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## The Structure of Psychopathology and Its Relationship to Personality and EEG

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THE STRUCTURE OF PSYCHOPATHOLOGY AND ITS  
RELATIONSHIP TO PERSONALITY AND EEG

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## **Abstract**

The factor structure of psychopathology has been debated in the literature, with studies showing support for several models, including one-, two-, and three-factor solutions. The factor structures often vary as a function of what symptoms and diagnoses are included, and when a wide array of diagnoses are present, a three-factor solution is often found. Personality has been shown to be related to psychopathology and its higher order structures, but there is little research regarding neurobiological associations that take into account the factor structure of psychopathology along with personality. This dissertation examined the factor structure of a wide range of psychopathology, and its associations with both personality and neurobiological correlates using EEG paradigms in a sample of college students. When total scores were examined, a three-factor structure was supported, and a six-factor structure was supported when examining subscales. Feelings of alienation and a tendency to become stressed were related to most psychopathologies. EEG findings suggest that symptom clusters not typically captured in the internalizing-externalizing factor structure are less likely to experience emotional reactions, and possibly a lack of attention and engagement in general.

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## **Chapter 1: Introduction**

### **The Factor Structure of Psychopathology**

The nature of psychiatric comorbidity, or the co-occurrence of mental disorders (Feinstein, 1970), is a point of contention in the adult psychodiagnostic literature. Some theorists believe it represents an artifact of arbitrary categories (Robins, 1994) that do not faithfully represent the fullness of clinical presentations (e.g., Maj, 2005). Others argue that disorders co-occur in a relatively lawful fashion that reflects a higher-order structure of psychopathology (Krueger & Markon, 2006) in which increasingly severe clinical presentations are marked by the presence of more disorders across these factors (Kessler, Chiu, Demler, & Walters, 2005). The factors of psychopathology may be underpinned by extremes in normal-range personality (Khan, Jacobson, Gardner, Prescott, & Kendler, 2005). However, the neurobiological concomitants of higher-order factors of psychopathology remain tantalizingly underexplored.

Research on the factor structure of psychopathology in adults has yielded support for several models. Some research has found evidence for a general single factor of psychopathology. A large research study examining the hierarchical structure of mental disorders found that all disorders loaded onto a single general psychopathology factor, with correlations ranging from .54-.82 (Kim & Eaton, 2015). In a 20 year longitudinal study, psychiatric disorders were best represented by a single factor, with a three-factor solution showing the next best fit (Caspi et al., 2014). This study included disorders such as depression, bipolar, panic disorder, and drug abuse/dependence disorders. Some studies find that a one-factor model of psychopathology fits better than other models, often two- or three-factor models (Lahey et al., 2012). This finding is further supported by a meta-analysis using similar diagnoses that found that of participants that had a mental health diagnosis, 45% of them had at least one other



diagnosis (Krueger & Markon, 2006). The Minnesota Multiphasic Inventory-2-Restructured Form (MMPI-2-RF; Ben-Porath & Tellegen, 2008) contains a Demoralization scale which captures general unhappiness and dissatisfaction, which reflects a general psychopathology factor.

Research also yields support for two correlated factors of psychopathology when using similar diagnoses: internalizing disorders and externalizing disorders (Eaton, South, & Krueger, 2010), with some evidence that internalizing can be broken down into sub-factors (Krueger, 1999). Internalizing disorders include constructs such as depression, panic attack disorder, dysthymia, social phobia, generalized anxiety, and specific phobias (Krueger & Markon, 2006). Internalizing disorders have been shown to be moderately-to-highly stable in different age cohorts over time (Eaton, Krueger, & Oltmanns, 2011). Externalizing disorders include diagnoses such as conduct disorder, antisocial personality disorder, and substance abuse disorders. A large meta-analysis of the mentioned disorders showed that an internalizing-externalizing factor structure was the best fit (Krueger & Markon, 2006), although the two higher order constructs were still related, indicating that there may be some underlying connection.

Some diagnoses do not fit neatly into a two-factor model, including eating disorders. One study found that in veterans, anorexia, bulimia, and binge eating disorder all loaded onto a distress subfactor of internalizing problems (Mitchell, Wolf, Reardon, & Miller, 2014). A study of adolescents found that baseline internalizing symptoms interacted with affective reactivity to predict later development of eating disorder related attitudes (Juarascio et al., 2016). However, in the National Comorbidity Study Replication, substance abuse disorders were observed in anywhere from 23% to 36% of individuals with eating disorders, depending on the specific diagnosis (Hudson, Hiripi, Pope, & Kessler, 2012). A study including both men and women

showed that hyperactivity and aggression were more strongly associated with eating disorders in men while alcohol use was more strongly associated with eating disorders in women (Slane, Burt, & Klump, 2010).

The importance of internalizing and externalizing symptoms in eating disorders may differ upon the specific diagnosis under consideration. Girls who simultaneously presented with anorexia and bingeing and purging symptoms showed greater delinquency and externalizing problems compared to girls with other eating disorder symptom patterns (Ekeroth, Engström, Hägglöf, & Broberg, 2003). In a study comparing individuals with binge eating disorder with a BMI-matched control sample without the disorder, individuals with binge eating disorder experienced more internalizing and externalizing symptoms overall (Marek, Ben-Porath, Ashton, & Heinberg, 2014). Internalizing symptoms were more predictive of later anorexia symptoms, whereas externalizing symptoms were more predictive of later bulimia symptoms in a sample of adolescent girls (Adambegan et al., 2012). Eating disorder psychopathology is not the only set of diagnoses that do not fit neatly into a two-factor solution.

**Beyond a one- or two-factor solution.** Models of psychopathology that have more than two factors have been supported by research, especially when certain diagnoses are included. One study involving over 30,000 participants over two waves of data collection found support for a one-factor model of psychopathology, and then extracted factors until no new factors could be extracted (Kim & Eaton, 2015). They found that the general psychopathology factor extracted into internalizing and externalizing factors at the first step. At the end of the analysis, the internalizing factor broke down into the following factors: fear, distress, panic disorder, and bipolar disorder. For the externalizing factor, the only two other factors that emerged separately were an antisocial personality disorder factor and nicotine dependence factor. The externalizing

factor remained stable otherwise. These results suggest that disorder-specific factors may indicate a relatively weak connection between the specific disorders and the higher order factor (i.e., internalizing vs. externalizing) that they are often grouped with. The authors propose that some of these disorders may be more closely related to factors of other disorders they did not examine (e.g., bipolar disorder may be more closely related to psychosis/thought disorders). It is also possible that some constructs are unrelated to these higher order factors altogether.

Other studies that have included diagnoses such as psychotic disorders and autism have found evidence for a multifactor solution. For example, one study that examined psychotic symptoms found that the best fitting higher-order model grouped symptoms into internalizing, externalizing, and psychotic experiences factors (Wright et al., 2013). These factors were able to be extracted further into the following three factors: a) distress, fear, obsessive-compulsivity (from the internalizing factor); b) alcohol problems and drug problems (from the externalizing factor); and c) psychotic experiences. These factors all remained correlated with their higher order factors, indicating they are parings of those factors rather than separate entities. One longitudinal study following a group of children showed that later psychotic symptoms were predicted by both previous internalizing and externalizing problems (Lancefield, Raudino, Downs, & Laurens, 2016). Additionally, children who showed improvement in their internalizing and externalizing problems were just as likely to experience later psychotic symptoms as children who had never experienced any kind of psychopathology, further suggesting that psychotic disorders may comprise their own separate factor.

Another study that included psychotic symptoms and bipolar disorder (but excluded externalizing symptomatology) found evidence for a five-factor model: positive symptoms of psychosis, negative symptoms of psychosis, disorganization, mania, and depression/anxiety

(Wilson & Sponheim, 2014). This finding supports Kim & Eaton's (2015) suggestion that bipolar symptoms may be separate from other mood disorders that do not feature mania. Additionally, mania loaded separately from psychotic symptoms, providing evidence for their original finding of a separate "bipolar" factor. Regardless, psychotic and manic symptoms do not fit neatly into a two-factor model of psychopathology.

With regards to autism spectrum disorders, there is evidence that these disorders load onto a separate and related factor from externalizing and internalizing problems (Noordhof, Krueger, Ormel, Oldehinkel, & Hartman, 2015). This study found evidence for four factors, including internalizing problems, externalizing problems, autism spectrum problems, and attention/orientation problems. The finding that autism problems represent a separate constellation of symptoms related to but separate from internalizing and externalizing problems is in line with evidence that both internalizing and externalizing symptoms are highly comorbid among children with autism (Jamison & Schuttler, 2015; Vaillancourt et al., 2016). This would suggest that having autism spectrum problems predisposes individuals to other kinds of problems in general, rather than just to internalizing or externalizing problems alone. Autism symptoms, in addition to manic and psychotic symptoms, also defy neat categorization within the internalizing-externalizing structure.

Dissociative symptoms have received little attention with regards to how they fit into the factor structure of psychopathology. There is some evidence that dissociative symptoms among children who have been traumatized are positively correlated with both externalizing and internalizing problems (Hagan, Hulette, & Lieberman, 2015). A study of young adult women showed that dissociation was positively related to body surveillance, depression, and self-harm (Erchull, Liss, & Lichiello, 2013). In a longitudinal study of adolescents, girls exposed to

violence were more likely to experience dissociative symptoms than boys, but not more likely to develop greater externalizing, internalizing, or PTSD symptoms (Zona & Milan, 2011). The mixed results of these studies shows that more research is needed to clarify dissociation's role in the higher order structure of psychopathology.

**Demographic differences in psychopathology factors.** The two-factor solution has been extensively studied in regards to who develops internalizing or externalizing problems and why. Evidence suggests that gender differences in rates of internalizing and externalizing problems are seen as early as middle school or adolescence, with girls showing more internalizing problems and boys showing more externalizing problems (Barriga, Morrison, Liao, & Gibbs, 2001; Leadbeater, Kuperminc, Blatt, & Hertzog, 1999). One study of adolescents showed that boys who score high on internalizing disorders tended to display more inhibited and apprehensive behavior compared to girls, whereas girls who scored high on the internalizing factor were more likely to show a cold and distant emotionality and labile affect (Abad & Forns, 2008). An fMRI study showed that among individuals with and without a history of internalizing disorders, women with a history of internalizing disorders showed the greatest disruption in the default mode network during the resolution of cognitive interference (Wang et al., 2016). In a sample of adolescent offenders, boys showed more psychopathic personality traits than girls, and the girls experienced greater levels of depression, regardless of offender status (Urban et al., 2015). Men may be more likely to inherit genetic vulnerabilities associated with lower sympathy, self-control, and empathy compared to women, and they may be more prone to adverse prenatal, perinatal, and postnatal events that impair intelligence and executive functions (Eme, 2016). These factors would lead to a greater prevalence of externalizing disorders in men.

The Hierarchical Taxonomy of Psychopathology (HiTOP; Kotov et al., 2017) is a model proposed to address the inconsistent findings by focusing on symptom clusters rather than being restricted to diagnostic categories. The HiTOP model proposes six spectra, including somatoform, internalizing, externalizing, thought disorder, disinhibited externalizing, antagonistic externalizing, and detachment. These spectra were found to be all positively correlated with each other, similar to the one-factor model of psychopathology, which the HiTOP model refers to as “super spectra.” The internalizing and both externalizing spectra were found to have subfactors, such as eating psychopathology, substance abuse, and antisocial behavior. These spectra and subfactors are comprised of syndromes, which map closely onto established DSM-5 disorders. This model includes syndromes and disorders such as personality disorders as well as sexual problems, although it does not include autism spectrum or cognitive disorders.

### **Normal Range Personality Traits and Psychopathology**

**Theories of personality.** Normal range personality traits have been researched and conceptualized in a variety of ways. Tellegen and Waller's (2008) three- or four-factor model places heavy emphasis on emotional experience as defining factors of individual differences. The first factor is Positive Emotionality, which measures the degree of pleasure derived from either interpersonal interactions or achievements. Sometimes this factor is broken down into Communal and Agentic Positive Emotionality (reflecting whether the source of pleasure comes from interpersonal or achievement related activities, respectively). Negative Emotionality assesses differences in the strength and frequency of negative emotional experiences, including aggressive interpersonal tendencies. Finally, Constraint examines individual differences in approaches to potentially dangerous situations, planning, and attitudes towards social norms.

This model suggests that consistent, predictable, and widespread emotional experiences drive large parts of personality.

A similar model of personality is Eysenck's three-factor model (Eysenck, 1991), which also places some emphasis on emotional experiences. The three factors are: Extraversion, Neuroticism, and Psychoticism. Extraversion refers to tendencies to be gregarious, enjoy gatherings of people, and to find comfort in interpersonal relations. Neuroticism captures differences in negative emotions and pessimistic thinking patterns. Psychoticism refers to traits such as aggression, egocentrism, and tendencies to be manipulative. This model of personality has been linked to a number of clinical presentations, including criminal offenses (McEwan, 1983), alcohol use problems (MacAndrew, 1980), drug tolerance (Claridge, Donald, & Birchall, 1981), and externalizing problems in adolescents (Jackson & Center, 2002). However, Eysenck's model has not received significant attention in years from psychopathology researchers.

One of the most commonly accepted and heavily researched models of personality is the Big Five model, or the Five Factor Model (Digman, 1990; Goldberg, 1990). The five factors include: Neuroticism, Extraversion, Openness to Experience, Agreeableness, and Conscientiousness. Neuroticism and Extraversion are both similar to Eysenck's model, in that they capture negative emotional experiences and positive engagement in social relationships, respectively. Openness to Experience measures intellectual curiosity and the tendency to engage in fantasy, imagination, or unconventional thinking. Agreeableness measures the degree to which someone accommodates other people, including trustworthiness, cooperation, and modesty. Conscientiousness measures traits such as organization, diligence, and discipline.

Comparisons of the Big Five model and Tellegen's model revealed large amounts of overlap in what they measure (Church, 1994). Negative Emotionality was related to both

Neuroticism and Agreeableness (inverse), suggesting that intrapersonal negative emotional experiences and a disregard for interpersonal harmony together comprise overall individual differences in negative emotionality. Positive Emotionality was positively associated with Extraversion and Conscientiousness, indicating that seeking out the company of others and approaching tasks and challenges in an organized fashion lead to greater positive emotional experiences. Constraint was associated with greater Conscientiousness and lower Openness to Experience, indicating it is a higher order factor that represents constriction of both behaviors and cognitions. Although the Big Five has received a greater deal of research interest in psychopathology, the strong link with Tellegen and Waller's (2008) model shows that general emotional experiences are integral to measuring normal range personality.

**Personality and psychopathology.** Considering the strong link between emotional experiences and personality, it follows that personality traits have been shown to be related to psychopathology. A 20 year longitudinal study showed that psychopathology in general is related to below average Agreeableness, Conscientiousness, and above average Neuroticism (Caspi et al., 2014). With regards to specific facets of personality, externalizing behavior was associated with lower impulse control, aggression, and manipulation, while internalizing problems were associated with a tendency to be more easily distressed and to avoid interacting with the environment. High Neuroticism by itself has been linked with both greater internalizing and externalizing problems, and novelty-seeking distinguishes anxiety disorders from externalizing problems (Hink et al., 2013).

