involved in affect management (2002). It is likely that deficits in emotion identification would negatively impact the cognitive and behavioral processes involved in affect management. Furthermore, emotionality and self-regulation have not only been demonstrated to influence the encoding and interpretation of both internal and external stimuli, they also influence the availability and selection of responses (Lengua, 2002; Derryberry & Rothbart, 1997; Lemerise & Arsenio, 2000). If emotion identification is the link between the experience of emotionality and the encoding and interpretation of events, it may also influence later phases of emotion regulation.

By influencing the interpretation and encoding of events, emotion identification deficits related to both self and others may influence cognitive processes involved in the appraisals of events. Walden asserts that appraisals consist not only of information related to an event, but are largely influenced by expectations established prior to an event (1993). With regard to emotional

self-awareness, difficulties in emotion identification may result in errors interpreting emotional stimuli of events and potentially the encoding and recall of events involved in appraisals. For example, if a child struggles to specifically identify an experienced emotion, they may not be able to differentiate the degree of threat associated with that emotion from other emotional experiences; they may struggle to differentiate “feeling bad” as the result of being disciplined by a teacher from “feeling bad” in response to serious abuse. This undifferentiated emotional identification may lead to similarly undifferentiated encoding and recall, leading to an overgeneralization of potential for threatening experiences. If deficits and attributional inaccuracies are not addressed, over time this overgeneralization may contribute to the development of maladaptive attributional styles.

Similarly, an inability to differentiate feelings experienced in the self from those in others may lead to inaccurate interpretations of social interactions. An inability to differentiate the emotion experienced as the result of an interaction from the intent of others in the interaction may lead to inaccurate interpretations of events. This is evidenced in the social information processing literature that demonstrates children with internalizing and externalizing problems consistently make inaccurate interpretations and attributions of the behavior of others (Crick & Dodge, 1994; Dodge et al., 2003). For example, an individual may perceive a hostile intent in another because of the way they feel as opposed to accurate environmental cues as to the intent of others. Once hostile attributional styles develop, individuals may attend to what they perceive as more hostile stimuli, which confirms their beliefs and influences expectancies in future situations. This negative appraisal style filters interactions and reduces the likelihood an individual will accurately perceive information in the interpersonal environment and learn from interactions and overcome deficits.

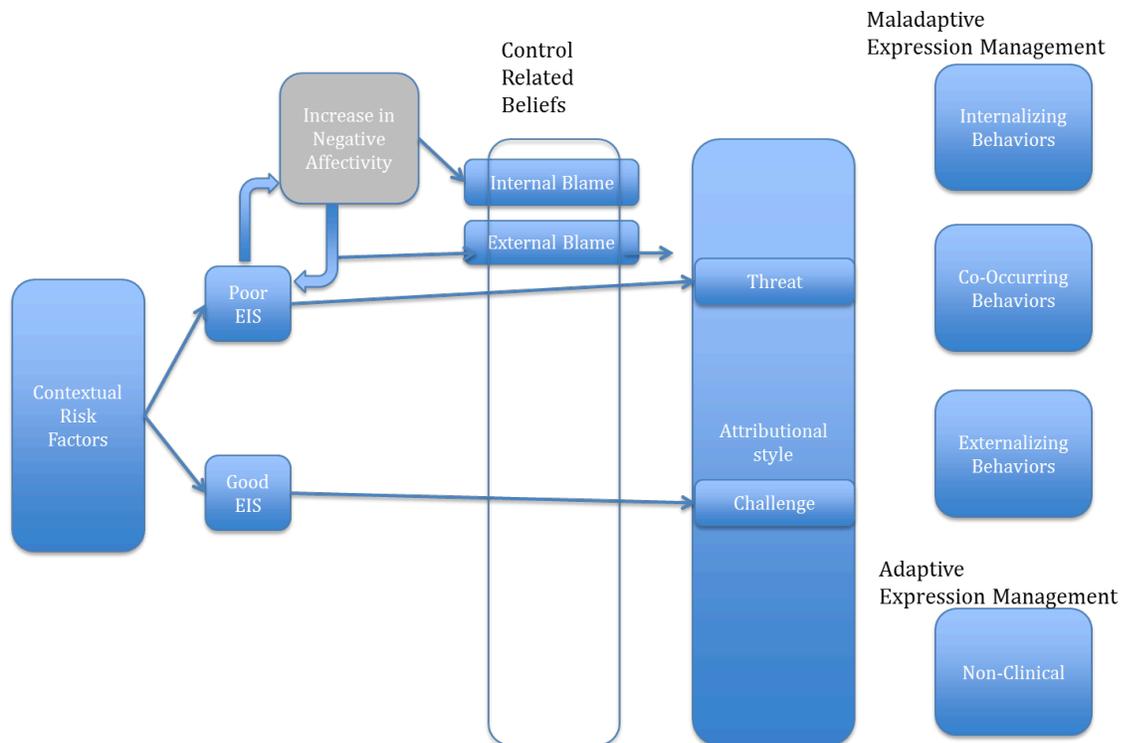
In addition to influencing cognitive styles involved in appraisals of events, emotion identification deficits may also impact the cognitive and behavioral processes involved in emotion regulation management strategies and coping strategies. Undifferentiated emotions or a paucity of identifiable emotions may also lead to a corresponding undifferentiated (or poor) use of or limited number of emotion regulation management strategies or coping styles. Research has demonstrated emotionality is associated with appraisals and coping styles and has demonstrated that it is predictive of adjustment problems above the effects of negative life events (Lengua & Long, 2002). Differences in the influence of emotionality due to emotion identification skills may contribute to these differences. These individual differences may represent a mechanism for the development of psychopathology from negative life events to deficits in emotional competence, and these emotional processing deficits may drive the development of maladaptive attributional styles and subsequent adjustment problems.

### **The Current Study**

Despite extensive research in the fields of emotional competence, cognitive appraisals, and childhood adversities, these fields have not developed a generally accepted model of psychopathology that sufficiently explains the development of internalizing and externalizing psychopathology. To date no studies have examined the specificity of relations of emotion perception, emotion expression management and general appraisal style in conjunction with contextual risk factors to differentiate internalizing, externalizing, co-occurring and non-clinical behavior patterns. Although common risk factors and the emotion regulation processes discussed have been associated with general psychopathology or specific disorders, they have not been examined concurrently to differentiate internalizing, externalizing, co-occurring, and non-clinical behavioral profiles. Identifying substrates that differentiate resilience and specific areas of

psychopathology may shed light on the development and maintenance of psychopathology and provide insight for the development of more targeted preventative and curative interventions.

The present study cross-sectionally examined the specificity of relations between emotion regulation processes and psychological adjustment in the context of putative risk factors. Specifically, the extent that contextual risk factors, emotion identification and general appraisal style are ‘common’ or ‘specific’ determinants of internalizing, co-occurring, and non-clinical behavioral profiles. As many psychosocial risk factors are often wide-spread and deeply rooted in societal frameworks as well as non-specific in their association with psychopathology, they can be costly or difficult to address. If the present study can identify processes that confer additional risk for those exposed to psychosocial risk factors or processes that promote resilience, it may have important implications for the prevention and treatment of psychopathology.



**Figure 1. Psychological Processes in the Development of Psychopathology**

## Study Aims

**Specific Aim 1:** *To examine the association between psychosocial risk factors and internalizing, externalizing and co-occurring disorders and individuals without clinically significant psychopathology problems.*

Exposure to stress and adverse experience has been demonstrated to be predictive of poor mental health, social, emotional, and cognitive functioning (Compas et al., 2001; Lengua & Long, 2002; Grant, et al., 2003). As described above, cumulative risk, an indicator of stress exposure and psychosocial risk, is generally predictive of psychopathology. As such, cumulative risk should be associated with emotion competence, appraisal style, and levels of psychopathology.

**Hypothesis 1:** Cumulative risk will be positively correlated with internalizing problems, externalizing problems, co-occurring problems, total problems, threat appraisal style, and centrality appraisals, whereas cumulative risk will be negatively correlated with emotion identification skill, challenge appraisals, and resource appraisals.

**Specific Aim 2:** *To examine whether individual differences in psychological processes can differentiate groups with internalizing, externalizing and co-occurring disorders and individuals without clinically significant psychopathology problems.*

Research has demonstrated that cognitive and emotional processes predict psychopathology. However, how well these processes are able to differentiate different forms of psychopathology is less clear. This study aims to examine whether the four mental health status groups (internalizing, externalizing, co-occurring and non-clinical) can be

differentiated on the basis of variables that have been theoretically and/or empirically associated with mental health outcomes.

**Hypothesis 2A:** Childhood adversity, emotion identification (both self and others), and appraisal style (primary and secondary) will significantly discriminate between the four mental health status groups.

**Hypothesis 2B:** Emotion identification (both self and others), and appraisal style (primary and secondary) will have larger structure coefficients, than childhood adversity, indicating that they are more important for discriminating between the four mental health status groups.

**Specific Aim 3:** *To examine whether individual differences in some psychological processes are more important for predicting some forms of psychopathology than others.*

Although cumulative risk is predictive of psychopathology, it cannot discriminate forms of psychopathology. Emotional competence and appraisal style have strong associations with psychopathology, however, their ability to differentiate internalizing psychopathology, externalizing psychopathology, co-occurring psychopathology and absence of clinically significant psychopathology when accounting for cumulative risk has not been examined. Cumulative risk exposure has been demonstrated to be predictive of poor social-emotional competence (Sameroff et al., 1997). As described above, poor emotional competence, such as emotion identification deficits, may introduce bias during cognitive appraisals. Therefore, emotional competence should have predictive ability

beyond that of cumulative risk. Furthermore, appraisal style should have predictive ability beyond that of cumulative risk .

**Hypothesis 3A:** Deficits in self emotion identification and a threat appraisal style will predict internalizing disorders from the other three groups while childhood adversity will not.

**Hypothesis 3B:** Deficits emotion identification for others and a threat appraisal style will predict externalizing disorders from the other three groups while childhood adversity will not.

**Hypothesis 3C:** Deficits in emotion identification for both self and others and a threat appraisal style will predict co-occurring disorders from the other three groups while childhood adversity will not.

**Hypothesis 3D:** Low childhood adversity, strong emotion identification and challenge appraisal style will predict the non-clinical group from the other three groups.

## METHOD

### Participants

Participants were undergraduate students recruited from the undergraduate psychology participant pool from the University of South Florida using the SONA participant management system. Only participants who were currently enrolled at USF, were 18+ years of age, and fluent and literate in English were included in the study. No other exclusion criteria were in place for the study. Participants were not provided any financial reimbursement but were remunerated with extra credit based upon each instructor's course policies.

In total, 158 participants met criteria for valid responses to the survey (see Data Screening section for a detailed description of procedures). The majority of participants were female (89. 2%), Caucasian (69. 6%), and exclusively heterosexual (93%). Class year was distributed relatively equally across participants with 67.7% of the sample in years 1-3 of college. There was also some diversity in living arrangements, but the majority of participants lived off-campus or at home with family (63. 8%). Please see Tables 1 and 2 for additional details.

### Measures

*Demographics* Demographic information, such as age, gender, sexual orientation, race/ethnicity, year of school, and living situation were obtained via questionnaire (See Appendix A).

*Revised Stress Appraisal Measure (RSAM; Roesh and Rowley, 2005).* This self-report measure (adapted from Peacock & Wong, 1990) was used to assess cognitive appraisal of stress. The SAM is a 19-item Likert-type scale for which items are rated from 0 (not at all) to 4 (extremely/ a great amount) and takes approximately 10 minutes to complete. This multidimensional scale measures primary appraisal (threat, challenge, and centrality) and secondary appraisal (resources or perceptions of control related to self, other, or uncontrollability) of a stressful situation. Reliability coefficients for the various scales range from .65 to .90.

Previous research has shown this measure to be valid and show adequate internal consistency for each of its subscales: Challenge ( $\alpha = .85$ ), Threat ( $\alpha = .79$ ), Resources ( $\alpha = .72$ ) and Centrality ( $\alpha = .75$ ) (Roesh and Rowley, 2005). The convergent and discriminant validity of the revised SAM was supported and each factor demonstrated the expected relationship to anxiety. Significant positive correlations were found between threat and centrality and anxiety, while challenge and resources were negatively related to anxiety (Roesh and Rowley, 2005).

*Diagnostic Assessment of Nonverbal Affect-2 (DANVA-2; (Nowicki & Carton, 1993).* This performance based measure was used to assess an individual's ability to perceive emotional information. The DANVA-2 has four subtests: Adult Facial Expressions, Child Facial Expressions, Adult Paralanguage (tone of voice), and Child Paralanguage. The 24 items in each subtest consist of six happy, six sad, six angry, and six fearful expressions, equally distributed between high or low intensity. The Facial Expression subtest involves the presentation of 24 images (via computer) and each participant views the picture for a period of approximately four seconds, then the stimulus is removed and the participant responds by selecting an emotion choice displayed on the computer screen. For the Paralanguage subtest, participants listen to

male and female actors state “I am going out of the room now, and I’ll be back later.” in a happy, sad, angry, or fearful tone of voice and the participant responds by selecting an emotion choice displayed on the computer screen. Responses were in forced-choice format, requiring participants to decide between happy, sad, angry, and fearful. Previous research has shown that the DANVA-2 has strong psychometric properties. The DANVA-2 has been supported as having adequate convergent validity with the original DANVA scale, with both the adult and child facial expression subtests being significantly correlated in a college sample ( $r = .51$ ;  $r = .44$ , respectively) (Nowicki & Carton, 1993). The initial DANVA had adequate psychometric properties but facial expression and paralanguage recognition scales were created to improve reliability and validity (Nowicki & Duke, 1994). Research on college students demonstrated adequate internal consistency for the Adult Facial Expressions subtest ( $\alpha = .77$ ) and Child Facial Expressions subtests ( $\alpha = .74$ ) (Nowicki & Carton, 1993). Test-retest reliabilities over a two-month period in college students on the Adult Faces was .84 and .was .88 on Child Faces (Nowicki & Carton, 2001). Internal consistency was also adequate for the Adult Paralanguage subtest ( $\alpha = .78$ ) and Child Paralanguage subtest ( $\alpha = .73$ ) (Rothman & Nowicki, 2004). Test-retest reliabilities over a four week period in college students on the Adult Paralanguage subtest was .93 and Child Paralanguage subtest was .78 (Rothman & Nowicki, 2004).