These relationships are observed across developmental stages. A study of adolescents showed that a reactive temperament factor of negative affectivity was related to both internalizing and externalizing disorders, while fear and low attention control were more strongly



related to internalizing problems, and anger/frustration, low activation, and low inhibitory control were more related to externalizing problems (Muris, Meesters, & Blijlevens, 2007). Dominance, poor rule conformity, and low self-discipline have been positively correlated with psychopathology in general in adolescents; and girls who had externalizing problems were more likely to score high on impulsiveness, social boldness, and low on sensitivity (Abad & Forns, 2008). In a two-year longitudinal study, emotionality and Extraversion were predictive of greater internalizing problems, and low Agreeableness and effortful control were related to greater externalizing problems (Hsu & Chang, 2015). A study of young adults found that greater general negative temperament was related to internalizing problems (Conway, Craske, Zinbarg, & Mineka, 2016). An eight-year study showed that adolescents who were the most prosocial at the start of the study were less likely to have externalizing problems by the end of the study, and that girls in the high prosocial group were less likely to develop internalizing problems (Flynn, Ehrenreich, Beron, & Underwood, 2015).

Research has drawn links between externalizing problems and a hierarchical two-factor model of the Big Five personality traits; specifically, externalizing problems were related to low Stability (Neuroticism reversed, Agreeableness, Conscientiousness) and high Plasticity (Openness and Extraversion; DeYoung, Peterson, Séguin, & Tremblay, 2008). More specifically, Agreeableness and Conscientiousness have been shown to be related to a variety of externalizing problems (Miller, Lynam, & Jones, 2008). Personality has also been shown to moderate the link between testosterone and externalizing behavior, with low Agreeableness and low Conscientiousness acting as risk factors and high Conscientiousness acting as a protective factor (Reardon, Herzhoff, & Tackett, 2015). In another study of adolescents and prosocial behavior, the personality traits of Agreeableness and Conscientiousness played a role in explaining the

relationship between prosocial behavior and both aggression and delinquency in girls (Pursell, Laursen, Rubin, Booth-LaForce, & Rose-Krasnor, 2008). One study showed that individual personality facets of larger constructs are helpful in predicting externalizing psychopathology. Specifically, they found that low scores on the non-antagonistic orientation facet in Agreeableness, low scores on the orderliness and dependability facets from the Conscientiousness factor, and low scores on the sociability facet from the Extraversion factor were associated with greater delinquency (Klimstra, Luyckx, Hale III, & Goossens, 2014).

**Internalizing disorder-specific links to personality.** Normal range personality traits have been also found to be associated with specific disorders beyond the overarching “internalizing” higher order factor, including depression, PTSD, and generalized anxiety. Higher Neuroticism and lower Extraversion, Agreeableness, and Conscientiousness have all been shown to be correlated in depression in both cross-sectional (Kim, Linton, Cho, & Ha, 2016; Kim et al., 2016) and longitudinal studies (Dermody, Quilty, & Bagby, 2016). Low positive emotionality has been associated with greater depression, social anxiety, and generalized anxiety over a 10 year period (Kendall et al., 2015). Greater Neuroticism and lower Extraversion and Conscientiousness were associated with comorbid anxiety disorders in older adults with a previous diagnosis of depression (van der Veen, van Zelst, Schoevers, Comijs, & Oude Voshaar, 2015). Individuals with both depression and anxiety showed greater amounts of harm avoidance compared to individuals with depression alone in a 10 year longitudinal study (Goldberg, Wittchen, Zimmermann, Pfister, & Beesdo-Baum, 2014).

In combat veterans, open-mindedness, flexibility, and emotional stability were all associated with lower levels of PTSD symptoms (Herrera & Owens, 2015). In a sample of combat veterans with PTSD and comorbid internalizing and externalizing problems, those with

externalizing problems showed lower constraint and harm avoidance, along with high alienation and aggression (Miller, Greif, & Smith, 2003). Veterans with internalizing problems showed lower positive emotionality, alienation, aggression, and higher constraint. Impulsivity and Neuroticism have been shown to be associated with greater PTSD symptoms (Lavoie et al., 2016; Netto et al., 2016), while greater Extraversion and intrapersonal and interpersonal resiliency were associated with fewer PTSD symptoms (Besser, Weinberg, Zeigler-Hill, & Neria, 2014; Lavoie et al., 2016; Wolf, Miller, Harrington, & Reardon, 2012).

### **EEG, Personality, and Psychopathology**

Electroencephalography (EEG) has been used to examine neural differences in individuals with internalizing and externalizing problems. One event-related potential (ERP) commonly used in studies of emotion regulation is the late positive potential (LPP) elicited by emotional stimuli (Hajcak et al., 2010). The LPP is a slow positive voltage change that is seen around 300 ms after viewing a picture with emotional stimuli (Dennis & Hajcak, 2009) and is thought to be sustained when attention is focused on the stimuli (Cuthbert, Schupp, Bradley, Birbaumer, & Lang, 2000). When participants view pleasant or aversive images, their LPP is much larger compared to neutral images (Cuthbert et al., 2000; Moratti, Keil, & Stolarova, 2004). The LPP does not typically habituate to emotional stimuli, meaning that it can be used in tasks employing multiple emotional stimuli (Hajcak, MacNamara, & Olvet, 2010; Olofsson & Polich, 2007).

**Diagnoses and EEG.** EEG has been used to show differing patterns of neural activity among individuals with different disorders. For example, depressed individuals displayed faster processing of negative self-relevant information compared to positive self-relevant information (Alloy, Abramson, Murray, Whitehouse, & Hogan, 1997; Greenberg & Alloy, 1989). There is

also evidence that individuals with depression show greater LPPs during processing of negative words (Shestyk & Deldin, 2010), which is a marker of attention to emotional stimuli (Dennis & Hajcak, 2009). Higher depressive symptoms have also been shown to be negatively associated with greater LPPs in response to angry faces, regardless of diagnosis (Kujawa et al., 2015). Thus, individuals with depression seem to pay more attention to and have a greater emotional reaction to negative stimuli than people without depression.

Differences in emotion reactivity have been noted in individuals with various anxiety disorders. Individuals with OCD showed greater LPPs in response to pictures that were relevant to their disorder compared to healthy controls, and they showed no difference in LPP strength when told to reduce emotional responding with cognitive distraction or reappraisal coping skills (Paul, Simon, Endrass, & Kathmann, 2016). Both trait and state anxiety have been shown to be positively correlated with LPP strength for emotional images of any kind but not neutral images (Burkhouse, Woody, Owens, & Gibb, 2015; MacNamara, Kotov, & Hajcak, 2016). In a study of children and adolescents with and without anxiety disorders, participants with anxiety disorders showed greater LPPs in response to seeing pictures of fearful faces compared to neutral faces (Kujawa et al., 2015).

LPPs can be used in conjunction with both dimensional and diagnostic measures of anxiety and depression. One study compared healthy controls with people who met criteria for major depressive disorder (MDD) or generalized anxiety disorder (GAD), as well as dimensional measures of depression and anxiety (MacNamara et al., 2016). Diagnostic and dimensional measures of depression were positively associated with reduced LPPs in response to emotional images in general, while diagnostic and dimensional measures of anxiety were associated with greater LPPs in response to emotional images. Additionally, dimensional depression and anxiety

were associated with greater rates of change of LPPs to visual stimuli that followed emotional pictures. Overall LPP amplitude (rather than the emotion-neutral difference) has also been associated with depressive symptomatology and social phobia (Benning & Oumeziane, 2017).

Emotion regulation processes in Posttraumatic Stress Disorder (PTSD) has also been investigated with EEG methods. In a sample of combat veterans, veterans without PTSD showed increased LPPs over time as a function of sustained emotional reactivity to emotional stimuli, but veterans with PTSD did not show this increase over time (Fitzgerald et al., 2016), suggesting reduced engagement with emotional stimuli. Individuals with more severe PTSD symptoms also showed greater LPPs in response to negative stimuli in general (Lobo et al., 2014). In a study of youth diagnosed with and without PTSD, participants without PTSD showed habituation to negative stimuli over time via skin conductance, whereas those with PTSD showed little habituation (Grasso & Simons, 2012). Additionally, participants with PTSD exhibited greater startle probe responses, which did not change as the participants received therapy and showed reduced symptoms. Taken together, these results suggest that people with PTSD greatly attend to initial negative emotional stimuli and never habituate, which may be a driving force behind hypervigilance symptoms.

Externalizing symptoms have also been researched with LPP paradigms. One study showed that among children who were later exposed to stress due to a natural disaster, those who had the greatest LPP response to negative images before the disaster were the most likely to develop externalizing symptoms after the disaster (Kujawa et al., 2016). Among anxious children, reduced LPP response to pictures of happy faces was associated with greater rule breaking and social problems (Woltering, Liao, Liu, & Granic, 2015). There has also been some limited research on adults and externalizing behavior. One study involving community

participants found that higher psychopathy scores were related to reduced LPP responses to both pleasant and aversive images (Anderson & Stanford, 2012). A study of prisoners found that with regards to psychopathy, the affective-interpersonal component of psychopathy was related to reduced LPP response to aversive pictures (Sadeh & Verona, 2012). Another study of male offenders found that the impulsive-antisocial factor of psychopathy was associated with reduced P3 response (a measure of attention and working memory) to pictures in general, and that the affective-interpersonal factor was associated with reduced LPP responses to aversive images (Venables, Hall, Yancey, & Patrick, 2015). However, it is rare to find LPP studies of higher-order factors of psychopathology, leaving this an open area for research.

**EEG and personality.** In contrast to the rich LPP literature in psychopathology, there are few studies that link emotional processing and normal range personality traits. High Extraversion has been shown to produce greater LPPs, particularly in response to positive stimuli, while Neuroticism was not related to LPP magnitude in response to emotional versus neutral pictures (Speed et al., 2015). This finding that high Extraversion was associated with positive emotions is congruent with Church's (1994) findings that Extraversion partly makes up Tellegen's (1985) Positive Emotionality factor. As mentioned above, trait anxiety is associated with LPP strength for emotional images of any kind, but not neutral images, even when controlling for state anxiety (Burkhouse et al., 2015). The personality trait Absorption, which is associated with greater subjective experience of emotions in general, has been shown to be associated with greater LPPs in response to emotional pictures versus neutral pictures, as well as reduced P3 strength in reaction to distracting noises presented soon after emotional pictures (Benning, Rozalski, & Klingspon, 2015).

## **Current Study**

The current study has three aims: First, the higher order factor structure of psychopathology was examined in a sample of undergraduate students. This sample includes symptoms that do not fit neatly a one- or two-factor solution, including symptoms of eating disorders, schizotypal personality, autism, and dissociation. Thus, we expected to find at least a three-factor solution to the data. The second aim was to then examine the associations between the higher order factors and normal range personality traits. Normal range personality traits and their associations with a factor structure that includes more than two factors have not been studied extensively, and the data will be explored. Finally, LPP patterns in response to an emotional picture viewing paradigm will be examined with respect to the higher-order factors of psychopathology that emerge in our analyses.

## **Chapter 2: Methods**

### **Participants**

Data was analyzed from an archive of 275 college student participants, who all received credit for participation in their introductory psychology courses. Participants had to be at least 18 years old to participate. The mean age was 20.3, ranging from 17 years to 50 years. Participants self-identified mostly as female (58.9%) and white (60.7%). Further racial breakdown is as follows: Black (10.9%), some other race (5.1%), Chinese (4.7%), Filipino (4.7%), Other Asian (4.4%), Asian Indian (1.8%), Vietnamese (1.5%), Other Pacific Islander (1.1%), American Indian or Alaskan Native (0.7%), Korean (0.7%), Native Hawaiian (0.7%), Japanese (0.4%), and Guamanian or Chamorro (0.4%).

## Measures

Participants filled out 15 questionnaires pertaining to normal-range personality and a diverse array of psychopathology symptoms. Not all participants completed every questionnaire, as some questionnaires were added into the battery later. Table 1 presents descriptive statistics and internal consistencies for each measure. In all data analyses involving personality and psychopathology, multivariate imputation by chained equations (*mice*; van Buuren, 2015) was used to impute scores for missing questionnaires and conduct subsequent data analyses using 10 pooled imputations.

EEG was recording using a 64-channel Neuroscan Quik-Cap with Ag/AgCl sintered electrodes and sampled at 2000 Hz with a Neuroscan SynAmps2 bioamplifier at DC with a 500 Hz low-pass filter. Offline, EEG data were referenced to linked mastoids before being epoched from 250 ms prepicture onset to 1,550 ms postpicture onset. An ocular artifact was applied (Semlitsch, Anderer, Schuster, & Presslich, 1986) to correct for blinks before data were low-pass filtered at 20 Hz (24 dB/octave).

**Multidimensional Personality Questionnaire.** The Multidimensional Personality Questionnaire (MPQ; Tellegen, 1985) is a self-report questionnaire of 11 normal-range personality characteristics grouped into three categories: Positive Emotionality, Negative Emotionality, and Constraint. It has shown good internal consistency (Miller, Greif, & Smith, 2003) and convergent validity with the Big Five model of personality (Church, 1994).

**Alcohol Dependence Scale.** Alcohol dependence symptoms were measured with the Alcohol Dependence Scale (ADS; Skinner & Horn, 1984). It is a continuous measure that has been found to be a valid measure of outcomes such as drinks consumed per day, years of problem drinking, and both psychiatric and physical health problems (Kivlahan, Sher, &



Donovan, 1989). Exploratory factor analysis has shown that the measure is unidimensional (Skinner & Allen, 1982).

**Autism-Spectrum Quotient.** Autism symptoms were assessed with the Autism-Spectrum Quotient (AQ; Baron-Cohen, Wheelwright, Skinner, Martin, & Clubley, 2001). It assesses symptoms in the following domains: Social Skills, Attention Switching, Attention to Detail, and Imagination. The measure has been used extensively in both research and clinical populations and has shown both good reliability and validity in distinguishing those with the diagnosis from those without it. (Ruzich et al., 2015).

**Beck Anxiety Inventory.** Panic and anxious arousal symptoms were assessed with the Beck Anxiety Inventory (BAI; Beck & Steer, 1990). The measure is a 21-item questionnaire meant to assess anxiety in psychiatric populations, and it has shown to have good reliability and validity in distinguishing those with panic disorder and agoraphobia from those without it (Muntingh et al., 2011; Piotrowski, 1999).

**Behavior Report on Rule Breaking.** The Behavior Report on Rule Breaking (BHR) is a short self-report questionnaire that is used to assess antisocial behavior. Items are answered on a 4-point frequency (1 = never to 4 = very often). The BHR is composed of items from the Short-Nye Self-Report Delinquency Items (Nye & Short, 1957), the Seattle Self-Report Instrument (Hindelang, Hirschi, & Weis, 1981), and the Clark Self-Report List of Deviant Behavior (Clark & Tiffit, 1966). The measure has shown to have good convergent validity with measures of psychopathy (Benning, Patrick, Hicks, Blonigen, & Krueger, 2003).

**Dissociative Experiences Scale.** The Dissociative Experiences Scale (DES; Bernstein & Putnam, 1986) is a 28-item measure that examines the frequency and severity of many dissociative experiences on an 11-point visual scale (0%-100%). It has shown excellent

convergent validity with other instruments of dissociation, as well as predictive validity with dissociative disorders in both clinical and non-clinical samples (van IJzendoorn & Schuengel, 1996).

**Eating Disorders Examination Questionnaire.** The Eating Disorders Examination Questionnaire (EDE-Q; Fairburn & Beglin, 1994) is a measurement of problematic eating behaviors and attitudes that has shown acceptable to high internal consistency and test-retest-reliability (Berg, Peterson, Frazier, & Crow, 2012), and good validity in assessing behaviors such as binge episodes, laxative and diuretic misuse, and concerns about shape and weight in both clinical and non-clinical samples (Carter, Aime, & Mills, 2001).

**Fear Survey Schedule.** The Fear Survey Schedule (FSS-III; Wolpe & Lang, 1974) is a 76-item measure that utilizes a 5-point Likert scale to assess symptoms related to neuroticism, phobias, and agoraphobia. Recent research has shown that it shows good test-retest reliability and convergent validity with measures of phobias (Bakhshipour, Bairami, & Kakaee, 2009).

**Generalized Anxiety Disorder Inventory.** The Generalized Anxiety Disorder Inventory (GADI; Argyropoulos et al., 2007) is an 18-item measure that was designed to assess generalized anxiety disorder (GAD) symptoms and severity. It has shown good reliability, and both convergent and divergent validity. It assesses symptoms on three factors: cognitive, somatic, and sleep symptoms of GAD. It accurately distinguished patients from non-patients as well (Argyropoulos et al., 2007).

**Obsessive-Compulsive Inventory – Revised.** The Obsessive-Compulsive Inventory – Revised (OCI-R; Foa et al., 2002) is an 18-item self-report measure that measures obsessive compulsive symptoms across six dimensions. It has been shown to good test-retest reliability and

both convergent and divergent validity, including the ability to differentiate hoarding from other obsessive compulsive symptoms (Wootton et al., 2015).

**PTSD Checklist for Civilians.** PTSD symptoms were assessed with the PTSD Checklist for Civilians (PCL-C; Wilkins, Lang, & Norman, 2011) The PCL-C is a self-report measure of PTSD symptoms that can be administered quickly at each therapy session. The PCL-C showed good test-retest reliability and convergent validity with other validated instruments of PTSD.

**Symptom Checklist (Somatization).** Somatization symptoms were assessed from the fourteen items in the Symptom Checklist-14 (SCL-14; Harfst et al., 2002). The full SCL-90 is a widely used self-report measure that assesses for a large range of mental disorders and their subjective symptoms (Derogatis & Savitz, 1999). Both the original SCL-90 and its shortened versions have been shown to have good validity for distinguishing between those with and without a psychiatric diagnosis.

**Short Drug Abuse Screening Test.** A short version of the Drug Abuse Screening Test (DAST-20; Skinner, 1982) was used to assess for problematic substance use. The DAST-20 and other versions of this measure have been shown to have good test-rest reliability and convergent validity with other measures of drug and alcohol abuse (Yudko, Lozhkina, & Fouts, 2007).

**Schizotypal Personality Questionnaire.** A brief form of the Schizotypal Personality Questionnaire (SPQ; Raine, 1991) was used to assess for nine symptoms of schizotypal personality, as well as psychotic-like phenomena in general. The measure has been shown to have good reliability and good validity in distinguishing those with and without schizotypal personality disorder in individuals with and without psychosis (Mason, 2015).

**Zung Self-Rating Depression Scale.** Depression symptoms were assessed with the Zung Self-Rating Depression Scale (ZSDS; Zung, 1965). It has been shown to have good incremental

validity when compared to the MMPI-2's Depression scale in predicting clinical diagnoses of depression (Thurber, Snow, & Honts, 2002) and good reliability (Campo-Arias, Díaz-Martínez, Rueda-Jaimes, del Pilar Cadena, & Hernández, 2006).

### **Stimuli**

A total of 48 pictures from the International Affective Picture System (IAPS; Bradley & Lang, 2007) were analyzed in this report; IAPS numbers are available in Benning (2011). Maximally intense exemplars of 16 pleasant and 16 aversive pictures were included, as were 16 minimally arousing neutral pictures close to the midpoint of the valence scale. All pictures were gender balanced on dimensions of normatively rated valence and arousal.

A total of eight run orders were used in this study. Four different serial positions of the stimuli were used, with appropriate stimulus substitutions made for women and men in the study. In each run order, no more than two stimuli of the same valence occurred contiguously.

### **Psychophysiological Recordings and Reduction**

EEG was recorded using a 64 channel Neuroscan Quik-Cap with Ag/AgCl sintered electrodes and sampled at 2000 Hz with a Neuroscan SynAmps<sup>2</sup> bioamplifier at DC with a 500 Hz lowpass filter. Offline, EEG data were referenced to linked mastoids before being epoched from 250 ms pre-picture onset to 1550 ms post-picture onset. An ocular artifact correction was applied (Semlitsch, Anderer, Schuster, & Presslich, 1986) to correct for blinks before data were lowpass filtered at 20 Hz (24 dB/octave) before scoring.

For each participant, average waveforms for emotional and neutral pictures and probes were generated prior to scoring. LPP amplitude was assessed as the mean activity 500-800 ms after picture onset minus the mean 200 ms pre-picture baseline activity. Prior to signal averaging, trials were excluded if baseline activity exceeded 100  $\mu$ V. We focused our analyses at Fz, Cz,

and Pz; these sites were where task-related effects were maximal in our dataset.

## **Procedure**

Participants completed a consent form after being escorted into the laboratory. They then completed the questionnaires as the electrodes were attached. Questionnaires were administered in the following order: MPQ, AQ, GADI, ADS, OCI-R, BHR, FSS-III, SPQ-BF, EDE, SCL-14, DAST-20, ZSDS, DES, BAI, PCL-C. Once hookups were completed, participants were told to follow the directions on the screen, keeping as still as possible at all times. Participants were instructed to watch each picture the entire time it appeared on the screen and to keep their gaze directed toward the fixation cross whenever no picture was on the screen. Participants then attended to each stimulus in the sequence determined by the run order.

Pictures were preceded by a 3 s baseline consisting of a blank screen with a fixation point; each was presented for 6 s, followed by a 3 s recovery period. After rating their current emotional state, a blank screen lasting 3 s was displayed to allow participants to prepare for the next picture.

## **Data Analysis**

For the first two aims of our study, all 14 psychopathology questionnaires were examined to determine their higher order factor structure and their relationships to normal range personality traits. For the first aim, we used principal axis factoring in the *factanal* function in R to derive factor solutions for these data. Parallel analysis was used to guide decisions about the number of factors to retain in each solution. We predicted that there will be three factors: an internalizing factor, an externalizing factor, and an aberrant experiences factor. We predicted that symptoms of anxiety, PTSD, somatization, and depression would load onto the internalizing factor. We predicted that symptoms of alcohol and drug use and aggression to load onto the

externalizing factor. We predicted that symptoms of autism, dissociation, eating disorders, and schizotypy to load onto the aberrant experiences factor.

For the second aim, we used the *corr.test* function from the psych package (Revelle, 2016) in R to correlate the 11 primary trait scales of the MPQ with each psychopathology scale's scores. We also conducted two sets of regression analyses to examine which primary trait scales and psychopathology scales (and factors) were uniquely related to each other. In the first set of regressions, MPQ primary trait scale scores were entered as predictors of either each higher-order factor of psychopathology or each psychopathology scale in sequence. In the second set of regressions, either the higher-order psychopathology factor scores or psychopathology scale scores were entered as predictors of each MPQ primary trait scale in sequence. We predicted that high Stress Reaction, low Social Potency, Social Closeness, and Well-Being will be related to internalizing problems, and that low Control, Harm Avoidance, and Traditionalism will be related to externalizing problems. Given the mixed findings in the literatures regarding the symptoms that comprise the predicted aberrant experiences factor, we will explore the data without prediction.

For the third aim of this study, we conducted two separate MANCOVAs with mean LPP amplitude as the dependent variable, Site and Emotion-Neutral picture content specified as within-subjects factors variables, and either three- or six-factor scores as covariates in the model. Significant interactions involving factor scores were followed up with partial correlations involving each factor controlling for the other two or five factors.

## Chapter 3: Results

### Factor Analyses

Two sets of factor analyses were conducted with the 15 measures that were analyzed in our sample. When total scores for each measure were factor analyzed, a two-factor solution was the best fit to the data. The first six eigenvalues of real and random data are as follows: 4.96, 2.54, 1.11, 0.98, 0.83, .78; and 1.49, 1.37, 1.28, 1.20, 1.14, 1.08. Both parallel analysis and a MAP test suggest a two-factor solution (presented below in Table 2). However, the Autism Questionnaire (AQ) did not load highly onto either factor. Therefore, a three-factor solution was also analyzed. The three-factor solution provided a better theoretical fit to the data (see Table 2 for a comparison to the two-factor solution). The factors were named Internalizing Problems, Externalizing Problems, and Aberrant Experiences and Cognitions (see Table 2). The Internalizing Problems factor comprised panic symptoms, phobias, generalized anxiety, somatization, and depressive symptoms. The Externalizing Problems factor comprised alcohol use problems, substance use problems, and childhood and adult aggressive and rule breaking behavior. The Aberrant Experiences and Cognitions factor comprised autism symptoms, dissociative experiences, obsessive-compulsive symptoms, PTSD, and schizotypal personality characteristics. The eating disorder scale did not load highly on any of these factors.

When subscales of each measured were examined in factor analysis, a five-factor solution was the best fit to the data. The following are the first nine eigenvalues of the real and random data: 8.79, 5.92, 2.65, 2.08, 1.62, 1.43, 1.23, 1.21, 1.04; and 1.49, 1.37, 1.28, 1.20, 1.14, 1.08, 1.04, .98, and .93. Both parallel analysis and the MAP test suggested a five-factor solution. However, considering that two subscales of the AQ, the DES, one subscale of the GADI, one

subscale of the SPQ, and one subscale of the Zung did not load onto any factor, a six-factor solution was examined. The results of the six-factor solution were a better theoretical fit for the data. The factors were named Internalizing Problems, Externalizing Problems, Eating Disorder Problems, Posttraumatic Stress Problems, Interpersonal Deficits, and Psychosis. The Internalizing Problems and Externalizing Problems factors were comparable to the total score factors of the same names. The subscales of the Eating Disorder Examination alone comprised the Eating Disorder Problems factor (rather than failing to load on any factor), and the Posttraumatic Stress Problems was fully characterized by three of the four subscales of the PTSD Checklist – Civilian version (i.e., intrusion, avoidance, and numbing). The Interpersonal Deficits factor was composed of three autism subscales (i.e., social skills, communication, and imagination) and the interpersonal subscale of the Schizotypal Personality Questionnaire. Finally, the Psychosis factor was comprised of adult aggressive behaviors, dissociative experiences, and each of the three factors of the Schizotypal Personality Questionnaire. The AQ Attention to Detail and Attention Switching and SDS Anhedonia still did not load appreciably onto any factor in the six-factor solution.

### **Full Scale Correlation and Regression Analyses**

Scores on each full scale and subscale measure of psychopathology in our sample were correlated with MPQ primary trait scores. To examine the unique variance among these relationships, four sets of regression equations were conducted: 1) full scale psychopathology scores were specified as predictors of each individual MPQ primary trait score; 2) MPQ primary trait scores were identified as predictors of each full scale psychopathology score; 3) subscale psychopathology scores were specified as predictors of MPQ primary trait scores; and 4) MPQ primary trait scores were specified as predictors of subscale psychopathology scores. Correlation



values for full scale analyses are reported in Table 4, and regression coefficients are reported in Tables 5 and 6 (see below).

With regards to full scale psychopathology measures, each personality factor was significantly correlated with at least one measure of psychopathology. All internalizing symptoms and most aberrant experiences correlated with Stress Reaction, Alienation, and Absorption (though autism spectrum symptoms did not correlate with Absorption). Within internalizing, phobic symptomatology was additionally related to Harm Avoidance. Generalized anxiety symptoms were related to low Well-Being and low Social Closeness. Depressive symptomatology was negatively related to all traits associated with positive emotionality and low Control. Dissociative symptoms had an additional positive relationship with Traditionalism, whereas obsessive-compulsive symptomatology had an additional negative relationship with Social Closeness. Schizotypal and autism spectrum symptoms both correlated negatively with Well-Being, Social Potency, and Social Closeness; however, autism spectrum symptoms also had positive relationships with all facets of behavioral constraint. Post-traumatic stress symptomatology correlated with low Well-Being, low Social Closeness, and high Traditionalism. In contrast, externalizing symptoms were correlated with high Aggression and low Control. Symptoms of antisocial behavior also correlated negatively with Harm Avoidance and Achievement but positively with Social Potency; alcohol dependence symptoms shared this correlation with low Achievement, whereas drug dependence symptoms shared the correlation with low Harm Avoidance.

### **Subscale Correlation and Regression Analyses**

Correlation values for subscale scores are reported in Table 7, and regression coefficients are reported in Tables 8 and 9 (see below). All measures except for the ADS, Beck Anxiety

Inventory, Dissociative Experiences Scale, Somatization Checklist, and SDAST had demonstrated subscales through previous factor analytic studies. These subscales' associations to personality factors were measured in a similar way to full scale scores. The Obsessive Compulsive Inventory's subscales were not examined due to their homogeneity, and the OCI was retained as a full scale score.

Correlations revealed that every subscale was significantly correlated with at least one personality factor, with the exception of the restraint subscale from the Eating Disorder Examination. All internalizing scales and subscales were significantly correlated with Stress Reaction and Alienation (except for the Blood/Injection Phobia of the FSSIII, which was only correlated with Stress Reaction). Lower Well-Being was correlated with social phobia, cognitive symptoms of generalized anxiety, and both positive and negative symptoms of depression. Lowered Social Potency and Achievement were only related to positive symptoms of depression. Lower Social Closeness was correlated with cognitive symptoms of generalized anxiety as well as negative symptoms of depression. Agoraphobia and blood/injection phobias shared greater Harm Avoidance in common, and higher Absorption was correlated with social phobia, all three subscales of generalized anxiety, somatization symptoms, and negative symptoms of depression.