*Trait Meta-Mood Scale (TMMS;* (Salovey, Mayer, Goldman, Turvey, & Palfai, 1995). The TMMS is a 30-item self-report measure based on the Mayer Salovey model of emotional intelligence. TMMS subscales include: Attention - 13 items (8 reverse scored); Clarity - 11 items (5 reverse scored); Repair - 6 items (2 reverse scored). The Attention subscale relates to how much attention participants pay to their own feelings with items such as “I pay a lot of attention to my feelings.” The Clarity subscale relates to clarity of feelings with items like “I am usually

very clear about my feelings.” The Repair subscale relates to attempts to repair unpleasant moods or maintain pleasant ones with items like “When I become upset, I remind myself of all the pleasures in life.” The Participants indicate their level of agreement with each statement on a 5-point Likert scale ranging from “strongly disagree” (1) to “strongly agree” (5). Internal consistencies for the TMMS were adequate for the Attention ( $\alpha = .86$ ), Clarity ( $\alpha = .88$ ) and Repair ( $\alpha = .82$ ) subscales. This scale has been shown to have adequate discriminant and convergent validity in an undergraduate sample (Salovey et al., 1995).

*Adult Self-Report (ASR; Achenbach & Rescorla, 2003).* The ASR was used to evaluate internalizing, externalizing, and total problems. The ASR provides standardized ratings of the adaptive functioning strengths and problems of adults. The ASR is composed of 126 items. The ASR is a revised version of the Young Adult Self-Report (YASR) normed for ages 18 to 30. In response to statements on the questionnaire, participants circle 0 (the statement is not true for self), 1 (the statement is somewhat or sometimes true), or 2 (the statement is very true or often true) (Achenbach & Rescorla, 2003).

Normed scales of the ASR include adaptive functioning, empirically based symptoms, substance use, internalizing, externalizing, and total problems. There are eight subscales of the ASR measuring anxious/depressed, withdrawn, somatic complaints, thought problems, attention problems, aggressive behavior, rule-breaking behavior and intrusive behavior. The ASR Internalizing scale measures anxious/depressed, withdrawn, and somatic behaviors and complaints, while the Externalizing scale measures aggressive behavior, rule-breaking behavior, and intrusive behavior (Achenbach & Rescorla, 2003).

The reliability and validity of the ASR are well established. The reliability of the ASR was assessed with internal consistency and test-retest reliability. Internal consistencies were

strong for internalizing ( $\alpha = .93$ ), externalizing behavior ( $\alpha = .89$ ) and total problems ( $\alpha = .97$ ). The ASR demonstrated very high test-retest reliability. The one-week test-retest reliability for internalizing behavior and externalizing behavior was .89 and .94, respectively (Achenbach & Rescorla, 2003).

The validity of the ASR items is demonstrated by their ability to discriminate between referred and non-referred samples that are demographically similar. Lastly, the content validity of the ASR was supported by an expert panel that evaluated the items as very consistent with DSM-IV diagnostic categories (Achenbach & Rescorla, 2003). Convergent validity was quite good, established via significant associations with the Beck Depression Inventory, the Beck Anxiety Inventory, the MMPI, and the SCL-90-R (Achenbach & Rescorla, 2003).

*Cumulative Childhood Adversity.* Following methods outlined by Trentacosta and colleagues (Trentacosta et al., 2008), a cumulative risk index was generated composed of seven indicators of socio-demographic risk: 1) teen parent status; 2) primary caregiver education level; 3) single adult in the home; 4) household overcrowding; 5) household member legal conviction; 6) primary caregiver drug or alcohol problem; and 7) neighborhood dangerousness. Families receive a score of '1' for each indicator if present or a score of '0' if absent. For indicators 1-6. To assess indicator 7, neighborhood dangerousness, the Screen for Adolescent Violence Exposure (SAVE; Hastings & Kelley, 1997) was used. A point will be given if respondents score within one standard deviation or more above the sample mean on the SAVE. The SAVE is a 32 item measure with a 5-point Likert type scale that assesses violence exposure across school, home, and neighborhood settings. The SAVE assess three violence exposure factors across each setting including: Traumatic Violence (severe victimization experiences), Indirect Violence (witnessing or being informed of a less severe interpersonal violence), and Interpersonal

Aggression (threatened harm directed at the participant). The SAVE has demonstrated acceptable reliability and validity. Internal consistency alphas of the SAVE ranged from .65 to .95. And test-retest coefficients were acceptable, ranging from .53 to .92.

### **Procedures**

Participants who signed up for the study were directed to an online informed consent form explaining the background, purpose, procedures, risks and benefits, participant rights, and confidentiality policies of the study. Once consented, participants were directed towards an online-based survey form to complete the study measures. The full survey took approximately 40-60 minutes to complete. Participants were not required to complete the survey to receive extra credit and could stop at any time. Following completion of the survey, participants were directed to a debriefing form explaining the purposes of the study. Because the survey asks about mental health symptoms, upon completion participants were directed to a resource form with contact information for local resources such as the USF counseling center and the National Suicide Prevention Lifeline 1-800-273-TALK (8255). All data from the study was identified only by an anonymous code unconnected to any identifying information. Data was stored on a secured, password protected server with access granted only to authorized research personnel. All consent data was stored in locked filing cabinets separate from participant study data.

### **Data Analysis**

Upon the completion of data entry, subtest scores were calculated from the individual items of the measures. Descriptive statistics were run on all demographic variables and subtest scores to obtain means (continuous variables) or frequencies (categorical variables), standard deviations, and ranges. To evaluate Aim 1 simple correlation analyses were conducted to examine the association between variables.

Discriminant function analysis (DFA) was used to test the multivariate hypotheses in this study (Aim 2). Discriminant function analysis is a statistical technique used to identify dimensions that classify group membership, reliably and accurately, based on a combination of measured, continuous variables (Garson, 2012; Huberty & Hussein, 2003; Mertler & Vannatta, 2002). DFA is used to determine which variables discriminate between two or more naturally occurring groups. The main purpose of DFA is to predict group membership (a categorical variable) based on a linear combination of a set of continuous variables. If there are more than two categories for the specified grouping variable, the procedure is considered “multiple discriminate analysis” (MDA). Whereas, if the specified grouping variable only has two categories, the procedure is considered “discriminate analysis” (DA). In this study, MDA informed how well the variables in the study (childhood adversity, emotion identification of both self and others, and appraisal style) predicted membership into one of the three mental health status groups (internalizing, co-occurring and non-clinical). Wilks’ lambda was used as a measure of the discriminating power of the predictor variables, with values near zero denoting higher discrimination.

A number of assumptions must be met in order to use DFA. Firstly, the maximum number of independent or discriminant variables must be  $N-2$ , with  $N$  being the overall sample size. With four independent variables, a sample size greater than 6 is required. This was easily addressed with the sample of 200. Additionally, unequal group sizes (90:10 or better) are acceptable in DFA as long as the sample size of the smallest group exceeds the number of predictor variables. This assumption was easily satisfied given the low number of predictor variables. Thirdly, DFA is highly sensitive to heterogeneity of variance-covariance matrices and a Box’s Test of Equality of Covariance Matrices was conducted to test homogeneity. Finally,

DFA assumes that there is no multicollinearity among the independent variables. Correlations were examined to ensure that the independent variables were not highly correlated.

The DFA process was conducted in two steps: 1) testing the significance of a set of discriminant functions and 2) determining group classification using the discriminant functions that emerge during the first step. In the first step, the DFA procedure examined whether there were any significant differences between the groups (internalizing, co-occurring and non-clinical as determined by the ASR) on the independent variables (childhood adversity, emotion identification and appraisal style). When the multivariate test demonstrated significance, mean differences across groups were examined. In the second stage the predictor variables were examined to determine how well they predict outcome classification. In this step, each case was placed within one of the groups based on classification scores determined by the canonical functions in step 1, and the outcomes of the classification process were examined. From this procedure, a percentage rate of classification may be obtained.

To evaluate Aim 3, logistic regression was used to predict the odds of each form of psychopathology based on the predictor variables. Several procedures were conducted as precautionary data checks following the general approach to logistic regression described by Menard (1995). A thorough examination of Studentized residuals, the leverage statistic, and the DBETA was conducted. Using the .05 level of significance, three separate regression models were run. In the first model, the dependent variable, internalizing versus all other groups, was regressed on the predictor variables of childhood adversity, emotional competence and appraisal style. In the second model, the dependent variable, externalizing VS all other groups, was planned to regress on the predictor variables of childhood adversity, emotional competence and appraisal style, however this group was eliminated. In the third model, the dependent variable,

co-occurring VS all other groups, was regressed on the predictor variables of childhood adversity, emotional competence and appraisal style. In the fourth model, the dependent variable, non-clinical VS all other groups, was regressed on the predictor variables of childhood adversity, emotion identification and appraisal style.

## RESULTS

### Data Screening

Total scores and subscale scores were calculated following scoring guidelines in the literature. An 80% completion rate was required to meet criteria for computing valid subscales and total scores and 25 participants were dropped as a result. An additional 10 individuals were excluded for not completing the ASR, as they could not be placed into corresponding psychopathology groups. Once the ASR was scored, results showed only 7 individuals were in the clinical range for pure externalizing. This group was too small to draw meaningful results from and it was determined they should be excluded from analyses. Descriptive statistics were evaluated to determine normality of constructs examined. Data completeness, skewness, kurtosis, and internal consistency were screened. Total scores and subscales were considered normally distributed if skewness and kurtosis was between +2 and -2 (Cameron, 2004). Internal consistencies for each measures total score was evaluated using Cronbach's  $\alpha$  with a criterion of less than 0.70 for exclusion.

### Descriptive Statistics

*Cognitive Appraisal of Stress.* Descriptive statistics, internal consistencies, and univariate normality parameters for the various subscales of the Revised Stress Appraisal Measure are presented in Table 3. Skewness and kurtosis for all subscales were within limits for normality criteria. All subscales demonstrated high internal consistency with the exception of the centrality and resources subscales. Data collected in this study were significantly different

than in the study done by Fletcher, Parkera & Manicavasagara (2010). Compared to the Fletcher, and colleagues study, the current study's sample's scores on the Challenge subscale were significantly different from a sub-sample of participants who were in an "control" condition ( $M_c^1 = 15$ ;  $t(188)=2.99, p<.01$ ) and were also significantly different than a sub-sample of participants who were in an "unipolar depression" condition ( $M_c = 10.10$ ;  $t(239)=12.77, p<.01$ ; Fletcher, Parkera & Manicavasagara, 2010). Compared to the Fletcher, and colleagues study, the current study's sample's scores on the Threat subscale were significantly different from a sub-sample of participants who were in an "control" condition ( $M_c = 6.60$ ;  $t(188)=7.89, p<.01$ ) and were also significantly different than a sub-sample of participants who were in an "unipolar depression" condition ( $M_c = 11.6$ ;  $t(239)=2.13, p<.05$ ; Fletcher, Parkera & Manicavasagara, 2010). Compared to the Fletcher, and colleagues study, the current study's sample's scores on the ChallengeResources subscale were significantly different from a sub-sample of participants who were in an "control" condition ( $M_c = 8.6$ ;  $t(188)=2.26, p<.05$ ) and were also significantly different than a sub-sample of participants who were in an "unipolar depression" condition ( $M_c = 7.5$ ;  $t(239)=7.65, p<.01$ ; Fletcher, Parkera & Manicavasagara, 2010). Compared to the Fletcher, and colleagues (2010) study, the current study's sample's scores on the Centrality subscale were significantly different from a sub-sample of participants who were in an "control" condition ( $M_c = 6.5$ ;  $t(188)=4.43, p<.01$ ) and were also significantly different than a sub-sample of participants who were in an "unipolar depression" condition ( $M_c = 9.4$ ;  $t(239)=-4.57, p<.01$ ; Fletcher, Parkera & Manicavasagara, 2010). No range restriction was observed on any of the subscales.

*Objective Measure of Emotional Intelligence* Descriptive statistics, internal consistencies, and univariate normality parameters for the various subscales of the Diagnostic Assessment of

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<sup>1</sup>  $M_c$  refers to the mean score of the comparison group

Nonverbal Affect-2 are presented in Table 3. Distributions of the DANVA subscales were leptokurtic suggesting a lack of variability on this measure, scores were concentrated around the mean. The faces and postures subscales demonstrated high internal consistency, however the voices subscale alpha indicated some degree of scale unreliability. Data collected in this study were significantly different values reported by Nowicki (2010). Compared to the DANVA manual, the current study's sample's scores on the Faces subscale were not significantly different from a college aged sample of participants ( $M_c = 4.2$ ;  $t(1096) = 1.78$ ,  $p = .07$ ), the Postures subscale data were significantly different than a college aged sample of participants ( $M_c = 7.9$ ;  $t(145) = -3.04$ ,  $p < .01$ ) and the Voices subscale data were significantly different than a college aged sample of participants ( $M_c = 5.5$ ;  $t(976) = 3.82$ ,  $p < .01$ ; Nowicki, 2010). No range restriction was observed on any of the subscales. Higher scores on this measure indicate more errors and larger deficits with emotion identification.