Among the externalizing measures, all measures were positively correlated with Aggression. Lower Control was associated with alcohol use, childhood aggressive and non-aggressive symptoms, and adult non-aggressive symptoms. Child non-aggression was associated with greater Social Potency and lower Achievement, while child aggression was associated with greater Alienation. Adult aggression was associated with lower Social Closeness, and both child and adult non-aggression were associated with lower Traditionalism. All four subscales of the BHR were also associated with less Harm Avoidance.

All subscales of the Interpersonal Deficits factor (the social skills, communication, and imagination subscales of the AQ, and the interpersonal problems subscale of the SPQ) were correlated with lower Social Potency and Social Closeness. Both the social skills and interpersonal problems subscales were negatively correlated with Well-Being, and both the communication and interpersonal problems subscales were positively correlated with Stress Reaction. Only the interpersonal problems subscale was associated with greater Alienation.

No primary traits were correlated with every subscale of the Psychosis factor (adult aggressive behaviors, dissociative experiences, and the three subscales of the SPQ). The interpersonal problems subscale of the SPQ alone was negatively correlated with Well-Being, and the interpersonal problems and disorganization subscales were both negatively correlated with Social Potency. Lower Social Closeness was associated with adult aggressive behaviors, interpersonal problems, and disorganization. Higher Stress Reaction and Alienation were associated with dissociative symptoms and all three subscales of the SPQ. Adult aggression and disorganization were associated with greater Aggression and lower Harm Avoidance. Dissociative symptoms, along with the cognitive-perceptual and disorganized symptoms of the SPQ were associated with greater Absorption.

Among the eating disorders factor, the restraint subscale was not significantly correlated with any personality measure. The other three subscales were all positively correlated with Stress Reaction, and only eating concerns and shape concerns were associated with greater Alienation. With regards to the PTSD factor, all four subscales shared lower Well-Being and greater Stress Reaction and Alienation in common. Numbing was uniquely negatively associated with Social Closeness, and Intrusion was uniquely positively correlated with Absorption.

For Interpersonal Deficits, cognitive-perceptual problems were associated with greater Stress Reaction, Alienation, Traditionalism, and Absorption. After controlling for other symptoms, cognitive-perceptual problems retained their associations with Alienation, Traditionalism, and Absorption. Interpersonal problems were associated with lower Social Potency and Social Closeness, Stress Reaction, Alienation, and Traditionalism. After controlling for other symptom clusters, interpersonal problems were associated with lower Well-Being, Social Potency, and Social Closeness. Disorganization symptoms were associated with lower Social Closeness, Social Potency, Harm Avoidance, and Traditionalism, and with greater Stress Reaction and Absorption. After controlling for other psychopathologies, disorganization symptoms were associated with lower Harm Avoidance and Traditionalism, and greater Absorption.

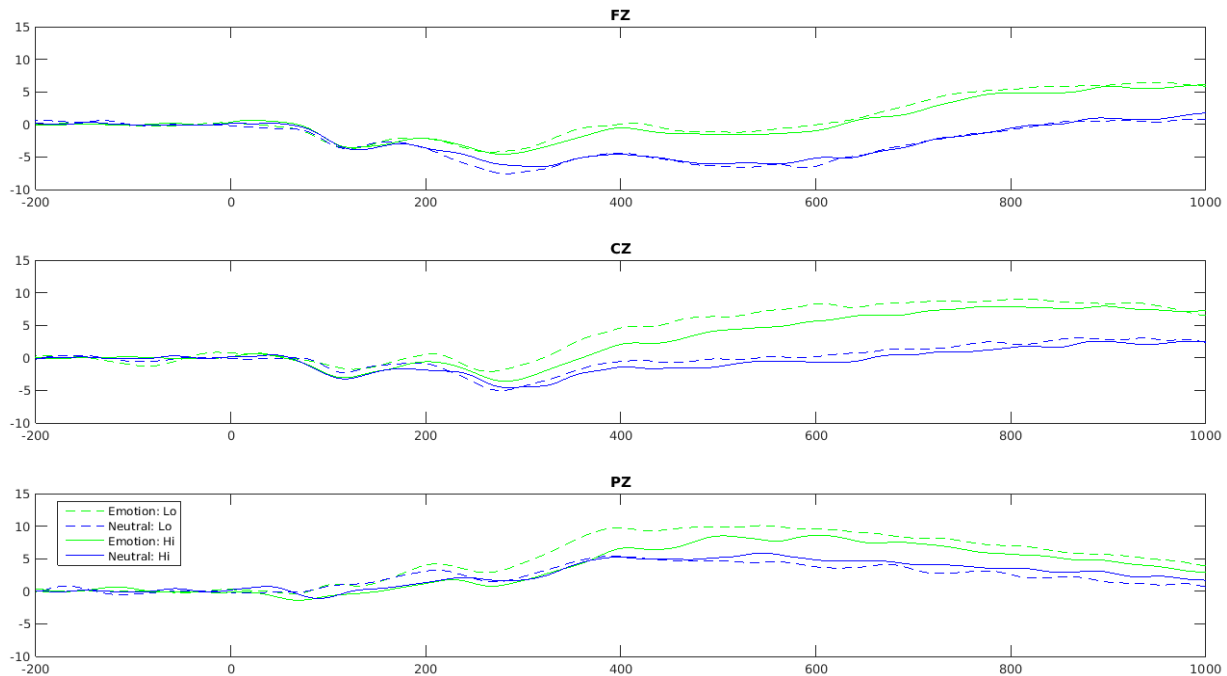
### **Electroencephalography Analyses**

**Three factor structure.** A repeated measures MANCOVA was conducted to test for the hypothesis of emotion differentiation by site. Site (Fz, Cz, and Pz) and Emotion Neutral difference (Emotion and Neutral) were specified as independent variables. Mean LPP amplitude was specified as dependent variables. The three factor scores were specified as covariates in the model. In the case where a scale cross-loaded onto multiple factors, the score was only retained in computation of its highest factor loading. Main effects and interactions between site, emotion-neutral differences, and psychopathology were examined.

A significant main effect was found for site,  $F(2,102) = 44.5, p < .001, \eta^2_p = .47$ , in which LPP amplitude at Fz ( $M = 0.35 \mu\text{V}, SE = 0.59$ ) was significantly smaller than that at Cz ( $M = 4.36 \mu\text{V}, SE = 0.72$ ) and Pz ( $M = 5.07 \mu\text{V}, SE = 0.64$ ),  $t(106)s > 7.8, ps < .001$ , with no significant difference between LPP amplitudes at Cz and Pz,  $t(106) = 1.24, p = .218$ . Likewise,

LPP amplitude was larger during emotional pictures ( $M = 5.79 \mu\text{V}$ ,  $SE = .64$ ) than during neutral pictures ( $M = 0.73 \mu\text{V}$ ,  $SE = .58$ ),  $F(1,102) = 125$ ,  $p < .001$ ,  $\eta^2_p = .55$ . Though there was a Site x Emotion interaction,  $F(2,102) = 6.83$ ,  $p = .002$ ,  $\eta^2_p = .12$ , the difference in LPP amplitude during emotional and neutral pictures was highly significant and positive at each site,  $t(106)s > 5.3$ ,  $ps < .001$ .

With respect to psychopathology, the interaction between Emotion-Neutral and the Aberrant Experiences factor score was significant,  $F(1,102) = 6.24$ ,  $p = .014$ ,  $\eta^2_p = .06$  (see Figure 1). Follow-up partial correlations revealed that the Aberrant Experiences score correlated negatively with the emotion-neutral LPP amplitude differentiation at Pz,  $r_p = -.23$ ,  $p = .016$ ; this correlation had the same negative sign but was not significant at Cz,  $r_p = -.17$ ,  $p = .087$ , or Pz,  $r_p = -.15$ ,  $p = .139$ . When this correlation was looked at more closely, the Aberrant Experiences score was correlated negatively with positive-neutral LPP amplitude differentiation at Pz,  $r_p = -.22$ ,  $p = .023$  but was not correlated significantly with negative-neutral LPP amplitude differentiation at Pz,  $r_p = -.14$ ,  $p = .15$ . No other main effects of psychopathology,  $F_s < 0.6$ ,  $ps > .45$ ,  $\eta^2_{ps} < .01$ , or interactions involving psychopathology,  $F_s < 2.3$ ,  $ps > .14$ ,  $\eta^2_{ps} < .04$ , were statistically significant. There were also no main effects of psychopathology factors on LPP amplitude,  $F_s < 0.54$ ,  $ps > .46$ ,  $\eta^2_{ps} < .01$ .



*Figure 1.* Grand average waveform plots for emotional vs. neutral pictures for the three-factor structure. Values on the x axis represent milliseconds from picture onset; values on the y axis represent microvoltage of the waveform.

**Six factor structure.** A repeated measures MANCOVA for the six factor structure was conducted in a similar manner as the three factor structure. A significant main effect was found for site,  $F(2,102) = 45.14, p < .001, \eta^2_p = .49$ , in which LPP amplitude at Fz ( $M = 0.38 \mu\text{V}, SE = 0.60$ ) was significantly smaller than that at Cz ( $M = 4.50 \mu\text{V}, SE = 0.74$ ) and Pz ( $M = 5.21 \mu\text{V}, SE = 0.66$ ),  $t(106)s > 7.8, ps < .001$ , with no significant difference between LPP amplitudes at Cz and Pz  $t(106) = 1.18, p = .236$ . Likewise, LPP amplitude was larger during emotional pictures ( $M = 5.83 \mu\text{V}, SE = .67$ ) than during neutral pictures ( $M = 0.90 \mu\text{V}, SE = .60$ ),  $F(1, 102) = 105.86, p < .001, \eta^2_p = .53$ . Though there was a significant Site x Emotion interaction,  $F(2,102) = 5.78, p = .004, \eta^2_p = .11$ , the difference in LPP amplitude during emotional and neutral pictures was highly significant and positive at each site,  $t(106)s > 5.4, ps < .001$ .

With respect to psychopathology, no interactions were significant. Follow-up partial correlations were also conducted between the average of the Emotion-Neutral differences across

sites and factor scores, with each partial correlation controlling for the other five factors. No partial correlations emerged as significant,  $r_{ps} < |.11|$ ,  $ps > .33$ . There were also no main effects of psychopathology factors on LPP amplitude,  $F_s < 1.84$ ,  $ps > .18$ ,  $\eta^2_{ps} < .02$ .

## **Chapter 4: Discussion**

The aim of this project was to examine the factor structure of psychopathology and its relationship to normal-range personality traits, as well as to examine differences in emotional reactivity among different symptom presentations via an EEG paradigm.

### **Factors of Psychopathology**

The factor analysis of psychopathology total scores suggests that several symptom clusters do not fit neatly into an internalizing-externalizing conceptualization of psychopathology. Indeed, a three-factor structure of psychopathology incorporating aberrant experiences appears necessary. Autism entails interpersonal problems that appear relatively unrelated to internalizing and externalizing distress. Although OCD was formerly classified as an anxiety disorder, its associations with dissociative and schizotypal problems support research that OCD has distinct links to psychotic symptoms (Pallanti et al., 2009). This link to aberrant experiences may explain OCD's separation from panic symptoms, generalized anxiety, and phobias. PTSD is often characterized by intrusive thoughts, flashbacks, and nightmares. These unwanted reminders share a similar intrusive quality to unwanted obsessions in OCD, which may explain why PTSD symptomatology loaded onto the Aberrant Experiences and Cognitions factor.

These findings have some similarities and differences from the HiTOP model (Kotov et al., 2017). The factors found in this study map onto what the HiTOP model refers to as “spectra.” The externalizing factor in the present study mostly reflected the “disinhibited externalizing” spectra, as the “antagonistic externalizing” spectra is mostly comprised of syndromes that were not measured in the present study (i.e., narcissistic, histrionic, paranoid, and borderline traits).



However, our findings that schizotypal personality traits were separate from internalizing and externalizing problems are consistent with the HiTOP model, which found that schizotypy was related to other Cluster A personality problems and psychotic symptoms (referred to as “thought disorder” spectra). This suggests that autism symptoms may fall under this spectrum if measured in the HiTOP classification. The HiTOP model tentatively proposes somatoform problems as its own spectrum. Our results indicate that somatoform problems were more closely related to internalizing problems. However, we only used one unitary measure of somatoform problems, and including more measures of somatic complaints may yield different results.

Comparing the two-factor model to the three-factor model reveals that only Internalizing symptom clusters shifted to the Aberrant Experiences cluster (i.e., autism, dissociative symptoms, OCD, PTSD, and schizotypal symptoms). Symptom clusters that originated in the Externalizing factor in the two-factor model did not move in the three-factor model. This suggests a greater overlap between these aberrant experiences and internalizing problems (Caspi et al., 2014), and that some of these symptoms may straddle the divide between internalizing and aberrant experiences.

The Eating Disorder Examination (EDE) total score did not load onto any factor, which is somewhat surprising given that individuals with eating disorders often experience co-morbid internalizing and externalizing problems (Hudson et al., 2012). Rather than cross-loading, the total score was not strongly related to any of the three factors found in this solution. This either suggests that a three-factor solution is an under-extracted solution or the EDE total score does not fit neatly within existing frameworks of psychopathology. However, a four-factor solution was not supported by a scree plot or MAP analysis. Furthermore, though eating symptomatology was related to Stress Reaction on the MPQ, this relationship did not hold controlling for other

psychopathological symptoms, indicating it may be a unique form of psychopathology. The following factor analysis using subscale factors suggests that the subscales of the EDE may tell a more nuanced story that is missed by the total score.

**Subscale Analyses.** The differences between the full scale and subscale factor analyses suggest that certain symptoms related to eating disorders, PTSD, and autism do not fit cleanly into the three-factor model derived from analyses of total scores. Additionally, the fact that the subscales for eating disorder and posttraumatic stress symptoms formed their own separate factors but not when their total scores were used implies that these symptoms are more strongly related to each other than to other psychopathologies. This implies that these two disorders may require their own tailored treatment considerations. Current clinical practice supports these findings: Eating disorders are notoriously difficult to treat (Thompson & Park, 2016), and research shows that specialized exposure-based treatments are the most effective for treating PTSD (Powers, Halpern, Ferenschak, Gillihan, & Foa, 2010). Notably, the hyperarousal subscale of the PCL loaded most highly with the Internalizing symptoms. This is congruent with the tripartite model of depression and anxiety which states that physiological hyperarousal is a separate contributing factor to anxiety and depression (Clark & Watson, 1991).

In the subscale analyses, two other factors emerged that are unique to the subscale analysis. The first one, Interpersonal Deficits, was comprised of the Social Skills, Communication, and Imagination subscale of the Autism Questionnaire (AQ) along with the interpersonal problems subscale of the Schizotypal Personality Questionnaire (SPQ). This factor suggests that some of the hallmark interpersonal difficulties seen in autism are most strongly related to interpersonal problems seen in individuals with schizotypal personality features. Although autism is not conceptualized as a personality disorder, the pervasive interpersonal

problems experienced by those with autism may have long-term effects on personality. This factor structure tells a more nuanced story of the relationship between autism and schizotypal symptoms than the two- or three-factor models; namely, social deficits and problems seen in these symptoms clusters may have unique characteristics that separate them from the rest of their categorical diagnosis. Interpersonal deficits may drive their own symptom cluster and unique constellation of problems.

The second new factor seen in the subscale analysis was the Psychosis factor, which was comprised of the adult aggression subscale of the Behavior Report on Rule Breaking (BHR) with each of the three subscales of the SPQ (cognitive-perceptual aberrations, interpersonal problems, and disorganization) and dissociation. This factor suggests that individuals with schizotypal personality problems may also have problems with aggression. Considering that schizotypal personality problems cannot be considered for diagnosis until adulthood, it makes sense that these problems are not related to childhood aggression. Individuals with these personality problems may lash out and be aggressive because of their inability to understand and relate to other individuals, which is consistent with some research that links schizotypy with hostility (Schaub, Boesch, & Stohler, 2006) and physical aggression (Ragsdale, Mitchell, Cassisi, & Bedwell, 2013). Schizotypal problems can also include paranoia, social anxiety, and unusual ideas about others, which may lead to feelings of fear that manifests in aggressive behavior.

The Psychosis factor does not fit neatly into the HiTOP model of classification (Kotov et al., 2017). This factor is a blend of the thought disorder and antisocial behavior spectra, which includes schizotypy and aggression problems, respectively. The Psychosis factor includes dissociative symptoms, which were not included in the HiTOP model. It could be that dissociative symptoms delineate this factor from other psychopathology. In the three-factor

model, dissociative symptoms were associated with schizotypy, autism, and OCD symptoms, but not any externalizing problems. When psychopathology is examined at a subfactor level, dissociative symptoms may represent a unique constellation of problems that separate the spectra of thought disorder from externalizing problems.

Notably, the other two subscales of the AQ (Attention to Detail and Attention Switching) did not load strongly onto any of the six factors. These two problems may not be related to other psychopathologies because they are constrained to cognitive tasks. There is some evidence to suggest that attention deficits and restricted or repetitive behaviors in autism are related to a compromised motor system (Coombs, Brosnan, Bryant- Waugh, & Skevington, 2011), which may not have a direct impact on psychopathology (Pandolfi, Magyar, & Dill, 2012). The interpersonal difficulties seen in autism may cause more stress which may have a greater relationship and impact on other mental health symptoms. Additionally, the weak association of these two subscales with other psychopathology may explain why the AQ failed to load in the two-factor structure of full-scale scores.

Comparing the factor structures to each other also reveal what is stable. First, there are discernable Internalizing and Externalizing factors in each iteration of the factor analysis. Within the Internalizing factor, anxiety, phobias, panic symptoms, somatic symptoms, and the negative emotional depression remain constant. In the Externalizing factors, alcohol use, aggressive and rule-breaking behavior from both childhood and adulthood, and drug use remain constant. These findings support much of the literature on the two-factor structure of common forms of psychopathology (Kim & Eaton, 2015; Krueger, 1999).

Partial correlations with the three-factor model show that the Aberrant Experiences factor was strongly correlated with the Internalizing factor when controlling for the Externalizing factor

( $r = .59, p < .001$ ). Externalizing symptoms were not related to either factor. This is similar to Caspi et al.'s (2014) finding that internalizing and thought disorders were more closely related to a general psychopathology factor than externalizing disorders. This overlap between Internalizing and Aberrant Experiences can be seen when moving from a two-factor solution to a three-factor solution; of the five symptom measures that comprise the Aberrant Experiences factor, four of them (all but autism symptoms, which did not load significantly in the two-factor model), loaded onto the Internalizing factor in the two-factor model.

In the six-factor model, obsessive-compulsive symptoms loaded onto the Internalizing factor despite loading onto the Aberrant Experiences factor in the three-factor model. It could be that the discrete symptoms of autism and schizotypy were too specific and diffuse for obsessive-compulsive symptoms to correlate with. Partial correlations revealed that the Internalizing factor was significantly correlated with the Psychotic factor ( $r = .31, p < .01$ ), suggesting that obsessive-compulsive symptoms may straddle the line between Internalizing and Psychotic symptoms.

PTSD symptoms also originally loaded onto the Internalizing symptoms in the two-factor model and then the Aberrant Experiences factor in the three-factor model. When given more “room” to vary, nearly all PTSD symptoms, except for hyperarousal, created their own factor in the six-factor model. Hyperarousal symptoms went with Internalizing symptoms, consistent with the tripartite model that states that physiological arousal is a separate construct in psychopathology (Clark & Watson, 1991).

A somewhat surprising finding is that symptoms of anhedonia, as measured by the Zung, did not load highly onto any factor in the five- or six-factor solution. Considering the lack of the negative symptoms of psychosis, it could be that anhedonia was weakly associated with

measures of schizotypy in addition to other Internalizing problems, and resulted in a diffuse correlation with both.

### **Relationships between Psychopathology and Personality**

Normal range personality characteristics, as measured by the Multidimensional Personality Questionnaire (MPQ), and their associations with the 14 psychopathology measures were examined. Full scale and subscale scores were examined in separate regression analyses. In half the analyses, the psychopathology scores were used as predictors of personality, and personality factors were used as predictors of psychopathology in the other half.

**Depression, anxiety, and phobias.** With regards to depression, the personality factors of low Well-Being, Social Potency, Achievement, Stress reaction, and Control, along with high Alienation and Aggression were all significantly predictive of depression as measured by total scores. When depression was specified as the predictor, it significantly predicted the same personality factors except for Aggression. This suggests that after other personality and psychopathology measures were controlled for, symptoms of depression are related to being engaged in both positive and negative emotions.

Stress Reaction and Absorption were the only personality factors predictive of generalized anxiety symptoms. Conversely, generalized anxiety was predictive of high Stress Reaction and Control. These results suggest that a heightened reactivity to stress is the main driving force behind generalized anxiety. The propensity to experience stress will likely cause generalized anxiety, which is congruent with research that shows that anxiety problems have the highest prevalence rate out of all mental health disorders (Kessler, Berglund, et al., 2005).

Comparing the personality factors associated with depressive and generalized anxiety symptoms show that stress reactivity is a main component behind both sets of problems, but

deficits in positive emotionality are uniquely associated with depressive symptoms. These findings support the tripartite model of depression and anxiety, where general distress is common to both anxiety and depression, whereas physiological arousal is unique to anxiety and anhedonia is unique to depression (Clark & Watson, 1991). When the effects of other psychopathologies were controlled for, depression and generalized anxiety still uniquely predict Stress Reaction and Control. However, individuals with depression tend to be less planful, whereas those with generalized anxiety have a greater propensity for planfulness. Additionally, depression is further distinguished by a deficit of positive emotionality and a surfeit of alienation. Though a propensity towards stress may exacerbate both of these commonly reported and co-morbid problems, key differences in general emotional experiences and planfulness separate whether this stress manifests as depression or anxiety. This planfulness may manifest as a symptom of anxiety: anxious participants have more trouble with *verbally* selecting a correct response compared to depressed individuals (Snyder et al., 2014). Individuals who experience anxiety but not depression may experience anxious symptoms around planning which may backfire and hinder performance.

Furthermore, the more physiologically activated anxiety reflected in the Beck Anxiety Inventory was uniquely associated with *greater* Social Potency and reduced Aggression. Thus, this form of anxiety may arise from threading the needle in engaging in socially appropriate but not inappropriate forms of dominance, which contrasts against the withdrawal from social dominance that characterizes depression. However, this pattern stands opposed to a finding that individuals with panic disorder are generally less assertive than individuals without the disorder (Levitan, Simoes, Sardinha, & Nardi, 2016), suggesting that further work should explore the relationship between assertiveness and anxious hyperarousal.

Though somatization and phobic symptomatology shared the same correlations with stress reactivity as other measures of internalizing psychopathology, they had additional unique relationships with primary personality traits. Both sets of internalizing symptoms were uniquely associated with Alienation, indicating that those with either high levels of somatic symptoms or self-reported fears have a propensity to view others with suspicion and mistrust. Reduced social support is associated with worse physical health; individuals who are mistrustful may be more likely to have worse social support and thus may be at higher risk for physical health problems (Yu, Hu, Efird, & McCoy, 2013). With regards to phobias, the heightened alienation may be because individuals with phobias show a greater tendency to generalize their fears (Dymond, Schlund, Roche, & Whelan, 2014). Previous evidence has also found a correlation between reported somatic symptoms and different types of social anxiety (May et al., 2014). Consistent with the separation of fear and anxiety on the MPQ (Tellegen & Waller, 2008), fearful and phobic symptomatology was uniquely related to Harm Avoidance. Curiously, after controlling for symptoms of all other psychopathologies, somatization was *negatively* associated with Stress Reaction. This pattern may reflect a construct similar to the “hysteria” assessed on Scale 3 of the MMPI-2, in which an individual has a large number of somatic symptoms but a lackadaisical *belle indifférence* about the impact of those symptoms (Butcher, Hamilton, Rouse, & Cumella, 2006).

**Aberrant experiences and cognitions.** Within the aberrant experiences and cognitions factor, the AQ was predicted by low Social Potency, Social Closeness, and high Stress Reaction and Traditionalism. When other psychopathologies were controlled for, the AQ predicted lower Social Potency and Closeness, and higher Stress Reaction and Harm Avoidance. This is congruent with research that shows that individuals with autism have worse and more conflictual



social relationships, which are associated with more psychopathology (Whitehouse, Durkin, Jaquet, & Ziatas, 2009; Zeedyk, Rodriguez, Tipton, Baker, & Blacher, 2014).

Dissociative problems were predictive of higher Well-Being, Stress Reaction, Alienation, and Absorption. After controlling for other psychopathologies, dissociative problems predicted higher Well-Being and Absorption. This somewhat paradoxical finding suggests that individuals with these problems generally feel good throughout their daily life and have a tendency to get absorbed into experiences and strong emotions. Individuals with dissociative problems experience more negative affect but the same amount of positive affect compared to those without dissociative symptoms (Simeon, Riggio-Rosen, Guralnik, Knutelska, & Nelson, 2003). This indicates that the presence of other psychopathologies may be the source behind stress reactivity and mistrust of others; controlling for these apparently reduces the influence of a suppressor effect regarding the paradoxical dissociation/well-being relationship.

Problems with posttraumatic stress were predicted by only by low Well-Being and high Stress Reaction. It is notable that post-traumatic stress symptoms were not related to other facets of positive emotionality that depression problems are related to, specifically Achievement and Social Potency. PTSD and depression are highly comorbid, with 40-50% of those with a PTSD diagnosis also meeting criteria for Major Depressive Disorder (Rytwinski, Scur, Feeny, & Youngstrom, 2013). These results suggest that overall, a general sense of Well-Being is the most salient force behind PTSD's comorbidity with depression within internalizing disorders, but depression may involve a wider range of problems with agentic positive emotionality and the presence of negative emotions. Individuals who develop PTSD but who do not experience comorbid depression may have more agentic positive emotions and fewer negative emotions, sparing them the development of further depressive problems. This is supported by a study that

argued that negative affect underlies PTSD, and that low positive affect in PTSD was directly associated with the presence of depressive anhedonia (Seligowski & Orcutt, 2016).

Obsessive-compulsive problems were predicted by high Stress Reaction, Traditionalism, and Absorption. When other psychopathologies were controlled for, obsessive-compulsive problems were predicted by high Well-Being, Traditionalism, and Absorption. The desire to adhere to strict standards and rules conceptually fits in with problems of OCD where individuals feel they must say or do a given action in an exact way in order to obviate imagined danger. The association with higher Well-Being is difficult to place in the experiences of OCD problems, as these individuals report high levels of suffering and lower quality of life (Srivastava, Bhatia, Thawani, & Jhanjee, 2011).

Schizotypal personality problems were predicted by lower Social Closeness, Achievement, and Social Potency, and higher Stress Reaction, Alienation, and Absorption. When other psychopathologies were controlled for, these problems predicted lower Well-Being, Social Potency, Social Closeness, and Harm Avoidance; and higher Alienation, Aggression, and Absorption. Schizotypal personality problems are characterized by problems with social interactions (Waldeck & Miller, 2000), which may account for the observed tendency to either be mistrustful or aggressive of others. Additionally, these results suggest that individuals with these problems experiences greater involvement in their emotional experiences, congruent with research that those with aberrant experiences pay more attention to negative emotions (Martin, Becker, Cicero, Docherty, & Kerns, 2011).

When comparing these symptomatologies within the aberrant experiences factor, several patterns emerge. All symptoms were associated with Stress Reaction, but after controlling for all other psychopathologies, only autism symptoms were uniquely associated with higher Stress

Reaction. Absorption was linked to dissociative, obsessive-compulsive, and schizotypal problems, indicating that these symptoms include a general tendency to get swept up in emotional experiences. Autism and obsessive-compulsive symptoms share high Traditionalism in common, suggesting that the rigid thoughts and behaviors symptoms may generalize beyond psychopathology. Dissociative problems and schizotypal symptoms are also characterized by problems with mistrustfulness of others. Dissociative and obsessive-compulsive problems were uniquely predicted by high Well-Being after controlling for other psychopathologies, while PTSD and schizotypal personality symptoms were predicted by low Well-Being. Aggression was uniquely predictive of schizotypal problems, and autism and schizotypal problems were distinguished by high and low Harm Avoidance, respectively.

It could be that odd thoughts and behaviors regarding others seen in schizotypal problems may translate into aggressive or mistrustful attitudes and behaviors. Previous research suggests that individuals with schizotypal problems experience more victimization, which is associated with greater aggression (Yeung Shi Chung, McGuire, & Langdon, 2016). Additionally, individuals with autism may experience greater fear of harmful situations as a result of Traditionalism. Some research suggests that individuals with autism do not consider psychological information when judging moral tasks (Fadda et al., 2016), which may cause a greater adherence to rules and thus fear. Low Harm Avoidance in schizotypal personality problems may contribute to aggressive attitudes and behaviors.

**Externalizing symptomatology.** Problems with alcohol were predicted only by low Achievement, but when controlling for other psychopathologies, alcohol problems were not associated with any personality traits. This indicates that the variance unique to problems with alcohol may not be well represented by normal range personality traits. The overall societal

acceptance of alcohol use, especially among undergraduates, may result in widespread and accepted alcohol use regardless of personality phenotype. Externalizing problems were associated with higher Aggression and low Control and Harm Avoidance, and drug use was associated with both high Aggression and Absorption. After controlling for other psychopathologies, externalizing problems were associated only with Aggression and Harm Avoidance, and drug use was only associated with Absorption. This indicates that aggressive and non-aggressive externalizing behaviors throughout the lifespan reflect a general tendency towards aggression and less fear. Less fear may manifest as greater impulsivity, which has been shown to be related to greater aggression (Gvion & Apter, 2011).