*Subjective Measure of Emotional Intelligence* Descriptive statistics, internal consistencies, and univariate normality parameters for the various subscales of the Trait Meta-Mood Scale are presented in Table 3. Skewness and kurtosis for the total score and all subscales were within limits for normality criteria. All subscales demonstrated high internal consistency. Data collected in this study were significantly different than in the study done by Fitness & Curtis (2005). Compared to the Fitness and Curtis study, the current study's sample's scores on the Attention subscale were not significantly different from a male sub-sample of participants ( $M_c = 49.93$ ;  $t(199) = -1.06$ ,  $p = .29$ ) and were significantly different than a female sub-sample of participants ( $M_c = 51.69$ ;  $t(286) = -3.65$ ,  $p < .01$ ; Fitness & Curtis, 2005). Compared to the Fitness and Curtis study, the current study's sample's scores on the Clarity subscale were significantly different from a male sub-sample of participants ( $M_c = 40.72$ ;  $t(199) = -10.52$ ,  $p < .01$ ) and were

also significantly different than a female sub-sample of participants ( $M_c = 36.06$ ;  $t(239) = -4.82$ ,  $p < .01$ ; Fitness & Curtis, 2005). Compared to the Fitness and Curtis study, the current study's sample's scores on the Repair subscale were significantly different from a male sub-sample of participants ( $M_c = 18.98$ ;  $t(199) = 3.57$ ,  $p < .01$ ) and were also significantly different than a female sub-sample of participants ( $M_c = 18$ ;  $t(239) = 7.28$ ,  $p < .01$ ; Fitness & Curtis, 2005). Range restriction was observed on the lower ends of the Attention subscale with an observed range of 22-63 out of a possible 13-65. Range restriction was also observed on the Clarity subscale with an observed range of 23-44 out of a possible 11-55.

*Internalizing, Externalizing and Co-Occurring Behavior Problems* Descriptive statistics, internal consistencies, and univariate normality parameters for the various subscales of the Adult Self-Report are presented in Table 3. T-scores were calculated following methods outlined in the ASEBA manual and individuals were grouped into four categories based on derived T-scores (Achenbach & Rescorla, 2003). The ASR ASEBA manual states that the borderline clinical range can be combined with the clinical range scores for efficient dichotomous discrimination between groups. Therefore, individuals with T-scores  $>60$  on the subscales were placed in the corresponding group. Individuals with scores  $>60$  on only the Internalizing or Externalizing subscales were placed in the corresponding groups and individuals with scores  $>60$  on both subscales were designated in the Co-Occurring group. Individuals with scores  $<60$  on both the Internalizing and Externalizing subscales were placed in the non-clinical group. Although 10% of individuals would be expected to fall in the clinical range in a community sample, the rates observed in this study were similar to those observed in other college samples (Pittman & Richmond, 2008). For instance, Pittman and Richmond reported rates of internalizing problems at 18% and 30% and Externalizing problems at 15% (2008). Skewness and kurtosis for all total

subscales were within limits for normality criteria. All subscales demonstrated high internal consistency. No range restriction was observed.

*Cumulative Childhood Adversity* Descriptive statistics, internal consistencies, and univariate normality parameters for the Cumulative Risk Index are presented in Table 3. Data collected in this study were significantly different than in the study done by Trentacosta and colleagues (2008). Compared to the Trentacosta and colleagues (2008) study, the current study's sample's scores on the CCA were significantly different from a youth sample ( $M_c = 1.54$ ;  $t(713) = -4.36, p < .01$ ; 2008). Skewness and kurtosis for the CCA total score and all subscales were within limits for normality criteria. The CCA also demonstrated high internal consistency. No range restriction was observed.

### **Hypothesis Testing**

*Hypothesis 1:* Cumulative Childhood Adversity risk was hypothesized to be associated with internalizing problems, externalizing problems, co-occurring problems, total problems, emotion identification skills deficits, threat appraisal style, and centrality appraisals. Cumulative Childhood Adversity was also hypothesized to be negatively correlated with challenge appraisals and resource appraisals.

The associations between CCA and internalizing problems, externalizing problems co-occurring problems, and total problems were not significant. The associations observed for this hypothesis can be observed in the supplementary data and Table 4. CCA were also not significantly correlated with threat or centrality appraisals. However, CCA was significantly correlated with resource appraisals  $r(158) = -.189, p < .05$ . CCA was not associated with the subjective emotional intelligence TMMS clarity subscale, however, the hypothesized inverse relationship between CCA and the subjective measure of emotional intelligence, the TMMS

attention subscale, was observed  $r(158) = -.214, p < .01$ . CCA was associated with the DANVA postures objective measure of emotional intelligence,  $r(125) = .195, p < .05$ . CCA was not significantly associated with the DANVA voices objective measure of emotional intelligence. CCA was significantly associated with the DANVA faces objective measure of emotional intelligence  $r(122) = .195, p < .05$ . These associations support the hypotheses, indicating that greater cumulative adversity is associated with greater emotion identification skills deficits when observing postures and voices. CCA was not significantly correlated with challenge appraisal style. The hypothesis that CCA would be associated with internalizing problems, externalizing problems, co-occurring problems, total problems, emotion identification skills deficits, threat appraisal style, and centrality appraisals and that CCA would be negatively correlated with challenge appraisals and resource appraisals was partially supported.

*Hypothesis 2A:* In the current study it was hypothesized that childhood cumulative adversity, emotion identification (both self and others), and appraisal style (primary and secondary) will significantly discriminate between the four mental health status groups<sup>2</sup>.

In conducting a DFA, a function is produced that is akin to a synthetic variable derived from a linear combination of the discriminating variables (Sherry, 2006). This function in DFA is similar to a factor in factor analysis. The first function derived from a DFA provides the best separation between the groups while the second function provides the next best separation. The second function is orthogonal to the first and, therefore, provides separation once the

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<sup>2</sup> A number of assumptions must be met to use multiple discriminant function analysis (MDFA). Assumptions related to sample size, homogeneity of variance/covariance, and non-multicollinearity must be met. The maximum number of independent variables must be  $N-2$ , with  $N$  being the overall sample size. With an  $N$  of 159, the current study including 11 independent variables is well within the requirements for this methodology. Unequal group sizes are acceptable in MDFA if the sample size of the smallest group exceeds the number of predictor variables. Due to an unusually small group of individuals experiencing pure externalizing problems, this assumption was not met. Therefore, the externalizing group was dropped from analyses. Because of its sensitivity, a stringent  $p$  value of .001 is considered acceptable when using Box's  $M$  in MDFA. It was determined that the homogeneity of variance assumption was met for this analysis as noted by Box's  $M-F(132, 6282.361) = 1.326, p = .008$ —indicating that covariance matrices can be pooled for this analysis.

associations from the first function have been removed (Sherry, 2006). When interpreting results from a DFA, the Wilks's Lambda statistic is examined to evaluate the statistical significance of each function. This statistic is interpreted similarly to a ratio of within groups and total variance with smaller lambda values indicating a greater contribution from the variables to the discriminant function (Sherry, 2006). The Wilks's Lambda ranges from 1 to 0, with 1 indicating that all group means are the same and 0 indicating that they are different (Sherry, 2006). Smaller lambdas therefore indicate that the variables differentiate between the groups better (Sherry, 2006). Additionally, 1-Wilks's Lambda indicates the amount of variance in the function that is explained by the predictor variables that make up the function. Results from this analysis yielded two discriminant functions. The full model test of Function 1 was statistically significant at  $p < .001$  and the test of Function 2 was statistically significant at  $p < .05$ . Therefore, both functions are interpretable. It is important to not only examine the statistical significance but to also evaluate the practical significance of the functions by examining the effect size of each function to determine how much of the variance is accounted for by these variables. The effect size is represented using the squared canonical correlation ( $R_c^2$ ), and is equal to 1-Wilks's Lambda. The canonical correlation ( $R_c$ ) signifies the correlation between the grouping dependent variable (Internalizing, Co-Occurring, and Non-Clinical) and each discriminant function. In examining the canonical discriminant functions, there was a large canonical correlation (.761) on Function 1 with an effect size of  $R_c^2 = 57.9\%$ . There was a moderate to strong canonical correlation (.432) on Function 2 with an effect size of  $R_c^2 = 18.6\%$ . Table 5 demonstrates these findings. The eigenvalues represent a ratio of the between-groups to within groups sum of squares, with larger values indicating functions that discriminate well between the groups (Sherry, 2006). The Eigenvalues observed are reported in Table 6. The hypothesis that Childhood adversity, emotion

identification (both self and others), and appraisal style (primary and secondary) would significantly discriminate between the mental health status groups was supported.

*Hypothesis 2B:* It was hypothesized that emotion identification (both self and others), and appraisal style (primary and secondary) would have larger structure coefficients, than childhood adversity, indicating that they are more important for discriminating between the four mental health status groups.

Standardized discriminant function coefficients and structure coefficients were examined to determine what variables contributed to the group differences. Standardized coefficients are analogous to beta weights in multiple regression and aid in evaluation of the relative importance of the variables. Structure coefficients ( $r_s$ ) demonstrate how uniquely closely related each predictor variable and a function are related. Squaring the structure coefficients ( $r_s^2$ ) identifies the unique variance accounted for by the predictor variable in the composite score for each function (Sherry, 2006). Structure coefficients ( $r_s$ ) of .30 or greater are considered to be important in defining the discriminant dimension (Siniscalchi, 2011). When the variance accounted ( $r_s^2$ ) for is less than 10% of the variance, the variable was not considered to contribute substantially to the interpretability of either of the functions. Table 6 represents both sets of coefficients for all analyses. For Function 1, lack of emotional clarity, emotion repair, threat appraisal style, challenge appraisal style, resource appraisals and centrality of appraisals are primarily responsible for group differences, contributing the most percentage of variance in scores on this function. A lack of clarity and threat appraisal style were negatively correlated with emotion repair, a challenge appraisal style, appraisals of resources and centrality appraisals. For Function 2, emotion identification deficits in postures and faces were primarily responsible for group differences. These were positively correlated in this function.

Once the relative contributions of the predictor variables in each function are identified, it may be determined which groups have more or less of a trait in the linear equation. The group centroids provide an estimate of where each of the variables falls in one group relative to the others, they help to contextualize the coefficients by group. The group centroid is akin to the factor score for a function and every participant has a function score. The mean of all of these factor scores for individuals in a certain group is the group centroid. If a function is significant, the relative relationship of centroid scores between groups is examined. Predictor variables (that contribute unique variance – see structure coefficients) correlated with the function (or inversely) are then interpreted in the same direction (or inverse) as group differences on centroid scores.

Regarding the group centroids (see Table 7), it appears that on Function 1, the non-clinical group was lower than the other two groups. This indicates that we can attribute the group differences observed on Function 1 to lower lack of emotional clarity, higher emotion repair, lower threat appraisal style, higher challenge appraisal style, higher resource appraisals and higher centrality of appraisals in the non-clinical group. More specifically, individuals below clinical cutoffs for behavior problems are more likely to engage in emotion repair and more likely to have a challenge appraisal style, make appraisals that they have adequate resources to meet challenges, and appraise events as related to them and their behavior and less likely to have a lack of emotional clarity and threat appraisal style than individuals with internalizing problems and even more so when compared with individuals with comorbid internalizing and externalizing problems. Regarding the group centroids on Function 2, the internalizing group was lower than the non-clinical and comorbid group. This indicates that individuals with internalizing problems are much less likely to have deficits in emotion identification of postures and faces than individuals with comorbid externalizing problems and that non-clinical individuals are also less likely to have deficits in emotion identification of postures and faces than individuals with comorbid externalizing problems.

Overall, the 11 variables correctly classified 82% of the respondents into the three cluster groups. Prior probability estimates accounting for group size indicate what the overall

classification would be if everything were classified as a given group. Based on group size, prior probabilities would estimate the overall classification of individuals belonging to the internalizing, co-occurring or non-clinical groups as 28%, 13%, and 59% respectively. The variables were much more effective in correctly classifying the groups than chance (33.3%) or the group size based prior probabilities with correct classifications of the internalizing, co-occurring or non-clinical groups as 68%, 56% and 94% respectively.

It was hypothesized that childhood cumulative adversity, emotion identification (both self and others), and appraisal style (primary and secondary) would discriminate the mental health status groups. This hypothesis was supported. The 11 variables contributed to two significant discriminant functions and correctly classified 82% of respondents. Lack of emotional clarity, emotion repair, threat appraisal style, challenge appraisal style, resource appraisals and centrality of appraisals were primarily responsible for discriminating the non-clinical group from the internalizing and co-occurring group in Function 1. Emotion identification deficits in postures and faces were primarily responsible for discriminating the internalizing group from the non-clinical and co-occurring groups.

*Hypothesis 3A:* In the current study it was hypothesized that deficits in self emotion identification and threat appraisal style would predict internalizing disorders from the other three groups while cumulative risk would not.