The tendency to get absorbed into emotional experiences differentiates substance users from non-substance users. In a clinical sample, individuals who experienced less negative affect and were better able to regulate their emotions persisted in substance abuse treatment for longer (Hopwood, Schade, Matusiewicz, Daughters, & Lejuez, 2015). Additionally, the propensity to experience stronger emotions has been shown to be associated with greater substance use among young adults (Bonnet, Bréjard, & Pedinielli, 2013). It may be that psychoactive substances have a strong appeal for those who are likely to become fully engaged in their emotional experiences, as the substance may provide more of an intense experience compared to individuals who are average or low in Absorption. As a result, quitting the substance may be more difficult for those who experience stronger negative emotions and have difficulty regulating them.

### **Subscale Analyses**

**Internalizing problems.** The subdivisions of the Zung indicate that after controlling for other personality factors and psychopathologies, anhedonia is distinct from negative affect due to a lack of positive emotions and more variegated presentations of negative emotions. In this way,

anhedonia represents a unique symptom presentation from all other psychopathologies, characterized by multiple associations with both positive and negative emotionality. After controlling for other symptoms, the negative emotional aspects of depression seem to be purely driven by a propensity towards stress, which is consistent with the part of depression that is shared among internalizing psychopathologies (Clark & Watson, 1991). In this light, the presence of anhedonia may be a much more specific predictor of a diagnosis of Major Depressive Disorder.

Among phobia symptoms, social phobia was predicted by Stress Reaction and Alienation but was only associated with Alienation after controlling for other symptoms. While a propensity to stress seems to exacerbate social anxiety symptoms, a general mistrustfulness of others is uniquely predictive of social phobias. This is congruent with previous research that showed that those with social phobia were more likely to be mistrustful of others in general compared to control samples (Pinto-Gouveia, Castilho, Galhardo, & Cunha, 2006). Agoraphobia was predicted by greater Stress Reaction, Alienation, and Harm Avoidance, but it was only associated with Harm Avoidance after controlling for other problems. The propensity to fear danger in general rather than people specifically distinguishes social and agoraphobias, consistent with one study that found that individuals with agoraphobia showed higher expectancies of threat during a computerized task where they were shown neutral and panic-related words and were asked to rate the likelihood that each word would be followed by a loud, aversive sound (Duits et al., 2016). Blood/injection phobia was associated with greater Stress Reaction and Harm Avoidance but was not associated with any personality traits after controlling for other symptoms, suggesting that this phobia is not well represented by normal range personality traits. It is important to note that this phobia has a unique physiological manifestation (i.e., fainting) that is

not shared with other psychopathologies (Viar, Etzel, Ciesielski, & Olatunji, 2010), which suggests that certain physiological differences may distinguish this phobia from other psychopathologies.

Cognitive symptoms of generalized anxiety were only predicted by Stress Reaction, but were additionally associated with greater Achievement after controlling for other problems. This indicates that cognitive problems are largely driven by stress and also a need to succeed, which is consistent with evidence that the need to succeed is associated with greater anxiety (Ferreira, Gouveia, & Duarte, 2013). This combination of stress and need for achievement is reminiscent of classic “Type A” personality research, which posits that individuals with such a personality may have one or both components of achievement strivings or impatience and irritability (Spence, Helmreich, & Pred, 1987). Somatic symptoms of generalized anxiety were associated with greater Stress Reaction and Absorption, but they were only associated with greater Well-Being when controlling for other symptoms. With regards to Absorption, this finding is congruent with a study of dancers that showed that somatic anxiety was correlated with reporting debilitating imagery (i.e., imagining mistakes) (Nordin-Bates, Cumming, Aways, & Sharp, 2011). However, the association with greater Well-Being is surprising and difficult to parse; it may indicate that these symptoms are not necessarily always associated with negative emotionality. Sleep concerns within generalized anxiety were only predicted by Absorption, but they were not associated with any personality factors after controlling for other symptoms. Individuals with somatic and sleep problems may be overly absorbed in their bodily experiences, but these may be reflected more strongly in other symptoms.

**Externalizing problems.** Adult non-aggressive symptoms were associated with greater Social Closeness, Aggression, and lower Harm Avoidance; but they were associated only with

Aggression after controlling for other psychopathologies. Child non-aggressive symptoms were associated with greater Social Potency, Aggression, and lower Control, but they were associated only with lower Control after controlling for other symptom clusters. Taken together, these results contradict the literature that *aggressive* behavior in adolescence and young adulthood is related to problems with impulsivity and lack of control (Maneiro, Gómez-Fraguela, Cutrín, & Romero, 2017; McCabe, Louie, & King, 2015).

**Interpersonal Deficits.** The social skills subscale was predicted by lower Well-Being, Social Potency, and Social Closeness, and was only associated with lower Well-Being and Social Potency after controlling for other symptoms. Problems with social skills in autism are characterized by lower positive emotion, specifically around trying to persuade and influence others. This is in line with research that shows that individuals with high-functioning autism have difficulties in following nonverbal communication meant to coordinate actions (Schilbach, Eickhoff, Cieslik, Kuzmanovic, & Vogeley, 2012), which may interfere with forming bonds to other people. Communication was only predicted by lower Social Closeness, and this association disappears when controlling for other symptoms. This indicates that problems with communicating in autism are possibly subsumed by other symptoms when being distinguished by personality traits. The Imagination subscale was not predictive of or predicted by any facets of personality (including Absorption), indicating that despite its name, it is not associated with a propensity for becoming absorbed in imaginal experiences. Previous research with the AQ indicates that this subscale does not perform as well psychometrically as the other factors and the word “Imagination” may be a misnomer for the factor (Murray, Booth, McKenzie, & Kuenssberg, 2016).

The interpersonal problems subscale of the SPQ was predicted by lower Social Potency and Social Closeness, and greater Stress Reaction, Alienation, and Traditionalism. After controlling for other symptoms, it was associated with lower Well-Being, Social Potency, and Social Closeness. This suggests that in the presence of other psychopathologies, interpersonal problems are characterized by deficits in positive emotionality, specifically when related to social interactions. Previous work has found that individuals with schizotypal personality are likely to share social deficits seen in those with schizophrenia (Waldeck & Miller, 2000).

**Psychosis.** As discussed above, adult aggression was associated with greater Aggression and lower Harm Avoidance, but these associations disappeared when controlling for other symptoms. Dissociative symptoms were associated with greater Well-Being, Stress Reaction, Alienation, and Absorption; but after controlling for other symptoms, dissociation was associated with only greater Well-Being and Absorption. The latter association suggests that individuals with dissociative symptoms are generally more attentive to emotionally motivating experiences, whether these are positive or negative (Benning et al., 2015). However, the high feelings of general well-being are difficult to explain, especially considering the associations of dissociative symptoms with stress and mistrustfulness when controlling for other personality traits.

Nevertheless, these results indicate that the tendency to get absorbed in emotional experiences seems to be associated with aberrant experiences more broadly than dissociation. The divergent results for Well-Being and Traditionalism within aberrant psychopathological syndromes suggest that individuals who have this set of problems express their specific psychopathologies differently as a result of their personality. The links to propensity towards stress and mistrustfulness of others is supported by evidence that shows that individuals with aberrant perceptual experiences pay more attention to negative emotions (Martin et al., 2011).



Schizotypal symptoms have also been shown to be correlated with thought-action fusion (Lee, Cogle, & Telch, 2005), which is the tendency to believe faulty causal relationships between thoughts and external reality (e.g., having a thought about an event makes it more likely to occur). This idiosyncratic reasoning may be related to the lower Traditionalism seen in this population: These individuals may subscribe to their own individualized beliefs rather than more widely available social conventions and morals.

**Eating disorder symptoms.** The restraint subscale of the EDE was not predicted by any personality factors, but it was instead uniquely predicted by higher Achievement when controlling for other symptoms. This indicates that those who are successful in restricting their diet feel a sense of mastery, which is congruent with previous research that the need to strive was a moderator between low social rank and endorsement of dieting behaviors and desire to be thin (Ferreira et al., 2013). Eating concerns were predicted by higher Stress Reaction, but after controlling for other psychopathologies, this scale was associated with lower Social Closeness and greater Aggression and Harm Avoidance. Individuals with eating disorders report having smaller social networks and expect less support from their social networks (Tiller et al., 1997), which may explain the link to lower Social Closeness. The association with greater Aggression may be a result of cooperative suppressor effects from weight and shape concerns, as both restraint and eating concerns were correlated with lower Aggression. With regards to Harm Avoidance, some clinical research suggests that treating eating-related fears in anorexia can increase caloric intake (Steinglass et al., 2011). Thus, individuals with eating concerns may view food and situations where food is present as dangerous (Racine, Hebert, & Benning, 2017).

Both weight and shape concern symptoms were predicted by greater Stress Reaction and lower Aggression, but they were not significantly associated with any personality factors after

other symptoms were controlled for. One critique of the EDE notes that these two subfactors are highly correlated, which may have resulted in a significant reduction in power to detect associations due to statistical redundancy between the two scales ( Thomas, Roberto, & Berg, 2014). This suggests that a general propensity towards stress and a general mistrustfulness of others drives many concerns surrounding eating psychopathology, but restrictive cognitions seem to be motivated only by a desire to succeed.

The relative paucity of significant associations with the four subscales and normal-range personality may be due in part to limitations of the EDE itself. A critique of the measure discusses how the EDE is likely to be more representative of bulimia symptoms than anorexia symptoms, and many individuals included in treatment studies fall in the normative range of the EDE before treatment begins ( Thomas et al., 2014). Thus, it is possible that the lack of findings could be a limitation of the instrument itself, despite being described as the “gold standard” ( Thomas et al., 2014) of self-report eating psychopathology.

**PTSD symptoms.** All four subscales of the PCL were only predicted by greater Stress Reaction, but only the numbing subscale was associated with any personality traits (i.e., Alienation) after controlling for other psychopathologies. This suggests that overall, PTSD can be characterized by a general propensity toward stress in general but its uniqueness gets mostly lost in the presence of other symptoms. Given that PTSD is unique in that it is the only psychopathology that requires a specific eliciting event (i.e., the traumatic event), its course of development and severity of symptoms may not be explained well by normal range personality traits. PTSD has been linked to pathological personality traits as assessed through the Personality Inventory for DSM-5, including aggressive behavior, mood instability, eccentricity, grandiosity, isolation, and impulsivity (Reis, de Francisco Carvalho, & Elhai, 2016) , which may be more

clinically relevant in distinguishing PTSD from other psychopathologies. Thus, normal range personality traits may not be able to predict who develops PTSD after a trauma, nor do these traits respond to trauma in the way that abnormal personality traits respond.

### **Factors of Psychopathology and Emotional Reactivity**

Emotional reactivity was measured by EEG wavelengths in response to emotionally valent pictures (pleasant, aversive, and neutral). The finding that sites showed differential reactivity to emotional stimuli is supported in the literature (De Pascalis, Strelau, & Zawadzki, 1999; Mini, Palomba, Angrilli, & Bravi, 1996). The three-factor structure suggests that individuals who experience psychopathologies not typically captured by the internalizing-externalizing factor structure (e.g., autism, dissociation, schizotypy) are less likely to experience overall emotional reactions to emotionally valent pictures, regardless of whether they are pleasant or aversive. This may reflect a lack of attention and engagement with the world at large, leading to difficulties in setting and following goals and other functional impairments that are often seen in this kind of psychopathology.

The lack of interaction between psychopathology and LPP strength in the six-factor model runs contrary to literature that LPP strength is related to depression (Alloy et al., 1997), OCD (Paul et al., 2016), PTSD (Lobo et al., 2014), and other psychopathologies. It is possible that the number of predictors in the subscale analyses sufficiently reduced power to detect differences. Alternatively, separating the Aberrant Experiences and Cognitions factor into the Interpersonal Deficits and Psychosis factor may have separated portions the variance responsible for the LPP findings into parcels too small to have independent effects in this study.

Additionally, much of the literature has focused on disorder-level psychopathology, as opposed

to subscale and syndrome-level problems. LPP reactivity may be different at this lower level of psychopathology.

### **Future Directions**

There were several limitations to this study. Future studies should include symptoms of mania and other personality disorders in a sample more representative of the general population than university students. The inclusion of these symptoms would grant more nuance to the factor structure of psychopathology, and a more representative sample would broaden the generality of this work. This study used a measure of normal range personality traits. Measures of abnormal range personality would likely show stronger association with psychopathology. Additionally, LPPs were the only psychophysiological measure used in this study. Additional measures of psychophysiological reaction, such as skin conductance and heart rate, may give a fuller picture not captured by initial reactions to emotional images. Individuals with different psychopathology may also react differently to sounds meant to elicit emotional valences. This variety of emotional responses would provide richer associations between personality and psychopathology.

## Chapter 5: Conclusion

This study had three aims: 1) examine the factor structure of psychopathology that included lesser examined symptom clusters, 2) examine the relationship between psychopathology and normal range personality, and 3) examine the relationship between psychopathology and emotional reactivity as measured by EEG. Our results overall suggest that a common Internalizing-Externalizing conceptualization of psychopathology does not neatly capture symptoms of autism or eating disorders when symptom clusters are looked at with total scores. This two-factor structure becomes even less tenable when symptoms are looked at discretely, with symptoms of autism, eating disorder, posttraumatic stress, and schizotypy falling outside of an Internalizing-Externalizing framework. When looking at the subscales of psychopathology, PTSD and eating problems separate themselves, as well as interpersonal problems and psychosis.

The results of the personality analyses largely suggest that the traits of alienation and stress reaction are large driving forces behind much of psychopathology, especially anxiety symptoms. Additionally, symptoms of autism, dissociation, and schizotypy are uniquely characterized by the tendency to get absorbed in emotional experiences. However, EEG results show that these individuals are less engaged in the emotional stimuli presented during the study. This suggests that these individuals are more emotionally engaged in their internal world rather than external stimuli, which may result in problems with attending to pertinent information in the environment.



## Appendix

Table 1. *Descriptive Statistics of Measures*

	<i>n</i>	Mean	<i>SD</i>	Range	Alpha
MPQ scales					
Well-Being	275	50.9	9.23	27-64	.76
Social Potency	275	56.4	6.76	34-71	.76
Achievement	275	52.9	10.1	27-69	.81
Social Closeness	275	53.0	9.26	27-66	.81
Stress Reaction	275	51.1	9.17	31-71	.83
Alienation	275	54.5	8.37	43-78	.81
Aggression	275	52.0	9.74	38-78	.76
Control	275	49.5	9.56	22-66	.75
Harm Avoidance	275	44.4	8.72	22-63	.74
Traditionalism	275	42.4	7.69	22-66	.68
Absorption	275	55.9	8.33	29-73	.71
ADS	274	36.7	4.13	29-54	.85
AQ	156	17.4	4.98	7-32	.64
Social skills	156	2.61	1.82	0-8	.56
Attention switching	156	4.83	1.75	1-9	.31
Attention to detail	156	5.36	2.03	0-9	.52
Communication	156	2.30	1.74	0-7	.47
Imagination	156	2.35	1.70	0-9	.44
BAI	153	8.43	7.91	0-41	.90
BHRQ	275	23.1	15.6	90	.89
Adult aggressive	275	3.29	3.46	0-18.3	.72
Adult nonaggressive	274	7.05	5.95	0-29	.76
Child aggressive	275	3.32	3.30	0-18	.69
Child nonaggressive	275	9.60	6.38	0-31	.75
DES	275	49.3	38.8	0-166	.96
EDE	270	42.1	37.4	0-185	.95
Restraint	270	5.86	6.78	0-30	.83
Eating concerns	270	3.29	4.92	0-24	.78
Weight concerns	270	14.9	12.1	0-46	.89
Shape concerns	270	7.26	7.23	0-29	.85
FSS-III	274	100	22.8	54-175	.93
Social	274	31.5	8.77	13-62	.89
Agoraphobia	274	21.1	5.45	13-43	.76
Blood-injection-injury	274	23.1	7.81	12-47	.87
GADI	275	37.7	9.41	18-69	.87
Cognitive	275	16.7	4.84	7-34	.87
Somatic	275	15.9	4.76	9-32	.77
Sleep	275	5.13	1.91	2-10	.70
OCI	275	32.6	10.5	18-86	.90

PCL-C	151	24.6	13.5	0-78	.91
Intrusion	151	7.44	4.57	0-25	.91
Avoidance	151	3.07	2.12	0-10	.88
Numbing	151	6.56	4.41	0-22	.90
Hyperarousal	151	7.50	4.36	0-25	.75
SCL14	273	21.4	6.51	14-51	.87
SDAST	273	1.53	1.99	0-15	.73
SPQ	273	8.09	4.61	0-22	.81
Cognitive/perceptual	273	2.88	1.91	0-8	.60
Interpersonal	273	2.94	2.31	0-8	.76
Disorganized	273	2.27	1.67	0-6	.62
SRDS	273	35.2	7.47	20-56	.77
Anhedonia	273	18.8	5.37	9-34	.76
Negative emotion	273	11.5	3.13	8-23	.71

Note: ADS = Alcohol Dependence Scale; AQ = Autism Questionnaire; BAI = Beck Anxiety Inventory; BHR = Behavior Report on Rule Breaking; DES = Dissociative Experiences Scale; EDE = Eating Disorder Examination; FSS-III = Fear Survey Schedule-III; GADI = Generalized Anxiety Disorder Inventory; OCI = Obsessive-Compulsive Inventory – Revised; PCL-C = PTSD Checklist for Civilians; SCL14 = Symptom Checklist (Somatization); SDAST = Short Drug Abuse Screening Test; SPQ = Schizotypal Personality Questionnaire; SRDS = Zung Self-Rating Depression Scale.



Table 2. *Factor Loadings for a Two and Three Factor Solution for Total Scores*

	Factor 1	Factor 2	Factor 3
ADS	.110 / .093	<b>.540 / .522</b>	-- / -.046
AQ	.249 /-.301	-.301 /-.139	-- / <b>.755</b>
BAI	<b>.773 / .966</b>	.068 /-.075	-- /-.183
BHR adult	.067 /-.128	<b>.834 / .904</b>	-- / .118
BHR child	.073 /-.001	<b>.820 / .812</b>	-- /-.022
DES	<b>.464 / .154</b>	-.012 / .062	-- / <b>.395</b>
EDE	<b>.430 / .300</b>	.106 / .108	-- / .124
FSS-III	<b>.570 / .511</b>	-.056 /-.096	-- / .104
GADI	<b>.837 / .683</b>	.097 / .065	-- / .181
OCI	<b>.588 / .198</b>	-.068 / .010	-- / <b>.489</b>
PCL-C	<b>.605 / .277</b>	-.129 /-.040	-- / <b>.452</b>
SCL14	<b>.790 / .981</b>	.095 /-.043	-- /-.176
SDAST	.076 / .075	<b>.547 / .531</b>	-- /-.071
SPQ	<b>.518 /-.103</b>	.000 / .169	-- / <b>.776</b>
SRDS	<b>.611 / .416</b>	-.068 /-.057	-- / .258

Note: ADS = Alcohol Dependence Scale; AQ = Autism Questionnaire; BAI = Beck Anxiety Inventory; BHR = Behavior Report on Rule Breaking; DES = Dissociative Experiences Scale; EDE = Eating Disorder Examination; FSS-III = Fear Survey Schedule-III; GADI = Generalized Anxiety Disorder Inventory; OCI = Obsessive-Compulsive Inventory – Revised; PCL-C = PTSD Checklist for Civilians; SCL14 = Symptom Checklist (Somatization); SDAST = Short Drug Abuse Screening Test; SPQ = Schizotypal Personality Questionnaire; SRDS = Zung Self-Rating Depression Scale. Factor loadings > |.35| are bolded.

Table 3. Factor Loadings for a Five and Six Factor Solution for Symptom Scores

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
ADS Total Score	.095/ .100	.006/-.008	<b>.500/ .405</b>	.024/-.072	-.108/-.288	--/ .164
AQ Social Skills	.027/ .064	-.023/-.005	-.185/-.010	-.048/ .090	<b>.772/ 1.045</b>	--/ .009
AQ Attention To Detail	.104/ .068	-.018/-.072	-.044/-.143	.052/ .008	-.095/-.156	--/ .152
AQ Communication	.004/-.008	-.057/-.036	-.040/-.047	-.030/ .079	<b>.634/ .479</b>	--/ .274
AQ Attention Switching	-.030/-.068	.120/ .143	-.115/-.150	.053/-.057	.222/ .081	--/ .197
AQ Imagination	-.151/-.058	-.029/-.031	-.031/ .025	.088/ .163	<b>.471/ .329</b>	--/ .065
BAI Total Score	<b>.809/ .807</b>	-.008/-.002	.013/ .048	.248/ .057	-.187/-.050	--/-.060
BHR Adult Aggression	-.303/-.313	.019/ .012	<b>.669/ .552</b>	.027/ .019	.340/ .037	--/ <b>.386</b>
BHR Adult Non-Aggression	.143/ .131	.018/ .029	<b>.750/ .780</b>	-.002/ .035	-.187/-.071	--/-.070
BHR Childhood Aggression	-.075/-.074	-.025/-.030	<b>.723/ .679</b>	-.056/-.038	.306/ .167	--/ .258
BHR Childhood Non-Aggression	.095/ .099	.018/ .033	<b>.810/ .863</b>	-.012/-.006	-.177/-.021	--/-.095
DES Total Score	.234/ .176	.026/ .016	.023/-.076	.194/ .086	.162/-.104	--/ <b>.353</b>
EDE Restriction	-.014/-.025	<b>.675/ .688</b>	.041/ .058	.039/ .054	-.120/-.062	--/-.090
EDE Eating Concerns	.130/ .124	<b>.711/ .709</b>	-.049/-.085	.023/-.062	-.043/-.112	--/ .067
EDE Shape Concerns	-.069/-.073	<b>.970/ .976</b>	.015/ .019	-.014/-.015	.050/ .026	--/ .004
EDE Weight Concerns	-.048/-.052	<b>.996/ 1.002</b>	.015/ .038	-.025/-.002	.045/ .053	--/-.029
FSS-III Social Phobia	<b>.467/ .445</b>	.207/ .213	-.008/ .007	.068/-.018	.219/ .166	--/ .130
FSS-III Agoraphobia	<b>.459/ .440</b>	-.019/-.020	-.113/-.118	.071/-.044	.115/ .059	--/ .126
FSS-III Blood-Injury-Injection	<b>.468/ .455</b>	-.092/-.082	-.086/-.015	.107/-.008	-.142/ .037	--/-.065
GADI Cognitive	<b>.662/ .616</b>	.029/ .034	-.043/-.023	.180/ .092	.074/ .044	--/ .058
GADI Somatic	<b>.785/ .760</b>	-.055/-.060	.067/ .058	.100/ .002	.106/ .047	--/ .115
GADI Sleep	<b>.377/ .390</b>	.009/ .018	.256/ .258	.114/-.027	-.152/-.091	--/-.025
OCI Total Score	<b>.420/ .354</b>	.000/ .005	-.038/-.086	.179/ .054	.173/ .017	--/ .286
PCL-C Intrusive Thoughts	.212/ .148	.003/ .011	-.078/-.027	<b>.793/ .674</b>	-.085/-.084	--/ .049
PCL-C Avoidance	-.091/-.082	.015/-.011	-.043/-.067	<b>.633/ .529</b>	.133/-.058	--/ .208
PCL-C Numbing	.072/ .029	-.039/-.032	.016/ .050	<b>.601/ .760</b>	.149/ .086	--/ .000
PCL-C Hyperarousal	<b>.401/ .376</b>	.034/ .046	-.015/-.022	.251/ .258	-.001/-.046	--/-.048
SCL14 Total Score	<b>.962/ .972</b>	-.094/-.103	.018/ .020	.053/-.107	-.053/-.040	--/-.010
SDAST Total Score	.100/ .122	-.017/-.018	<b>.515/ .545</b>	.035/ .049	-.093/ .029	--/-.101
SPQ Cognitive Perceptual	<b>.362/ .295</b>	-.093/-.095	.065/-.045	.159/-.038	.175/-.103	--/ <b>.439</b>
SPQ Interpersonal	-.002/-.069	.065/ .069	.039/ .008	-.057/ .014	<b>.809/ .557</b>	--/ <b>.449</b>
SPQ Disorganization	.224/ .148	.004/-.005	.143/ .059	-.026/-.013	<b>.440/ .166</b>	--/ <b>.420</b>
SRDS Anhedonia	.230/ .235	.048/ .043	-.106/-.092	.087/ .083	.262/ .226	--/ .054
SRDS Negative Affect	<b>.675/ .663</b>	.055/ .064	.068/ .080	.171/ .033	.096/ .093	--/ .042

Note: ADS = Alcohol Dependence Scale; AQ = Autism Questionnaire; BAI = Beck Anxiety Inventory; BHR = Behavior Report on Rule Breaking; DES = Dissociative Experiences Scale; EDE = Eating Disorder Examination; FSS-III = Fear Survey Schedule; GADI = Generalized Anxiety Disorder Inventory; OCI = Obsessive-Compulsive Inventory – Revised; PCL-C = PTSD Checklist for Civilians; SCL14 = Symptom Checklist (Somatization); SDAST = Short Drug Abuse Screening Test; SPQ = Schizotypal Personality Questionnaire; SRDS = Zung Self-Rating Depression Scale. Factor loadings > |.35| are bolded.

Table 4. *Correlations of Full Scale Psychopathology with MPQ Primary Trait Scores*

	WB	SP	AC	SC	SR	AL	AG	CL	HA	TD	AB
ADS	.02	.09	-.16**	.07	.11	.14*	.20***	-.21***	-.11	-.12	.08
AQ	-.21**	-.31***	.04	-.36***	.29***	.20**	-.04	.17*	.18*	.16*	.06
BAI	-.07	.07	.01	-.04	.44***	.28***	-.02	-.06	.01	-.04	.19**
BHR	-.12	.14*	-.14*	.02	.10	.10	.45***	-.32***	-.29***	-.17**	.07
DES	.11	-.04	.00	-.07	.29***	.33***	.05	-.04	-.07	.14*	.35***
EDE	-.09	.03	-.01	-.10	.28***	.20***	.03	-.14*	-.09	-.03	.10
FSS-III	-.09	-.05	-.04	-.04	.38***	.29***	-.03	.07	.18**	.07	.16**
GADI	-.22***	-.05	-.01	-.20***	.62***	.37***	.07	.00	-.04	-.04	.31***
OCI	-.01	-.03	.05	-.15*	.36***	.33***	.06	.06	.05	.23***	.34***
PCL-C	-.27***	-.13	-.06	-.18*	.50***	.36***	.04	.00	.00	.07	.22**
SCL14	-.11	.00	.02	-.10	.39***	.28***	.02	-.09	-.07	-.05	.19**
SDAST	-.03	.08	-.06	.06	.05	-.01	.18**	-.14*	-.15*	-.03	.13*
SPQ	-.26***	-.30***	-.08	-.46***	.47***	.44***	.17**	.01	-.09	.05	.42***
SRDS	-.35***	-.23***	-.19**	-.19**	.53***	.42***	-.04	-.13*	.04	.06	.17**

*Note.*  $N = 274$ . \* =  $p < .05$ , \*\* =  $p < .01$ , \*\*\* =  $p < .001$ . ADS = Alcohol Dependence Scale; AQ = Autism Questionnaire; BAI = Beck Anxiety Inventory; BHR = Behavior Report on Rule Breaking; DES = Dissociative Experiences Scale; EDE = Eating Disorder Examination; FSS-III = Fear Survey Schedule; GADI = Generalized Anxiety Disorder Inventory; OCI = Obsessive-Compulsive Inventory – Revised; PCL-C = PTSD Checklist for Civilians; SCL14 = Symptom Checklist (Somatization); SDAST = Short Drug Abuse Screening Test; SPQ = Schizotypal Personality Questionnaire; SRDS = Zung Self-Rating Depression Scale; WB = Well-Being; SP = Social Potency; AC = Achievement; SR = Stress Reaction; AL = Alienation; AG = Aggression; CL = Control; HA = Harm Avoidance; TD = Traditionalism; AB = Absorption.