To determine if deficits in self-emotion identification (lack of emotion clarity), threat appraisal style, and cumulative risk would predict clinically significant internalizing problems, binary logistic regression analysis was performed. The binary logistic regression analysis with lack of emotional clarity, threat appraisal style, and cumulative childhood adversity scales as predictors of clinical levels of Internalizing Problems indicated that the predictors as a set reliably distinguished between individuals with internalizing problems from the other three

groups [ $X^2(3) = 32.74$ ;  $p < 0.001$ ]. Nagelkerke's  $R^2$  of .27 indicated a modest relationship between prediction and grouping. Prediction success overall was 75% (91.2% for non-pure internalizers and 34% for internalizers). Results showed that a threat appraisal style was a significant predictor for the presence/absence of clinical levels of Internalizing Problems  $B(SEB)=0.22(0.05)$ , while emotion clarity and cumulative risk were not ( $B(SEB)=0.10(0.06)$  and  $B(SEB)=-0.06(0.20)$ , respectively; Table 8). Each point increase in the threat appraisal style score was associated with a 25% increase in the odds of having a clinically significant internalizing problem. This pattern of results indicates that the hypothesis was partially supported.

*Hypothesis 3B:* In the current study it was hypothesized that deficits in emotion identification for others and a threat appraisal style would predict externalizing disorders from the other three groups while childhood adversity would not. Hypothesis 3B could not be evaluated since individuals with clinically significant externalizing problems only were removed from analyses due to insufficient sample size.

*Hypothesis 3C:* In the current study it was hypothesized that deficits in emotion identification for both self and others and a threat appraisal style would predict co-occurring disorders from the other three groups while childhood adversity would not.

To determine if deficits in self-emotion identification (lack of emotion clarity), emotion identification in others (DANVA composite), threat appraisal style, and cumulative risk would predict clinically significant co-occurring problems, binary logistic regression analysis was performed. The binary logistic regression analysis with lack of emotional clarity, emotion identification deficits, threat appraisal style, and cumulative childhood adversity scales as predictors of clinical levels of Internalizing Problems [ $X^2(4) = 32.28$ ;  $p < 0.001$ ] showed that a

threat appraisal style and emotion identification deficits significantly predicted the presence/absence of clinical levels of Co-Occurring Problems with  $B(SEB)=0.27$  (0.09) and  $B(SEB)=0.16$  (0.05), respectively, while poor emotion clarity and cumulative risk did not with  $B(SEB)=0.13$  (0.09) and  $B(SEB)=-0.14$  (0.33), respectively, (see Table 9). Nagelkerke's  $R^2$  of .43 indicated a moderate relationship between prediction and grouping. Prediction success overall was 89.3% (97.2% for individuals without co-occurring problems and 37.5% for individuals with co-occurring problems). Each point increase in threat appraisal style score was associated with a 31% increase in the odds of having a clinically significant co-occurring problem. Similarly, each point increase in the emotion identification problems DANVA composite score was associated with a 17% increase in the odds of having a clinically significant co-occurring problem. This pattern of results demonstrates that the hypothesis was partially supported.

*Hypothesis 3D:* In the current study it was hypothesized that low childhood adversity, strong emotion identification and challenge appraisal style would predict the non-clinical group from the other three groups.

To determine if deficits in self-emotion identification (lack of emotion clarity), deficits in emotion identification of others, challenge appraisal style, and cumulative risk would predict internalizing disorders binary logistic regression analysis was performed. The binary logistic regression analysis with self-emotion identification (lack of emotional clarity), challenge appraisal style, and cumulative childhood adversity scales as predictors of non clinical levels of Internalizing or Co-Occurring Problems [ $\chi^2$  (4) = 61.66;  $p < 0.001$ ] showed that a challenge appraisal style, emotion identification deficits and lack of emotional clarity significantly predicted the presence/absence of clinical levels of Internalizing or Co-Occurring problems with

$B(SEB)=0.24$  (0.06),  $B(SEB)=-0.09$  (0.04) and  $B(SEB)=-0.28$  (0.08), respectively, while cumulative risk did not with  $B(SEB)=0.03$  (0.24) (see Table 10). Nagelkerke's  $R^2$  of .54 indicated a moderate relationship between prediction and grouping. Prediction success overall was 83.6% (76% for individuals with clinically significant internalizing or co-occurring problems and 88.9% for individuals without clinically significant internalizing or co-occurring problems). For each point increase in challenge appraisal style score the odds of not having clinically significant internalizing or co-occurring problems increase from 1 to 1.27. However, for each point increase in the emotion identification deficits score the odds of not having clinically significant internalizing or co-occurring problems decreases from 1 to .93 and for each point increase in the emotion clarity deficits score the odds of not having clinically significant internalizing or co-occurring problems decreases from 1 to .76. This pattern of results indicates that the hypothesis was partially supported.

## DISCUSSION

The goal of this study was to go beyond typical models of risk and identify processes that predict specific forms of psychopathology. The equifinality and multifinality observed in the extant literature are indicative of how little we really understand the way risk factors contribute to the development of psychopathology. In considering prior research, emotion identification skill and cognitive appraisal style have been associated with either internalizing or externalizing disorders. However, to date no study has been conducted to examine whether emotion identification and appraisal style may differentiate forms of internalizing, and co-occurring psychopathology and those with non-clinical problems in one study. Enhancing our understanding of predictors or processes that differentiate forms of psychopathology may improve our understanding of developmental psychopathology as well as better inform our prevention and intervention efforts.

### **The Association between Psychosocial Risk Factors and Psychopathology**

Findings partially supported the hypothesis that cumulative childhood adversity would be associated with the specific forms of psychopathology and the psychological process variables. The hypothesized relationship between cumulative childhood adversity and appraisal style was partially supported. As expected CCA was significantly associated with resource appraisals. This result provides evidence that there is an association between cumulative risk and appraisal style. This finding is consistent with prior research suggesting that cumulative risk may influence the development of maladaptive appraisal styles (Roussi, 2002). CCA may be particularly salient in

the case of resource appraisals if multiple contextual risk factors contribute to a perceived lack of control. Roussi reported that individuals who have the most adaptive responses to stress are those that are best able to discriminate the controllability of the stressors and match them with the appropriate coping strategy (2002). When individuals were faced with controllable stressors, it was adaptive to employ problem-focused coping (Roussi, 2002). Similarly, it was also found to be adaptive to reframe or use emotion focused coping in the face of uncontrollable stressors like poverty (Roussi, 2002). If an individual were raised in an environment with high CCA, they may discern that there is low controllability in their situation and this may be adaptive. However, if circumstances change, and they apply this appraisal style to controllable situations, it may become maladaptive if they do not select an appropriate coping style to address the controllable stressor. Future research should prospectively examine whether cumulative risk contributes to the development of appraisals styles of perceived lack of control.

The hypothesized relationship between Cumulative Childhood Adversity and emotional identification skill was also partially supported. These results provide support for the idea that childhood risk may contribute to emotion skills deficits that are predictive of specific forms of psychopathology. As expected and in concordance with previous research (McMahon et al., 1999), there was a significant association between CCA and the objective measures of emotional intelligence related to faces and postures. CCA was also demonstrated to have an inverse relationship with attention to emotions. These findings support research linking environmental risk with emotion skills deficits (Pollack & Sinha, 2002; (U. S. Department of Health and Human Services, 2001). Research across age groups and in several countries has demonstrated that poverty and associated risk factors such as parental mental illness, exposure to violence and malnourishment are associated with emotion skills deficits (Walker et al., 2011). Thus the

demonstrated association between CCA and emotion skills deficits and resource appraisals may provide support for a proposed mechanism for the development of psychopathology from negative life events to deficits in emotional competence, and these emotional processing deficits then may drive the development of maladaptive attributional styles and subsequent adjustment problems.

However, the hypothesis was only partially supported because threat, challenge and centrality appraisals were not significantly associated with CCA. In addition, contrary to the expected findings, CCA was not significantly associated with Internalizing Problems, Co-Occurring Problems, or Total Problems. Although the hypothesis was not supported, these findings may actually support the proposed model of the development of psychopathology. As described earlier, theories such as the theory of emotional competence by Saarni and colleagues and the cognitive model of emotion by Lane and colleagues as well as the two-stage model of emotion regulation by Larsen all indicate that emotion skills may be key precursors for the development of appraisal styles and emotion regulation (Saarni, 1999; Lane et al., 1990; Larsen, 2002). These findings may also indicate that there is not a strong direct relationship between CCA and specific forms of psychopathology. Given that appraisal styles all had strong associations ( $p < .001$ ) with internalizing, externalizing and co-occurring psychopathology this may support models discussed that implicate pathways through emotion skills deficits and appraisal style. CCA may not have been associated with challenge and threat secondary appraisals if the pattern of the relationship is better accounted for or perhaps mediated by emotion skills. An indirect effect may better account for this relationship than a direct effect. This may indicate that these variables should not be viewed in isolation and should be examined within the context of a comprehensive model.

These findings may also support the distinction observed in the literature between primary and secondary appraisals (Chang, 1998). Secondary appraisals, also known as resource appraisals, related to whether or not an individual can handle a stressor may be directly related to cumulative risk. In other words, if an individual has been exposed to multiple adversities they may perceive themselves as less capable and having diminished access to resources. Conversely, the development of primary appraisal styles related to perceptions of threat or challenge in response to stressors may be better accounted for by emotion skills developed as represented by the study model. A significant correlation between CCA and appraisals would potentially not be expected if emotion skills mediate the relationship. Future research should examine whether emotion skills mediate the relationship between CCA and appraisal style.

Another consideration is that CCA was operationalized using more distal risk factors. This may explain the patterns of association observed in this study in that a significant association may not have been observed because the development of psychopathology may be better accounted for by more proximal risk factors such as parent-child relationships or parent appraisal style (Power, 2004). The non-significant associations between CCA and the primary appraisals styles may have been due to resource appraisals being more closely related to distal risk factors associated with objectively low resources inherent in a high CCA score. Future research on the associations between cumulative risk and specific forms of psychopathology should examine differences between proximal and distal risk factors and their associations with psychopathology.

The associations observed between emotion skills deficits and CCA while CCA associations with challenge or threat appraisals or specific forms of psychopathology were not observed may support the proposed model of differentiation of psychopathology. Based on the

pattern of these associations, future research should examine these variables in one comprehensive dynamic model, utilizing factor analytic methodologies to examine how these variables work together to explain the complex interaction between these variables and how they can impact appraisal styles and coping skills. Taken together, these findings support the idea that the relationship between CCA and psychopathology is not enough to explain the equifinality and multifinality observed in the development of psychopathology. The observed associations indicate that it is essential to examine important processes that link contextual risk factors to psychological outcomes.

### **Psychological Processes in the Formation and Maintenance of Psychopathology**

To address the identified need to examine process models of psychopathology, a major purpose of this study was to examine how cumulative risk and psychological process variables, when considered together, are associated with specific forms of psychopathology. This study, therefore, investigated multivariate hypotheses examining whether emotion skills and appraisal styles would significantly discriminate between specific forms of psychopathology beyond cumulative risk. An examination of whether individual differences in some psychological processes are more important for predicting some forms of psychopathology than others was also conducted.

It was hypothesized that psychological process variables would be important for discriminating specific forms of psychopathology while environmental risk factors would not. As hypothesized, strong support was found for the hypothesized variables challenge appraisal style and emotional clarity having an important relationship with young adult psychopathology. Challenge appraisal style and emotional clarity were variables that were identified as important for differentiating individuals without psychopathology from those with clinical levels of

internalizing problems and co-morbid internalizing and externalizing problems in MDFA analyses as well as being identified as significant predictors of having no clinically significant internalizing or co-occurring problems in logistic regression analyses. In other words, psychological process variables related to emotion skills and appraisal style were highlighted as especially critical processes for differentiating clinical and non-clinical samples. Emotional clarity and appraisal style also appear to be important for both predicting the presence or absence of psychopathology in addition to discriminating individuals without clinical levels of mood and behavior problems from those with clinically significant mood and behavior problems. These findings are consistent with research implicating emotional clarity and appraisal style with psychopathology, emotional disturbances, and social difficulties (Zemen et al., 2002; Ciarrochi et al., 2008). These findings are also in line with the self-regulation literature relating emotional clarity and appraisals (Lengua, 2002). This study asserted that, when following the social cognitive model of self-regulation, the interpretation of social and emotional information and the cognitive appraisals and control related beliefs of the forethought phase of self-regulation, are the critical individual differences contributing to the development of psychopathology. These findings support that assertion and indicate that research focused on emotional clarity and appraisal style may be viable avenues for developing prevention or intervention programs. Emotional clarity was also hypothesized to discriminate internalizing problems and co-occurring problems, however, regression analyses indicated that emotional clarity did not significantly predict the presence or absence of either behavioral profile. While emotional clarity did not discriminate specific forms of psychopathology, it was important for differentiating the clinical sample from the non-clinical sample as described above and warrants consideration in models of the development and maintenance of psychopathology. Emotion identification of others was also

hypothesized to predict the presence or absence of clinically significant internalizing and co-occurring problems. Regression analyses supported this hypothesis. Emotion identification was important for discriminating specific forms of psychopathology and predicted the presence or absence of clinically significant internalizing and co-occurring problems because of the pattern of discrimination observed. Emotion identification skills appear to be important in predicting the presence or absence of psychopathology more generally and discriminating specific forms of psychopathology.

Interestingly, despite a wealth of research implicating cumulative risk in the development of psychopathology (Appleyard et al., 2005; Masten & Wright, 1998), cumulative risk was not a strong predictor. This finding is surprising in light of previous research and indicates that CCA may not be enough on its own to inform our understanding of the development of psychopathology. This finding highlights the need for future research on the development and maintenance of psychopathology as well as research on resilience to incorporate both emotion skill and appraisal style in risk and resilience developmental models of psychopathology.

While challenge appraisal style and emotion clarity were identified as having strong support for their ability to differentiate individuals with clinical levels of internalizing or co-occurring problems from those without beyond cumulative risk, these variables were not clearly expected to differentiate specific forms of psychopathology. However, given that a major aim of this study was to identify psychological process variables that discriminate these specific forms of psychopathology to improve our understanding of the development of psychopathology, the present study hypothesized that emotion identification skills would be important for differentiating specific forms of psychopathology and that emotion skills deficits would be an important variable for identifying the presence of co-occurring disorders from the other groups

while childhood adversity would not. These hypotheses were supported by both the MDFA and logistic regression analyses. In Function 2 of the MDFA, emotion identification deficits in postures and faces were primarily responsible for group differences. Once group centroids were examined, it was demonstrated that those with co-morbid problems had the greatest difficulty with emotion identification while, in stark contrast, those with only internalizing problems were the strongest at emotion identification, with persons with internalizing disorders performing even better at emotion identification than the non-clinical sample. The finding that persons with internalizing disorders would perform better than those in the co-occurring group and even the non-clinical sample was actually expected given research indicating that persons with internalizing disorders can outperform controls depending on mood state (Joorman & Gotlib, 2006; Anderson et al., 2011). Therefore, emotion identification *deficits* were not included in the regression analyses predicting the presence or absence of internalizing disorders because, although persons with internalizing disorders were expected to outperform other groups with psychopathology, it was not believed that they would be significantly different from the non-clinical sample to a degree that would improve the regression equation. However, it was hypothesized, and ultimately consistent with MDFA findings, that individuals with co-occurring problems would demonstrate emotion identification skills deficits to a degree that would differentiate them from the other groups using binary logistic regression analyses. This hypothesis was supported; emotion identification deficits were again demonstrated to be important variables for identifying the presence or absence of co-occurring problems apart from individuals with internalizing problems or individuals in the non-clinical sample. This finding was consistent with MDFA results demonstrating that individuals with only Internalizing problems have strong emotion identification skills that differentiate them from individuals with

co-occurring problems who have significant emotion identification deficits. The finding that individuals with comorbid externalizing problems exhibit emotion skills deficits is in line with previous research indicating that emotion identification is an important predictor of externalizing problems (Zemen, 2002). As described in the introduction, these deficits in emotion identification contribute to externalizing problems by disrupting the development of self-regulation skills that relies on the use of accurate social-emotional information. Therefore, this finding also supports theories emphasizing the importance of emotion identification in self-regulation such as the two-stage model of emotion regulation developed by Larsen (2002) or social cognitive models of self-regulation (Zimmerman, 2000). It is therefore possible that internalizing disorders in those with comorbid internalizing and externalizing problems may develop differently from internalizing problems that develop without clinically significant externalizing problems and their associated emotion identification skills deficits. Evidence for this can be found in the peer rejection literature (Ladd & Troop-Gordon, 2003;) indicating that emotion skills deficits of those with externalizing problems contribute to peer rejection and subsequent internalizing problems such as depression. It was also hypothesized, and ultimately consistent with MDFA findings, that individuals without clinical levels of internalizing or comorbid problems would demonstrate emotion identification skills deficits to a degree that would differentiate them from the other groups using binary logistic regression analyses. This hypothesis was supported and emotion identification deficits were again demonstrated to be important variables for identifying the presence or absence of clinically significant internalizing or co-occurring problems. Future research should examine developmental models to determine if differences observed here between individuals with internalizing and comorbid externalizing problems are due to the trajectories asserted by the peer rejection literature or an alternative

model. Taken together, these results indicate that appraisal styles discussed earlier may be important for identifying those with internalizing problems like those in the internalizing and co-occurring groups while emotion identification skills deficits and strengths may be important for explaining the presence of comorbid externalizing versus internalizing problems.

As hypothesized, threat appraisal style was a significant predictor of the presence or absence of internalizing problems in logistic regression analyses. Additionally, threat appraisal style was *also* a significant predictor of the presence or absence of co-occurring problems in logistic regression analyses. This might appear indicative of threat appraisal style's ability to discriminate between internalizing and co-occurring behavior profiles, however, MDFA analyses did not support this conclusion. Threat appraisal style was important in the MDFA results, but not in discriminating between internalizing and co-occurring behavior. Instead, and actually consistent with initial predictions, it was important in Function 1, differentiating those without clinically significant internalizing or co-occurring problems from those with clinically significant internalizing or co-occurring problems. It appears that threat appraisal style only predicts psychopathology in general but fails to differentiate internalizing and co-occurring behavior profiles. This finding is consistent with recent research indicating that threat appraisal style predicts both internalizing and externalizing problems (Thompson, Zalewski, & Lengua , 2014). The association between threat appraisal style and internalizing and co-occurring problems indicates that threat appraisal style remains an important area for intervention to prevent the development of psychopathology.

Additional process variables related to appraisals and emotion identification skills were also hypothesized to serve an important role in the development and maintenance of psychopathology; however, they were only partially supported by MDFA analyses but not

supported by regression analyses. Three variables, resource appraisals, centrality appraisals, and emotion repair, were examined in the MDFA analyses that were not examined in the logistic regression analyses because the literature did not provide strong enough evidence to guide a priori hypotheses with regard to which specific forms of psychopathology they would predict. MDFA analyses revealed that these variables contributed a sizable percentage of variance of Function 1, discriminating individuals with non-clinical levels of internalizing and externalizing problems from individuals with internalizing problems and co-occurring problems. This finding may indicate that these factors may be important in risk models of the development or maintenance of psychopathology but that they do not inform us as to the different patterns of internalizing or co-occurring behavior profiles. It is no surprise that these variables differentiate the clinical and non-clinical groups as they have routinely been identified in the literature as having strong associations with psychopathology. However, due to the sparse literature examining how these variables specifically relate to individuals with internalizing, externalizing and co-occurring problems, there was no clear support for hypothesizing a specific association with a particular behavioral profile group. These variables were included in MDFA analyses in an exploratory way. It is notable that emotion repair and centrality and resource appraisals did not discriminate the internalizing and co-occurring groups. It is possible that a lack of discrimination was found between the internalizing and co-occurring group due to something inherent in the overlapping internalizing problems. Emotion repair on the TMMS captures mainly adaptive attempts at regulating emotions such as trying to focus on the positive, it is therefore likely that there are no differences between the groups because individuals with internalizing and externalizing have routinely been found to demonstrate poor coping skills (Compas, Connor-Smith, Saltzmann, Thomsen, & Wadsworth, 2001; Zemen Shipman, & Suveg,

2002). Important to note, however, is that the TMMS emotion repair scale does not capture many maladaptive attempts at emotion repair related to focusing on emotion such as the rumination often observed in internalizing problems (Robinson & Alloy, 2003). It is possible that centrality appraisals did not differentiate the groups because they both demonstrate a similar pattern of centrality appraisals. Although centrality appraisals were included as an exploratory aim, it is reasonable that the pattern of centrality appraisals in the MDFA was observed. The non-clinical sample demonstrated higher centrality appraisals than the other two groups, indicating that individuals with internalizing and externalizing problems interpret stressful events as more likely to have greater and more lasting negative effects on their lives. Research has found that individuals with internalizing problems frequently catastrophize and overemphasize the negative impact a stressful situation will have on them, these dysfunctional attitudes are at the core of Beck's cognitive-behavioral theory of depression and a major target of treatment associated evidence-based treatments (Beck et al., 1997). Interestingly, while centrality appraisals and emotion repair were not strong contributors to Function 2, the structure coefficients for resource appraisals did meet criteria for consideration as important in defining the discriminant dimension, with individuals with internalizing problems less likely to make appraisals that they have adequate resources to handle stressful situations than the non-clinical sample and even less so when compared to the co-occurring sample. With regard to perceptions of resources, the literature indicates that individuals with internalizing and externalizing problems differ in perceived control as well as patterns of discrepancies between actual and perceived control, with individuals with externalizing problems frequently over-confident in their abilities (Scott & Weems, 2010). Future research should examine more closely resource appraisal differences

between individuals with internalizing problems and those with co-occurring internalizing and externalizing problems.

Lastly, Cumulative risk was not found to contribute to the differentiation of any of the behavioral profiles or to be a significant predictor in any of the regression analyses focused on specific forms of psychopathology. These findings support the hypothesis that the psychological process variables, as discussed earlier, are more important discriminators of psychopathology than cumulative childhood adversity. On the other hand, one should consider the possibility that CCA was not found to be a significant predictor due to the way it was measured. The CCA index was collected by survey and was, therefore, dependent on the participants' memory. Memory bias or lack of knowledge regarding parental mental health issues or income may have limited responses and thus lessened the ability to detect potentially existing relationships. Furthermore, while CCA was a relatively comprehensive measure, it was not exhaustive. There may be contextual risk factors that can impact the development of psychopathology such as parenting style or attachment that were not captured in the CCA measure. For instance, invalidating parenting style was not specifically assessed and the literature does demonstrate that an invalidating parenting style is a strong predictor of psychopathology in general; that is, an important childhood adversity risk factor that predicts psychopathology was not included in the current study's CCA measure. Additionally, protective factors such as positive relationships with teachers, coaches, peers, and mentors was not assessed in the current CCA measure. Positive relationships may mitigate the impact of several contextual risk factors such as parental neglect or overcrowding in the home. Some of the individuals in this sample may have had supportive relationships that impacted the influence cumulative risk factors had on their development but this could not be determined in the current study. However, it is possible that these finding

support the assertion this research makes that cumulative risk is not sufficient for explaining the development of psychopathology. These findings highlight the importance of examining emotion skills and appraisal styles when studying the development and maintenance of psychopathology. Furthermore, they may provide critical opportunities for intervention. Future research should examine contributors to these skills deficits and appraisal styles as well as avenues for intervention.

### **Limitations and Future Directions**

While this study was an initial step forward in exploring the associations between cumulative risk factors, psychological process variables, and specific forms of psychopathology, there are additional limitations to the current research that warrant consideration beyond those already addressed. There were limitations regarding the methodology and overall study design that warrant further explanation. Examination of these limitations may inform improvement of future research evaluating these associations.

Firstly, the participants in the study were recruited through SONA and were, therefore, sampled from a small subsection of the larger university. Since all eligible participants had to be enrolled in psychology courses to participate in SONA, the conclusions from this study may have limited generalizability. Due to the nature of the behavioral problems examined, those with more severe externalizing problems may not be well represented in this college population. Future research is needed to evaluate whether these findings would be observed in non-college samples. The present study was also largely heterosexual, Caucasian females potentially limiting the cultural generalizability. Future research should examine these variables in more diverse samples to examine whether race or gender effects impact the findings. The present research should be replicated to determine if these findings are consistent the broader population.

Additionally, research with larger, more diverse samples including non-college populations is needed to more fully understand the specificity of relations with these behavior profiles. Non-college samples may be particularly important for understanding the role of appraisal style and emotion skills deficits in the development and maintenance of externalizing disorders.

Another potential limitation of the present study is the research design. This study employed a cross-sectional design. It is, therefore, not possible to infer directionality or causal relationships from the results. Literature suggests that risk contributes to the development of emotion skills deficits and maladaptive appraisal styles that contribute to the development of psychopathology however this study cannot evaluate directionality, it is possible that there may be a more transactional model or epigenetic effects that were unable to be evaluated here (Saarni, 2006; Lane et al., 1990; Larsen, 2002). Future research may examine these relationships in youth longitudinally to examine the impact of cumulative risk in relation to psychological processes and the development of psychopathology. Twin studies may also help evaluate how these processes develop and identify epigenetic processes. Experimental research could potentially examine causal theories but may not be possible due to ethical issues related to childhood adversity. Quasi-experimental designs and proxy studies of related constructs may be more plausible methods of evaluating causality of the identified constructs.

Additionally, the majority of variables of interest were measured using self-report measures, with the exception of the objective measure of emotional intelligence (DANVA). Self-report measures are sensitive to social desirability effects and may therefore limit conclusions that may be drawn from results. However, no objective measures currently exist for cognitive processes such as appraisal styles and self-report measures are the only established method for evaluating these appraisals. With regard to this study, participants may have minimized

problematic behavior on the Adult Self-Report. This may explain why we observed so few individuals reporting pure externalizing problems. Furthermore, lack of insight may have also distorted results observed on self-report measures, as people commonly have poor metacognitive skills (Flavell, 1979; Benjamin, Bjork, & Schwartz, 1998). It is widely acknowledged that individuals underreport occurrence or severity of externalizing problems (De Los Reyes et al., 2012). Furthermore, college students have demonstrated distorted views on problematic behaviors such as binge drinking or risky sexual behavior that may have led to underreporting of externalizing problems (Lintonen & Konu, 2004). It is also possible that the current study's sample was drawn from a population with fewer externalizing problems than young adults samples reported on in previous research. The present population was from a university system that awards extra credit for participation in research. These participating students may be more high functioning and less burdened with externalizing problems than the larger undergraduate population.

Despite the potential for social desirability to influence participant responses, data collection efforts were informed by the literature and strategic decisions were made to minimize the potential impact of social desirability. The survey was administered online in an anonymous manner. This administration was void of explicit or active monitoring by the researchers. Furthermore, consent forms and other study materials did not describe the hypotheses of the research so that participants were unable to have responses biased by the researchers' interests. These steps ensured that professional standards were met to reduce the potential impact of social desirability (Fisher, 1993). While there are limitations to research employing self-report measures, when steps are taken to minimize issues such as social desirability, these measures also have benefits that other methods such as direct observation may lack. Anonymous self-

report may allow participants to respond more freely than in person interviews or direct observation thereby allowing the researchers of the current study to collect fairly accurate data regarding personal information like exposure to violence or parental drug use (Tourangeau & Yan, 2007). These methods are also the best way we currently have of assessing personal experiences such as cumulative risk factors or appraisal styles.

Another potential limitation of this study is that data were collected online and not in the presence of research staff. It is possible that participants were not fully attending to the items and just running through the protocol to receive extra credit. To mitigate this possibility, data was screened to remove all participants that demonstrated patterned non-responsivity (e.g. participants that responded “a” for each question). While the presence of research staff could have improved attention to survey questions, their presence could also then have contributed to social desirability effects mentioned earlier.

One final limitation to consider is the psychometric properties of the measures used. There is a paucity of psychometrically valid measures of objective emotional intelligence and appraisal style as well as no widely accepted methodology for assessing cumulative risk. This may impact replication if different CCA measures are used. Despite the fact that these variables are consistently indicated as vital to our understanding of the development and maintenance of psychopathology, our ability to assess these factors remains limited. Future research should improve the assessment tools available to research these important variables.

### **Summary**

Despite these limitations, this research made several contributions, beyond contextual risk factors, to our knowledge regarding the specificity of relations of emotion perception, emotion expression management and general appraisal style to differentiating internalizing, co-

occurring and non-clinical populations. This study was the first exploration examining the extent to which contextual risk factors, emotion identification and general appraisal style are either ‘common’ or ‘specific’ determinants of internalizing, co-occurring, and non-clinical behavioral profiles. Although extensive research has been done in the fields of emotional competence, cognitive appraisals, and childhood adversities, these fields have not developed a generally accepted model of psychopathology that sufficiently explains the development of specific forms of psychopathology. The findings from this study provide some initial support for including emotion skills deficits and appraisal style in psychopathology risk models.

Preliminary evidence from this study suggests that emotion identification strengths and deficits may confer additional risk for those exposed to psychosocial risk factors and suggests appraisal processes that may be protective. These findings may have important implications for the prevention and treatment of psychopathology. As many psychosocial risk factors are often wide-spread and deeply entrenched in large societal institutions they can be costly or difficult to address. Furthermore, these risk factors are non-specific in their association with psychopathology. Identifying processes, such as emotion identification skills, that confer additional risk beyond that of psychosocial risk factors and have associations with specific forms of psychopathology enhances our understanding of the development and maintenance of psychopathology and highlights opportunities for intervention. Identifying individuals with emotion skills deficits and cognitive appraisal vulnerabilities permits the development of more targeted interventions such as emotion skills training and emotion regulation preventative interventions in early childhood. Ultimately, such research may help attenuate the pernicious impact of early childhood adversity and contribute to preventative interventions promoting resilience and improved mental health outcomes.

## TABLES

Table 1

*Sample Demographics: Gender, Sexual Orientation, and Race*

Variable	N (%)
Gender	141 (Female; 89.2%)
<u>Sexual Orientation</u>	147 (heterosexual; 93%)
<u>Race</u>	
Caucasian	122 (57.5%)
African American/Black	18 (11.4%)
Asian	18 (11.4%)
Hispanic/Latino	32 (20.3%)
American Indian or Alaskan Native	1 (.6%)
Native Hawaiian or Pacific Islander	2 (1.3%)
Bi/MultiRacial	6 (3.8%)
Other	11 (7%)

Table 2

<i>College Characteristics</i>	
<u>Year in College</u>	<u>N (%)</u>
Year 1	41 (25.9%)
Year 2	28 (17.7%)
Year 3	38 (24.1%)
Year 4	40 (25.3%)
Year 5 or more	10 (6.3%)
<u>Living Arrangement</u>	
Off-campus	101 (63.9%)
On-Campus	57 (36.1%)

Table 3  
*Descriptive Statistics*

Subscales	N	Mean (SD)	Min/Max	Range	Skewness	Kurtosis	Alpha Level
<i>Revised Stress Appraisal Measure</i>							
Challenge	158	17.99(5.68)	1/28	27	-0.46	-0.09	0.88
Threat	158	12.61(4.31)	0/20	20	-0.69	0.05	0.82
ThreatPos	158	7.37(0.34)	0/20	20	0.65	-0.06	0.82
Centrality	158	8.27(2.24)	1/13	12	-0.19	0.10	0.02 <sup>b</sup>
Resources	158	9.60(2.49)	3/12	9	-0.81	-0.34	0.66 <sup>b</sup>
<i>Trait Meta Mood Scale</i>							
Attention	158	48.59(7.63)	22/63	41	-0.5	0.2	0.85
ClarNeg	158	32.68(3.74)	23/44	21	0.0	-0.1	0.90
Repair	158	22.04(5.21)	8/30	22	-0.5	-0.3	0.86
<i>Adult Self Report</i>							
INT Raw Score	158	17.73(1.03)	0/54	54	0.69	-0.34	0.93
EXT Raw Score	158	9.48(0.56)	0/32	32	1.03	0.80	0.88
Total Raw Score	158	49.34(2.3)	2/145	143	0.71	0.08	0.96
INT T-Score	158	55.54(13.04)	30/84	54	0.10	-0.89	
EXT T-Score	158	49.74(9.45)	30/71	41	-0.14	-0.33	
Total T-Score	158	52.16(0.86)	25/81	56	-0.03	-0.20	
<i>DANVA</i>							
F_Total	122	4.62(2.84)	0/19	19	1.80	6.82 <sup>a</sup>	0.85
V_Total	125	6.34(3.09)	0/20	20	1.58	5.11 <sup>a</sup>	0.27 <sup>b</sup>
P_Total	125	9.08(3.89)	0/26	26	1.19	4.04 <sup>a</sup>	0.89
<i>CCA</i>							
Total	158	1.11(1.00)	0/4	4	0.90	0.48	0.37 <sup>b</sup>

Note: <sup>a</sup> Measure exceeds the critical value of 2.0, suggesting some degree of non-normality. <sup>b</sup> Alpha-level is below the established standard of 0.70, suggesting some degree of scale unreliability.

Table 4  
Correlations with DANVA subscales

	P TOTAL	V TOTAL	F TOTAL	Composite DANVA
CCA_Total	0.20*	0.13	0.20*	0.19*
RSAM Challenge	-0.11	-0.04	-0.19	-0.14
RSAM ThreatPos	-0.07	0.02	0.06	-0.04
RSAM Centrality	0.04	-0.02	-0.10	-0.07
RSAM Resources	-0.28**	-0.18	-0.21*	-0.27*
RSAM Total	-0.08	-0.06	-0.14	-0.15
TMMS Attention	-0.26**	-0.18*	-0.19*	-0.23*
TMMS ClarityNeg	0.01	-0.09	-0.01	0.00
TMMS Repair	-0.08	-0.04	-0.17	-0.19*
TMMS Total	-0.24**	-0.14	-0.22*	-0.28**
ASR INT Tscore	0.09	0.15	0.11	0.20*
ASR EXT Tscore	0.25**	0.28**	0.27**	0.37**
ASR Total Prob Tscore	0.14	0.19*	0.16	0.26**
ASR Internalizing Scale	0.08	0.14	0.14	0.21*
ASR Externalizing Scale	0.31**	0.29**	0.33**	0.43**
ASR CO Composite	0.17	0.21*	0.23*	0.31**
ASR Total Problems	0.13	0.17	0.19*	0.27**
P TOTAL	-	0.52**	0.53**	0.85**
V TOTAL		-	0.48**	0.78**
F TOTAL			-	0.81**
Composite DANVA				-

Note: \* $p < 0.05$ , \*\* $p < 0.01$

Table 5  
*Wilk's Lambda and Canonical Correlation*

Function	Wilk's Lambda	$\chi^2$	df	p	Rc	R <sup>2</sup> c
1	0.34	122.05	22	0	0.76	57.90%
2	0.81	23.51	10	0.03	0.43	18.60%

Table 6

*Standardized Discriminant Function and Structure Coefficients for Functions 1 and 2*

	<i>Function (Eigenvalue)</i>					
	<i>Function 1(1.37)</i>			<i>Function 2(.23)</i>		
	Coefficient	$r_s$	$r_s^2$	Coefficient	$r_s$	$r_s^2$
<i>CCA</i>	-0.09	.03	0.07%	-0.05	0.12	1.32%
<i>DANVA</i>						
PID	0.259	0.22	4.84%	0.25	0.52	26.63%
VID	0.37	.243	5.95%	-0.37	0.11	1.21%
FID	-0.053	0.17	2.82%	0.81	0.69	47.20%
<i>TMMS</i>						
LC	0.35	0.42	17.22%	-0.06	-0.13	1.64%
A	0.07	-.20	4.08%	0.21	0.07	0.45%
Rp	-0.06	-0.43	18.32%	0.41	0.15	2.16%
<i>RSAM</i>						
T	0.64	0.72	52.42%	-0.25	-0.24	5.91%
Ch	-0.33	-0.61	37.58%	-0.41	-0.18	3.13%
Rs	-0.09	-0.45	20.07%	-0.34	-0.3	9%
Cen	-0.03	-0.34	11.42%	0.24	0.18	3.13%

Note: CCA = Cumulative Childhood Adversity; DANVA = Diagnostic Assessment of Nonverbal Affect PID = Posture Identification Deficits; VID = Voice Identification Deficits; FID = Facial Identification Deficits; TMMS = Trait Meta-Mood Scale; LC = Lack of Clarity; A = Attention; RP = Repair; RSAM= Revised Stress Appraisal Measure; T = Threat; Ch = Challenge; Rs = Resources; Cen = Centrality.

Table 7  
*Group Centroids*

Group	<i>Function 1</i>	<i>Function 2</i>
Internalizing	1.09	-.62
Co-Occurring	1.92	.93
Non-Clinical	-.94	.09

Table 8

*Summary Statistics from the logistic regression equation predicting no Internalizing problems/Internalizing problems membership from risk and process variables.*

	$\beta$	SE	Exp(B)	95% C.I. for Exp(B)		Wald statistic
				Lower	Upper	
CCA	-0.06	0.2	0.94	0.64	1.39	0.09
Clarity	0.1	0.06	1.11	0.99	1.24	3.1
Threat	0.22	0.05	1.25	1.13	1.38	18.23***
Constant	-6.05	1.92	0			9.92**

\* $p < 0.05$  \*\* $p < 0.01$  \*\*\* $p \leq 0.001$

Table 9

*Summary Statistics from the logistic regression equation predicting no Co-Occurring problems/Co-Occurring problems membership from risk and process variables.*

	$\beta$	SE	Exp(B)	95% C.I. for Exp(B)		Wald statistic
				Lower	Upper	
CCA	-0.14	0.33	0.87	0.45	1.66	0.18
Clarity	0.13	0.09	1.14	0.96	1.36	2.26
DANVA	0.16	0.05	1.17	1.06	1.3	8.95**
Threat	0.27	0.09	1.31	1.1	1.56	9.23**
Constant	-12.24	3.51	0			12.16***

\* $p < 0.05$  \*\* $p < 0.01$  \*\*\* $p \leq 0.001$

Table 10

*Summary Statistics from the logistic regression equation predicting clinically significant Internalizing or Co-Occurring problems/no clinically significant Internalizing or Co-Occurring problems membership from blank risk and process variables.*

	$\beta$	SE	Exp(B)	95% C.I. for Exp(B)		Wald statistic
				Lower	Upper	
CCA	0.03	0.26	1.04	0.63	1.7	0.02
Clarity	-0.28	0.08	0.76	0.65	0.89	11.89***
DANVA	-0.09	0.04	0.91	0.84	0.99	4.61*
Challenge	0.24	0.06	1.27	1.14	1.42	19.05***
Constant	6.98	3.03	1073.13			5.3*

\* $p < 0.05$  \*\* $p < 0.01$  \*\*\* $p \leq 0.001$

## REFERENCES

- Achenbach, T. M. (1991). Manual for the CBCL/4-18 and 1991 Profile. *Burlington, University of Vermont, Department of Psychiatry.*
- Achenbach, T. M., & Rescorla, L. A. (2003). Manual for the ASEBA adult forms & profiles. Burlington, VT: University of Vermont, Research Center for Children, Youth, & Families.
- Appleyard, K., Egeland, B., Dulmen, M. H., & Alan Sroufe, L. (2005). When more is not better: The role of cumulative risk in child behavior outcomes. *Journal of Child Psychology and Psychiatry, 46(3), 235-245.*
- Bandura, A. (1986). *Social Foundations of Thought and Action: A Social Cognitive Theory.* Englewood Cliffs, NJ, US: Prentice-Hall, Inc.
- Banerjee, T. D., Middleton, F., & Faraone, S. V. (2007). Environmental risk factors for attention-deficit hyperactivity disorder. *Acta Paediatrica, 96(9), 1269-1274.*
- Baumeister, R. F., Heatherton, T. F., & Tice, D. M. (1994). *Losing Control: How and Why People Fail at Self Regulation.* San Diego, CA: Academic Press.
- Boekaerts, M., Pintrich, P. R., & Zeidner, M. (Eds.). (2000). Handbook of self-regulation. San Diego: Academic Press.
- Boyce, W. T., & Ellis, B. J. (2005). Biological sensitivity to context: I. An evolutionary-developmental theory of the origins and functions of stress reactivity. *Development and Psychopathology, 17(2), 271-301.*

- Bronstein, M., & Suess, P., (2000). Physiological self-regulation and information processing in infancy: Cardiac vagal tone and habituation. *Child Development*, 71(2), 273-287.
- Bukley, M., & Saarni, C. (2006). Skills of emotional competence: Developmental implications. *Emotional Intelligence in Everyday Life*, 51-76.
- Cameron, A. C. (2004). Kurtosis. In M. S. Lewis-Beck, A. Bryman & T. F. Liao (Eds.), *The Sage Encyclopedia of Social Science Research Methods* (Vol. 2, pp. 543-544). Thousand Oaks, CA: Sage Publications.
- Carter, A.S., Wagmiller, R.J., Gray, S.A.O., McCarthy, K.J., Horwitz, S.M., & Briggs-Gowan, M.J. (2010). Prevalence of DSM-IV disorder in a representative, healthy birth cohort at school entry: Sociodemographic risks and social adaptation. *Journal of the American Academy of Child & Adolescent Psychiatry*, 49(7), 686-698.
- Ciarrochi, J., Heaven, P. C., & Supavadeeprasit, S. (2008). The link between emotion identification skills and socio-emotional functioning in early adolescence: A 1-year longitudinal study. *Journal of Adolescence*, 31(5), 565-582.
- Ciarrochi, J., Scott, G., Deane, F. P., & Heaven, P. C. L. (2003). Relations between social and emotional competence and mental health: A construct validation study. *Personality and Individual Differences*, 35(8), 1947-1953. DOI: 10.1016/S0191-8869(03)00043-6
- Cicchetti, D. & Rogosch, F.A. (1996). Equifinality and multifinality in developmental psychopathology. *Development and Psychopathology*, 8, 597-600.  
doi:10.1017/S0954579400007318

- Cicchetti, D. & Toth, S. L. (1998). The development of depression in children and adolescents. *American Psychologist*, 53(2), 221-241. DOI: 10.1037/0003-066X.53.2.221
- Cicchetti, D. & Weisz J.R. (Eds.), *Developmental psychopathology: Perspectives on adjustment, risk, and disorder* 507-526. New York: Cambridge University Press.
- Cohen, L. H., & Park, C. (1992). Life stress in children and adolescents: An overview of conceptual and methodological issues. In A. M. La Graca, L. J. Siegel, J. L. Wallander, & C. E. Walker (Eds.), *Stress and coping in child health* (pp. 25–43). New York: Guilford Press.
- Cole, M., Cole, S. R., & Lightfoot, C. (2004). *The development of children*. Worth publishers.
- Compas, B. E., Connor-Smith, J. K., Saltzman, H., Thomsen, A. H., & Wadsworth, M. E. (2001). Coping with stress during childhood and adolescence: problems, progress, and potential in theory and research. *Psychological bulletin*, 127(1), 87.
- Copeland, W., Shanahan, L., Costello, E.J., & Angold, A. (2009). Configurations of common childhood psychosocial risk factors. *Journal of Child Psychology and Psychiatry*, 50(4), 451-459. doi:10.1111/j.1469-7610.2008.02005.x.
- Crick, N. R., & Dodge, K. A. (1994). A review and reformulation of social information-processing mechanisms in children's social adjustment. *Psychological bulletin*, 115(1), 74.

- Davies, P.T., Winter, M.A., & Cicchetti, D. (2006). The implications of emotional security theory for understanding and treating childhood psychopathology. *Development and Psychopathology, 18*, 707-735. Doi: 10.1017/S0954579406060354
- Del Giudice, M., Angeleri, R., Brizio, R., & Elena, M. R. (2010). The evolution of autistic-like and schizotypal traits: a sexual selection hypothesis. *Frontiers in Psychology, 1*(41), 1-18. DOI: 10.3389/fpsyg.2010.00041
- Del Giudice, M., Ellis, B. J., & Shirlcliff, E. A. (2011). The Adaptive Calibration Model of stress responsivity. *Neuroscience & Biobehavioral Reviews, 35*(7), 1562-1592. doi: 10.1016/j.neubiorev.2010.11.007
- Derryberry, D., & Rothbart, M. K. (1997). Reactive and effortful processes in the organization of temperament. *Development and Psychopathology, 9*(4), 633-652.
- Dodge, K. A., Lansford, J. E., Burks, V., Bates, J. E., Pettit, G. S., Fontaine, R., & Price, J. M. (2003). Peer rejection and social information-processing factors in the development of aggressive behavior problems in children. *Child Development, 74*(2), 374-393. doi:10.1111/1467-8624.7402004
- Drabick, D.A.G., Ollendick, T.H., Bubier, J.L. (2010). Co-occurrence of ODD and anxiety: Shared risk processes and evidence for a dual-pathway model. *Clinical Psychology: Science and Practice, 17*, 307-318.
- Durak, M. (2007). The Relationship between Cognitive Appraisal of Stress, Coping Strategies and Psychological Distress among Correctional Officers: Personal and Environmental Factors (Doctoral dissertation, Middle East Technical University).

- Eisenberg, N., Fabes, R. A., Guthrie, I. K., & Reiser, M. (2000). Dispositional emotionality and regulation: their role in predicting quality of social functioning. *Journal of Personality and Social Psychology*, 78(1), 136.
- Evans, A. S., & Frank, S. J. (2004). Adolescent depression and externalizing problems: Testing two models of comorbidity in an inpatient sample. *Adolescence*, 39(153), 1-18.
- Fanti, K. A., & Henrich, C. C. (2010). Trajectories of pure and co-occurring internalizing and externalizing problems from age 2 to age 12: Findings from the National Institute of Child Health and Human Development Study of Early Child Care. *Developmental Psychology*, 46(5), 1159-1175. doi: 10.1037/a0020659
- Fitness, J., & Curtis, M. (2005). Emotional intelligence and the Trait Meta-Mood Scale: Relationships with empathy, attributional complexity, self-control, and responses to interpersonal conflict. *Sensoria: A Journal of Mind, Brain & Culture*, 1(1), 50-62.
- Folkman, S., & Lazarus, R. S. (1985). If it changes it must be a process: Study of emotion and coping during three stages of a college examination. *Journal of Personality and Social Psychology*, 48(1), 150.
- Folkman, S., Lazarus, R. S., Gruen, R. J., & DeLongis, A. (1986). Appraisal, coping, health status, and psychological symptoms. *Journal of Personality and Social Psychology; Journal of Personality and Social Psychology*, 50(3), 571.
- Forbes, E. E., Fox, N. A., Cohn, J. F., Galles, S. F., & Kovacs, M. (2006). Children's affect regulation during a disappointment: Psychophysiological responses and relation to parent history of depression. *Biological Psychology*, 71(3), 264-277.

- Fletcher, K., Parker, G. B., & Manicavasagar, V. (2013). Coping profiles in bipolar disorder. *Comprehensive psychiatry*, 54(8), 1177-1184.
- Garnefski, N., Kraaij, V., & van Etten, M. (2005). Specificity of relations between adolescents' cognitive emotion regulation strategies and internalizing and externalizing psychopathology. *Journal of adolescence (London, England)*, 28(5), 619-631.
- Garson, G. D. (2012). Discriminant Function Analysis. *Asheboro, NC: Statistical Associates Publishers.*
- Gentzler, A. L., Santucci, A. K., Kovacs, M., & Fox, N. A. (2009). Respiratory sinus arrhythmia reactivity predicts emotion regulation and depressive symptoms in at-risk and control children. *Biological Psychology*, 82(2), 156-163. DOI: 10.1016/j.biopsycho.2009.07.002
- Grant, K. E., Compas, B. E., Stuhlmacher, A. F., Thurm, A. E., McMahon, S. D., & Halpert, J. A. (2003). Stressors and child and adolescent psychopathology: Moving from markers to mechanisms of risk. *Psychological Bulletin*, 129(3), 447-466. doi: 10.1037/0033-2909.129.3.447
- Green, J.G., McLaughlin, K.A., Berglund, P.A., Gruber, M.J., Sampson, N.A., Zaslavsky, A.M., & Kessler, R. C. (2010). Childhood adversities and adult psychopathology in the National Comorbidity Survey Replication (NCS-R) I: Associations with first onset of DSM-IV disorders. *Arch Gen Psychiatry*, 67(2), doi:10.1001/archgenpsychiatry.2009.186.

- Han, S. S., Weisz, J. R., & Weiss, B. (2001). Specificity of relations between children's control-related beliefs and internalizing and externalizing psychopathology. *Journal of Consulting and Clinical Psychology, 69*(2), 240.
- Hastings, P. D., Nuselovici, J. N., Klimes-Dougan, B., Kendziora, K. T., Usher, B. A., Ho, M. H. R., & Zahn-Waxler, C. (2009). Dysregulated coherence of subjective and cardiac emotional activation in adolescents with internalizing and externalizing problems. *Journal of Child Psychology and Psychiatry, 50*(11), 1348-1356.
- Hastings, T., & Kelley, M. L. (1997). Development and validation of the Screen for Adolescent Violence Exposure (SAVE). *Journal of Abnormal Psychology, 25*, 511-520.
- Huberty, C. J. & Hussein, M. H. (2003). Some problems in reporting use of discriminant analyses. *The Journal of Experimental Education, 71*(2), 177-192. DOI: 10.1080/00220970309602062
- Insel, T.R. (2008). Assessing the economic costs of serious mental illness. *The American Journal of Psychiatry, 165*(6), 663-665.
- Karademas, E. C., & Kalantzi-Azizi, A. (2004). The stress process, self-efficacy expectations, and psychological health. *Personality and Individual Differences, 37*(5), 1033-1043.
- Karoly, P. (1993). Mechanisms of self-regulation: A systems view. *Annual review of psychology, 44*(1), 23-52.
- Kauhanen, J., Kaplan, G. A., Julkunen, J., Wilson, T. W., & Salonen, J. T. (1993). Social factors in alexithymia. *Comprehensive Psychiatry, 34*(5), 330-335.

- Kerr, S., Johnson, V. K., Gans, S. E., & Krumrine, J. (2004). Predicting adjustment during the transition to college: Alexithymia, perceived stress, and psychological symptoms. *Journal of College Student Development, 45*(6), 593-611.
- Kessler, R. C., Davis, C. G., & Kendler, K. S. (1997). Childhood adversity and adult psychiatric disorder in the US National Comorbidity Survey. *Psychological medicine, 27*(05), 1101-1119.
- Kessler, R. C., Zhao, S., Blazer, D. G., & Swartz, M. (1997). Prevalence, correlates, and course of minor depression and major depression in the National Comorbidity Survey. *Journal of Affective Disorders, 45*(1-2), 19-30.
- King, K. R. (2005). Why is discrimination stressful? The mediating role of cognitive appraisal. *Cultural Diversity and Ethnic Minority Psychology, 11*(3), 202-212.  
DOI: 10.1037/1099-9809.11.3.202
- Kring, A. M., & Caponigro, J. M. (2010). Emotion in Schizophrenia Where Feeling Meets Thinking. *Current Directions in Psychological Science, 19*(4), 255-259.
- Lane, R. D., Quinlan, D. M., Schwartz, G. E., Walker, P. A., & Zeitlin, S. B. (1990). The levels of emotional awareness scale: A cognitive-developmental measure of emotion. *Journal of Personality Assessment, 55*(1-2), 124-134. DOI: 10.1080/00223891.1990.9674052
- Largo-Wight, E., Peterson, P. M., & Chen, W. W. (2005). Perceived problem solving, stress, and health among college students. *American Journal of Health Behavior, 29*(4), 360-370.
- Lazarus, R. S., & Folkman, S. (1984). *Stress, Appraisal, and Coping*. Springer Publishing Company.

- Lemerise, E. A., & Arsenio, W. F. (2000). An integrated model of emotion processes and cognition in social information processing. *Child Development, 71*(1), 107-118.  
doi:10.1111/1467-8624.00124
- Lengua, L.J., (2002). The Contribution of Emotionality and Self-Regulation to the Understanding of Children's Response to Multiple Risk. *Child Development, 73*(1), 144-161.
- Lengua, L. J., Bush, N. R., Long, A. C., Kovacs, E. A., & Trancik, A. M. (2008). Effortful control as a moderator of the relation between contextual risk factors and growth in adjustment problems. *Development and Psychopathology, 20*(2), 509-528. DOI: 10.1017/S0954579408000254
- Lengua, L.J., Honorado, E., & Bush, N.R. (2007). Contextual risk and parenting as predictors of effortful control and social competence in preschool children. *Journal of Applied Developmental Psychology, 28*, 40-55.
- Leppanen, J. M. (2006). Emotional information processing in mood disorders: A review of behavioral and neuroimaging findings. *Current Opinion in Psychiatry, 19*(1), 34-39.
- Little, S. A., & Garber, J. (2005). The role of social stressors and interpersonal orientation in explaining the longitudinal relation between externalizing and depressive symptoms. *Journal of Abnormal Psychology, 114*(3), 432-443. DOI: 10.1037/0021-843X.114.3.432

- Marsh, P., McFarland, F. C., Allen, J. P., Boykin McElhaney, K., & Land, D. (2003). Attachment, autonomy, and multifinality in adolescent internalizing and risky behavioral symptoms. *Development and Psychopathology, 15*(2), 451-467. DOI: 10.1017.S0954579403000245
- Matthews, K. A., Salomon, K., Brady, S. S., & Allen, M. T. (2003). Cardiovascular reactivity to stress predicts future blood pressure in adolescence. *Psychosomatic Medicine, 65*(3), 410-415.
- Menard, S.W. (1995) Applied Logistic Regression Analysis. *SAGE Publication, Inc.*, Thousand Oaks, CA.
- Merikangas, K.R., Avenevoli, S., Costello, E.J., Koretz, D., Kessler, R.C. (2009) National comorbidity survey adolescent supplement (NCS-A): I. background and measures. *Journal of the American Academy of Child & Adolescent Psychiatry 48*(4), 367-379. DOI: 10.1097/CHI.0b013e31819996f1
- Mertler, C. A. & Vannatta, R.A. (2002). A guide to multivariate techniques. *Advanced and Multivariate Statistical Methods: Practical Application and Interpretation* (2nd ed.) (13-22). Los Angeles, CA: Pyrczak Publishing.
- Nowicki, S., & Carton, J. (1993). The measurement of emotional intensity from facial expressions. *The Journal of Social Psychology, 133*(5), 749-750. DOI: 10.1080/00224545.1993.9713934
- Nowicki, S., & Duke, M. (1994). Individual differences in the nonverbal communication of affect: The Diagnostic Analysis of Nonverbal Accuracy Scale. *Journal of Nonverbal Behavior, 18*, 9-35.

- Oland, A. A., & Shaw, D. S. (2005). Pure versus co-occurring externalizing and internalizing symptoms in children: The potential role of socio-developmental milestones. *Clinical Child and Family Psychology Review*, 8(4), 247-270. DOI: 10.1007/s10567-005-8808-z
- Orobio de Castro, B., Veerman, J. W., Koops, W., Bosch, J. D., & Monshouwer, H. J. (2003). Hostile attribution of intent and aggressive behavior: A meta-analysis. *Child Development*, 73(3), 916-934. DOI: 10.1111/1467-8624.00447
- Peacock, E. J., & Wong, P. P. (1990). The stress appraisal measure (SAM): A multidimensional approach to cognitive appraisal. *Stress Medicine*, 6(3), 227-236. DOI: 10.1002/smi.2460060308
- Pittman, L. D., & Richmond, A. (2008). University belonging, friendship quality, and psychological adjustment during the transition to college. *The Journal of Experimental Education*, 76(4), 343-362.
- Porges, S. W. (1997). Emotion: An evolutionary by-product of the neural regulation of the autonomic nervous system. *Annals of the New York Academy of Sciences*, 807(1), 62-77. DOI: 10.1111/j.1749-6632.1997.tb51913.x
- Porges, S. W., & Furman, S. A. (2010). The early development of the autonomic nervous system provides a neural platform for social behavior: A polyvagal perspective. *Infant and Child Development*, 20(1), 106-118. DOI: 10.1002/icd.688
- Posner, M. I., & Rothbart, M. K. (2000). Developing mechanisms of self-regulation. *Development and Psychopathology*, 12(3), 427-441.

- Reef, J., van Meurs, I., Verhulst, F. C., & van der Ende, J. (2010). Children's problems predict adults' DSM-IV disorders across 24 years. *Journal of the American Academy of Child & Adolescent Psychology*, 49(11), 1117-1124. DOI: 10.1016/j.jaac.2010.08.002
- Roesch, S. C., & Rowley, A. A. (2005). Evaluating and developing a multidimensional, dispositional measure of appraisal. *Journal of Personality Assessment*, 85(2), 188-196. DOI: 10.1207/s15327752jpa8502\_11
- Rothbart, M. K., & Bates, J. E. (1998). Temperament. In W. Damon (Series Ed.) & N. Eisenberg (Vol. Ed.), *Handbook of child psychology: Vol. 3. Social, emotional and personality development* (5th ed., pp. 105–176). New York: Wiley.
- Rothman, A. D., & Nowicki, S. (2004). A measure of the ability to identify emotion in children's tone of voice. *Journal of Nonverbal Behavior*, 28(2), 67-92.
- Rottenberg, J., Clift, A., Bolden, A., & Salomon, K. (2007). RSA fluctuation in major depressive disorder. *Psychophysiology*, 44(3), 450-458. DOI: 10.1111/j.1469-8986.2007.00509.x
- Rowley, A. A., Roesch, S. C., Jurica, B. J., & Vaughn, A. A. (2005). Developing and validating a stress appraisal measure for minority adolescents. *Journal of Adolescence*, 28(4), 547-557. DOI: 10.1016/j.adolescence.2004.10.010
- Rutter, M. (2009). Understanding and testing risk mechanisms for mental disorders. *Journal of Child Psychology and Psychiatry* 50(1-2), 44-52. DOI: 10.1111/j.1469-7610.2008.01976.x
- Saarni, C. (1999). *The development of emotional competence*. New York, NY: The Guilford Press.

- Saarni, C. (2000). Emotional competence: A developmental perspective. In R. Bar-On & J.D. Parker (Eds.), *Handbook of emotional intelligence: Theory, development, assessment, and application at home, school, and in the workplace*, 68-91. San Francisco: Jossey-Bass.
- Salomon, K. (2005). Respiratory sinus arrhythmia during stress predicts resting respiratory sinus arrhythmia 3 years later in a pediatric sample. *Health Psychology* 24(1), 68-76. DOI: 10.1037/0278-6133.24.1.68
- Salovey, P., Mayer, J.D., Goldman, S.L., Turvey, C., & Palfai, T.P. (1995). Emotional attention, clarity, and repair: Exploring emotional intelligence using the trait meta-mood scale. *Emotion, Disclosure, and Health*, 125-154.
- Sameroff, A. J., Seifer, R., & Bartko, W. T. (1997). Environmental perspectives on adaptation during childhood and adolescence. In S. S. Luthar, J. A. Burack, D. Sander, J. B., & McCarty, C. A. (2005). Youth depression in the family context: Familial risk factors and models of treatment. *Clinical Child and Family Psychology Review*, 8(3), 203-219
- Sarason, I.G., Levine, H.M., Basham, R.B., & Sarason, B.R. (1983). Assessing social support: The social support questionnaire. *Journal of Personality and Social Psychology* 44(1), 127-139. DOI: 10.1037/0022-3514.44.1.127
- Shanahan, L., Copeland, W., Costello, E.J., & Angold, A. (2008). Specificity of putative psychosocial risk factors for psychiatric disorders in children and adolescents. *Journal of Child Psychology and Psychiatry* 49(1), 34-42. DOI: 10.1111/j.1469-7610.2007.01822.x

- Smith, C.A., & Lazarus, R.S. (1993). Appraisal components, core relational themes, and the emotions. *Cognition & Emotion* 7(3-4), 233-269. DOI: 10.1080/02699939308409189
- Strelau, J. (1995). Temperament and stress: Temperament as a moderator of stressors, emotional states, coping, and costs. *Stress and emotion: Anxiety, anger, and curiosity* 15(1), 215-254.
- Taylor, G. J. (2000). Recent developments in alexithymia theory and research. *The Canadian Journal of Psychiatry* 45, 134–142.
- Taylor, G. J., Bagby, R. M. & Parker, J. D. A. (1997). *Disorders of affect regulation: Alexithymia in medical and psychiatric illness*. Cambridge: Cambridge University Press.
- Thompson, R.A. (1994). Emotion regulation: A theme in search of definition. *Monographs of the Society for Research in Child Development* 59(2-3), 25-52. DOI: 10.1111/j.1540 5834.1994.tb01276.x
- Thompson, R. (1998). Early socioemotional development. In Damon, W. (series ed.) and Eisenberg, N. (vol. ed.), *Handbook of Child Psychology, Vol. 3: Social, Emotional, and Personality Development*, 5th edn., Wiley, New York, pp. 25–104.
- Thompson, B. (1998). Review of What if there were no significance tests? *Educational and Psychological Measurement*, 58, 332–344.
- Trentacosta C., Hyde L., Shaw D., Dishion T., Gardner F., Wilson M. (2008). The relations among cumulative risk, parenting, and behavior problems during early childhood. *Journal of Child Psychology and Psychiatry*, 1211-1220.

- Wakschlag, L.S., Pickett, K.E., Cook, E., Benowitz, N.L., & Leventhal, B.L. (2002).  
Maternal smoking during pregnancy and severe antisocial behavior in offspring:  
A review. *American Journal of Public Health* 92(6), 966-974. DOI:  
10.2105/AJPH.92.6.966
- Weisz, J.R., Weiss, B., Wasserman, A.A., & Rintoul, B. (1987). Control-related beliefs  
and depression among clinic-referred children and adolescents. *Journal of  
Abnormal Psychology* 96(1), 58-63. DOI: 10.1037/0021-843X.96.1.58
- Zeitlin, S. B., & McNally, R. J. (1993). Alexithymia and anxiety sensitivity in panic  
disorder and obsessive-compulsive disorder. *The American Journal of Psychiatry*  
150(4), 658-660.
- Zeman, J., Shipman, K., & Suveg, C. (2002). Anger and sadness regulation: Predictions  
to internalizing and externalizing symptoms in children. *Journal of Clinical Child  
and Adolescent Psychology* 31(3), 393-398. DOI:  
10.1207/S15374424JCCP3103\_11
- Zimmerman, B.J. (2000). Self-efficacy: An essential motive to learn. *Contemporary  
Educational Psychology* 25(1), 82-91. DOI: 10.1006/ceps.1999.1016

## APPENDIX A: DEMOGRAPHIC SURVEY

### Demographic Survey

1. What is your age? \_\_\_\_\_
  
2. What is your year in school?
  - Freshman
  - Sophomore
  - Junior
  - Senior
  - Senior-plus (More than four years)
  
3. What is your gender?
  - Male
  - Female
  
4. What is your sexual orientation?
  - Attracted to the opposite sex
  - Attracted to the same sex
  - Attracted to both sexes
  
5. Which ethnic group best describes you?
  - Hispanic or Latino/a
  - Not Hispanic or Latino/a
  
6. Which racial group best describes you? Please check all that apply.
  - American Indian or Alaskan Native
  - Asian

- Black or African American
- Native Hawaiian or Pacific Islander
- White or Caucasian
- Other - Specify: \_\_\_\_\_
- More than one race - Specify: \_\_\_\_\_

7. What is your living situation?

- Live with parents / family
- Live alone, on campus
- Live alone, off campus
- Live with roommate(s), on campus
- Live with roommate(s), off campus
- Other - Specify: \_\_\_\_\_

8. What was your total household income on average over the last 10 years?

- Under \$10,000
- \$10,000 - \$19,000
- \$20,000 - \$29,000
- \$30,000 - \$39,000
- \$40,000 - \$49,000
- \$50,000 - \$59,000
- \$60,000 - \$69,000
- \$70,000 - \$79,000
- \$80,000 - \$89,000
- Over \$90,000

## Appendix B: IRB APPROVAL LETTER



RESEARCH INTEGRITY AND COMPLIANCE  
Institutional Review Boards, FWA No. 00001669  
1090 Bruce B. Downs Blvd., MDC033 • Tampa, FL 33612-4799  
(813) 974-5538 • FAX (813) 974-7091

July 5, 2013

Brittany Jordan-Arthur  
Psychology Department  
4202 East Fowler Ave, PCD 4118G  
Tampa, FL 33620

RE: **Expedited Approval for Initial Review**

IRB#: Pro00011970

Title: **Equifinality and multifinality in psychopathology: Can cognitive and emotional processes differentiate internalizing, externalizing, and co-occurring psychopathology?**

**Study Approval Period: 7/5/2013 to 7/5/2014**

Dear Ms. Jordan-Arthur:

On 7/5/2013, the Institutional Review Board (IRB) reviewed and **APPROVED** the above application and all documents outlined below.

**Approved Item(s):**

**Protocol Document(s):**

[Equifinality and multifinality in psychopathology protocol V1 5.18.13](#)

**Consent/Assent Document(s)\*:**

[Online Informed Consent V1 4.22.13](#) (granted a waiver of informed consent documentation)

\*Please use only the official IRB stamped informed consent/assent document(s) found under the "Attachments" tab. Please note, these consent/assent document(s) are only valid during the approval period indicated at the top of the form(s). (Waivers are not stamped).

It was the determination of the IRB that your study qualified for expedited review which includes activities that (1) present no more than minimal risk to human subjects, and (2) involve only procedures listed in one or more of the categories outlined below. The IRB may review research through the expedited review procedure authorized by 45CFR46.110 and 21 CFR 56.110. The research proposed in this study is categorized under the following expedited review category:

(7) Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.

Your study qualifies for a waiver of the requirements for the documentation of informed consent as outlined in the federal regulations at 45CFR46.117(c) which states that an IRB may waive the requirement for the investigator to obtain a signed consent form for some or all subjects.

As the principal investigator of this study, it is your responsibility to conduct this study in accordance with IRB policies and procedures and as approved by the IRB. Any changes to the approved research must be submitted to the IRB for review and approval by an amendment.

We appreciate your dedication to the ethical conduct of human subject research at the University of South Florida and your continued commitment to human research protections. If you have any questions regarding this matter, please call 813-974-5638.

Sincerely,



John Schinka, Ph.D., Chairperson  
USF Institutional Review Board