Table 5. Beta Weights (and Standard Errors) for Full Scale Psychopathology Regressions with MPQ Scores as Predictors

	ADS	AQ	BAI	BHR	DES	EDE	FSS-III	GADI	OCI	PCL-C	SCL14	SDAST	SPQ	SRDS
WB	.07 (.07)	-.01 (.07)	-.10 (.08)	-.04 (.07)	.20 (.07)**	-.02 (.07)	-.01 (.07)	-.07 (.06)	.05 (.07)	-.17 (.08)*	-.05 (.07)	-.09 (.07)	-.03 (.05)	-.20 (.06)**
SP	.06 (.07)	-.25 (.07)**	.13 (.08)	.07 (.06)	-.09 (.06)	.05 (.07)	-.02 (.06)	.01 (.05)	-.02 (.06)	-.08 (.08)	.01 (.06)	.04 (.07)	-.19 (.05)**	-.14 (.05)**
AC	-.14 (.07)*	.07 (.09)	.02 (.07)	-.05 (.06)	-.07 (.06)	.00 (.07)	-.07 (.06)	-.04 (.05)	-.02 (.06)	-.03 (.07)	.02 (.07)	-.02 (.07)	-.10 (.05)*	-.12 (.05)*
SC	.08 (.07)	-.24 (.07)**	.04 (.07)	.06 (.06)	-.04 (.06)	-.05 (.07)	.05 (.06)	-.04 (.05)	-.10 (.06)	.01 (.07)	.01 (.06)	.08 (.07)	-.29 (.05)**	.03 (.05)
SR	.07 (.07)	.24 (.09)**	.36 (.08)**	.03 (.06)	.20 (.07)**	.23 (.07)**	.31 (.07)**	.53 (.06)**	.23 (.07)**	.37 (.09)**	.30 (.07)**	.01 (.07)	.23 (.05)**	.39 (.06)**
AL	.12 (.07)	.04 (.08)	.14 (.09)	.04 (.06)	.18 (.06)**	.10 (.07)	.16 (.07)*	.09 (.06)	.12 (.06)	.13 (.09)	.15 (.07)*	-.09 (.07)	.17 (.05)**	.25 (.05)**
AG	.12 (.06)	.01 (.07)	-.14 (.07)*	.35 (.06)**	.01 (.06)	-.08 (.06)	-.07 (.06)	-.05 (.05)	.04 (.06)	-.07 (.07)	-.09 (.06)	.15 (.06)*	.08 (.05)	-.19 (.05)**
CL	-.08 (.07)	.05 (.09)	-.08 (.09)	-.14 (.06)*	-.02 (.06)	-.12 (.07)	.04 (.06)	.04 (.05)	.02 (.06)	.03 (.08)	-.08 (.07)	-.07 (.07)	.03 (.05)	-.16 (.05)**
HA	-.06 (.06)	.09 (.07)	.02 (.06)	-.17 (.06)**	-.07 (.06)	-.08 (.07)	.14 (.06)*	-.05 (.05)	.04 (.06)	-.09 (.08)	-.05 (.06)	-.08 (.07)	-.06 (.05)	.00 (.05)
TD	-.10 (.06)	.15 (.06)*	-.06 (.07)	-.07 (.06)	.10 (.06)	.00 (.06)	.01 (.06)	-.05 (.05)	.19 (.06)**	.08 (.07)	-.05 (.06)	.02 (.06)	.07 (.05)	.09 (.05)
AB	.03 (.07)	-.02 (.07)	.05 (.08)	.04 (.06)	.17 (.06)**	-.01 (.07)	.04 (.06)	.12 (.05)*	.20 (.06)**	.06 (.09)	.06 (.07)	.16 (.07)*	.28 (.05)**	.02 (.05)

Note: \* =  $p < .05$ , \*\* =  $p < .01$ , \*\*\* =  $p < .001$ . ADS = Alcohol Dependence Scale; AQ = Autism Questionnaire; BAI = Beck Anxiety Inventory; BHR = Behavior Report on Rule Breaking; DES = Dissociative Experiences Scale; EDE = Eating Disorder Examination; FSS-III = Fear Survey Schedule-III; GADI = Generalized Anxiety Disorder Inventory; OCI = Obsessive-Compulsive Inventory – Revised; PCL-C = PTSD Checklist for Civilians; SCL14 = Symptom Checklist (Somatization); SDAST = Short Drug Abuse Screening Test; SPQ = Schizotypal Personality Questionnaire; SRDS = Zung Self-Rating Depression Scale; WB = Well-Being; SP = Social Potency; AC = Achievement; SR = Stress Reaction; AL = Alienation; AG = Aggression; CL = Control; HA = Harm Avoidance; TD = Traditionalism; AB = Absorption.

Table 6. Beta Weights for Personality Regressions with Psychopathology Full Scales as Predictors

	WB	SP	AC	SC	SR	AL	AG	CL	HA	TD	AB
ADS	.05(.07)	.04(.07)	-.09(.07)	.06(.07)	.07(.05)	.07(.06)	-.01(.07)	-.04(.07)	.06(.07)	-.07(.07)	.00(.07)
AQ	-.10(.08)	-.17(.08)*	.12(.10)	-.22(.07)**	.15(.07)*	.04(.08)	.00(.08)	.11(.09)	.15(.07)*	.07(.09)	-.10(.08)
BAI	-.01(.10)	.28(.12)*	.09(.13)	.10(.10)	.11(.08)	.04(.12)	-.10(.11)	-.05(.16)	.19(.12)	-.06(.14)	-.12(.10)
BHR	-.13(.07)	.09(.07)	-.13(.08)	-.02(.07)	.06(.06)	.11(.07)	.48(.07)**	-.31(.07)**	-.23(.07)**	-.12(.08)	-.06(.07)
DES	.30(.07)**	.03(.07)	.02(.07)	.13(.06)	.03(.05)	.10(.07)	-.01(.07)	-.02(.07)	-.04(.07)	.13(.07)	.20(.07)**
EDE	-.02(.06)	.03(.06)	.03(.07)	-.08(.06)	.01(.05)	.00(.06)	-.04(.06)	-.10(.06)	-.09(.06)	-.06(.07)	-.04(.06)
FSS-III	.02(.07)	-.02(.07)	-.09(.07)	.12(.06)	.08(.05)	.09(.06)	-.03(.07)	.08(.07)	.23(.07)**	.07(.07)	.01(.06)
GADI	-.05(.09)	.03(.10)	.07(.10)	-.08(.09)	.45(.08)**	.04(.10)	.00(.10)	.21(.10)*	.00(.10)	-.15(.10)	.17(.10)
OCI	.14(.07)*	.11(.07)	.04(.08)	.05(.07)	-.03(.06)	.08(.07)	.05(.07)	.03(.07)	.11(.07)	.30(.08)**	.14(.07)*
PCL-C	-.22(.09)*	-.05(.10)	-.02(.11)	.00(.09)	.08(.08)	.02(.11)	.06(.10)	.04(.11)	-.14(.10)	-.04(.11)	-.02(.11)
SCL14	.05(.10)	-.09(.11)	.11(.11)	-.07(.09)	-.24(.08)**	-.10(.09)	-.01(.10)	-.08(.12)	-.24(.10)*	-.09(.11)	-.02(.09)
SDAST	.04(.07)	-.03(.07)	.03(.07)	.04(.06)	-.06(.05)	-.11(.06)	-.03(.07)	.05(.07)	-.04(.07)	.11(.07)	.15(.06)*
SPQ	-.21(.07)**	-.28(.07)**	-.09(.08)	-.45(.07)**	.10(.06)	.21(.07)**	.16(.07)*	.01(.08)	-.18(.07)*	-.07(.08)	.31(.07)**
SRDS	-.26(.07)**	-.20(.07)**	-.30(.08)**	.00(.07)	.22(.06)**	.26(.07)**	-.06(.07)	-.23(.08)**	.10(.07)	.12(.08)	-.03(.07)

Note: \* =  $p < .05$ , \*\* =  $p < .01$ , \*\*\* =  $p < .001$ . ADS = Alcohol Dependence Scale; AQ = Autism Questionnaire; BAI = Beck Anxiety Inventory; BHR = Behavior Report on Rule Breaking; DES = Dissociative Experiences Scale; EDE = Eating Disorder Examination; FSS-III = Fear Survey Schedule-III; GADI = Generalized Anxiety Disorder Inventory; OCI = Obsessive-Compulsive Inventory – Revised; PCL-C = PTSD Checklist for Civilians; SCL14 = Symptom Checklist (Somatization); SDAST = Short Drug Abuse Screening Test; SPQ = Schizotypal Personality Questionnaire; SRDS = Zung Self-Rating Depression Scale; WB = Well-Being; SP = Social Potency; AC = Achievement; SR = Stress Reaction; AL = Alienation; AG = Aggression; CL = Control; HA = Harm Avoidance; TD = Traditionalism; AB = Absorption.

Table 7. Correlations of Subscale Psychopathology with MPQ Scores

	WB	SP	AC	SC	SR	AL	AG	CL	HA	TD	AB
ADS	.02	.10	-.15*	.07	.12*	.14*	.20***	-.21***	-.11	-.11	.09
AQ											
Social Skills	-.39***	-.43***	-.03	-.42***	.19*	.14*	-.06	.08	.14	.04	-.02
Attention to Detail	.11	.06	.09	-.02	.21*	.12	-.03	.08	.15*	.16	.26***
Communication	-.16*	-.22**	.01	-.34***	.26**	.20*	.10	.05	.03	.03	.04
Attention Switching	-.07	-.07	.12	-.09	.22*	.04	-.09	.30***	.19*	.03	-.01
Imagination	-.16*	-.20**	-.07	-.21**	.10	.10	.08	-.03	.03	.04	-.05
BAI	-.13	.10	.00	-.01	.43***	.24***	-.03	-.07	.02	-.01	.15*
BHR											
Child Aggression	-.11	.01	-.04	-.11	.13*	.18**	.42***	-.17**	-.21***	-.14*	.07
Child Non-Aggression	-.01	.20***	-.16**	.09	.04	.09	.34***	-.34***	-.22***	-.17**	.05
Adult Aggression	-.09	-.01	-.04	-.16**	.10	.14*	.37***	-.10	-.20***	.01	.08
Adult Non-Aggression	-.04	.15*	-.12*	.09	.09	.01	.36***	-.30***	-.29***	-.18**	.06
DES Total	.11	-.04	.00	-.07	.29***	.33***	.05	-.04	-.06	.14*	.35***
EDE											
Restraint	-.01	.11	.08	-.04	.13*	.11	-.04	-.04	-.05	-.02	.06
Eating Concerns	-.06	.00	-.08	-.12	.29***	.20***	-.01	-.10	.02	-.01	.10
Shape Concerns	-.16*	-.01	-.03	-.10	.24***	.15*	-.06	-.10	-.09	.01	.07
Weight Concerns	-.12*	.00	-.04	-.11	.22***	.16**	-.07	-.10	-.06	-.03	.07
FSS-III											
Social Phobia	-.21***	-.13*	-.03	-.14*	.45***	.36***	.10	.03	.01	.00	.16**
Agoraphobia	-.10	-.14*	-.03	-.11	.32***	.26***	-.02	.09	.22***	.05	.14*
Blood/Injection Phobia	.04	.04	-.08	.08	.19**	.10	-.10	.00	.17**	.06	.11
GADI											
Cognitive	-.28***	-.04	.04	-.22***	.70***	.31***	.02	.08	.02	-.01	.21***
Somatic	-.11	-.06	-.06	-.15*	.43***	.33***	.08	-.05	-.07	-.04	.32***
Sleep	-.11	.04	-.03	-.05	.22***	.19**	.08	-.08	-.09	-.08	.20***
OCI Total	-.01	-.03	.05	-.15*	.36***	.33***	.06	.06	.05	.23***	.34***
PCL-C											
Intrusion	-.18**	-.06	-.05	-.07	.46***	.27***	.04	.03	.02	.08	.27***
Avoidance	-.22**	-.12	-.02	-.09	.36***	.21**	.04	.03	.05	.11	.12
Numbing	-.27**	-.10	-.12	-.23**	.36***	.33***	.05	-.03	-.06	.08	.16*
Hyperarousal	-.22**	-.06	-.02	-.08	.38***	.23**	.10	-.04	-.07	.00	.04
SCL Total	-.11	.00	.02	-.09	.38***	.28***	.01	-.08	-.06	-.04	.19**
SDAST Total	-.03	.08	-.06	.06	.05	-.01	.18**	-.14*	-.15*	-.03	.13*
SPQ											
Cognitive-Perceptual	-.03	-.05	-.01	-.10	.37***	.44***	.14*	.01	-.01	.19**	.53***

Interpersonal	-.41***	-.41***	-.09	-.61***	.37***	.33***	.07	.09	.02	.06	.14*
Disorganized	-.11	-.20**	-.09	-.31***	.36***	.27***	.19**	-.11	-.24***	-.14*	.36***
SRDS											
Positive	-.31***	-.30***	-.24***	-.15*	.41***	.32***	-.05	-.10	.14*	.12*	.10
Negative	-.31***	-.03	-.07	-.19**	.55***	.38***	.06	-.12*	-.11	-.07	.18**

\* =  $p < .05$ , \*\* =  $p < .01$ , \*\*\* =  $p < .001$ . ADS = Alcohol Dependence Scale; AQ = Autism Questionnaire; BAI = Beck Anxiety Inventory; BHR = Behavior Report on Rule Breaking; DES = Dissociative Experiences Scale; EDE = Eating Disorder Examination; FSS-III = Fear Survey Schedule-III; GADI = Generalized Anxiety Disorder Inventory; OCI = Obsessive-Compulsive Inventory – Revised; PCL-C = PTSD Checklist for Civilians; SCL14 = Symptom Checklist (Somatization); SDAST = Short Drug Abuse Screening Test; SPQ = Schizotypal Personality Questionnaire; SRDS = Zung Self-Rating Depression Scale; WB = Well-Being; SP = Social Potency; AC = Achievement; SR = Stress Reaction; AL = Alienation; AG = Aggression; CL = Control; HA = Harm Avoidance; TD = Traditionalism; AB = Absorption.

Table 8. *Subscale Psychopathology Regressions with MPQ Scores as Predictors*

		WB	SP	AC	SC	SR	AL	AG	CL	HA	TD	AB
ADS	Total	.06 (.07)	.06 (.07)	-.14 (.07)*	.08 (.07)	.07 (.07)	.12 (.07)	.12 (.06)	-.08 (.07)	-.06 (.06)	-.09 (.06)	.04 (.07)
AQ	Soc Skill	-.23 (.09)*	-.32 (.08)**	.09 (.07)	-.24 (.08)**	.07 (.08)	.04 (.07)	-.06 (.08)	-.12 (.07)	.13 (.07)	.13 (.07)	.00 (.08)
	Atn' Det.	.10 (.10)	.06 (.09)	-.02 (.09)	.00 (.09)	.12 (.11)	.01 (.09)	.02 (.08)	.03 (.09)	.14 (.09)	-.01 (.08)	.26 (.09)**
	Comm	.07 (.09)	-.15 (.08)	.00 (.09)	-.27 (.09)**	.20 (.10)	.07 (.09)	.12 (.07)	.03 (.08)	-.01 (.07)	.03 (.07)	-.11 (.08)
	AttSwthcing	.05 (.11)	.01 (.09)	.00 (.08)	.01 (.11)	.28 (.13)*	-.09 (.09)	.00 (.09)	.29 (.09)**	.12 (.09)	-.02 (.08)	-.07 (.09)
	Imagination	-.01 (.09)	-.18 (.10)	-.01 (.09)	-.11 (.10)	.07 (.10)	.07 (.10)	.07 (.10)	-.05 (.10)	.05 (.08)	.07 (.11)	-.09 (.08)
BAI	Total	-.03 (.08)	-.18 (.09)	-.03 (.08)	-.11 (.08)	.07 (.09)	.05 (.08)	.08 (.07)	-.04 (.08)	.03 (.08)	.09 (.09)	-.08 (.08)
BHR	AdAg	.01 (.07)	-.03 (.06)	-.01 (.07)	-.11 (.06)	.01 (.07)	.05 (.07)	.34 (.06)**	.00 (.07)	-.14 (.06)*	.07 (.06)	.01 (.07)
	AdNonAg	-.04 (.07)	.08 (.06)	-.04 (.06)	.13 (.06)*	.08 (.07)	-.05 (.06)	.27 (.06)**	-.14 (.06)*	-.18 (.06)**	-.08 (.06)	.05 (.06)
	ChAg	-.03 (.07)	-.03 (.06)	.03 (.06)	-.02 (.06)	.02 (.07)	.11 (.06)	.35 (.06)**	-.05 (.06)	-.11 (.06)	-.08 (.06)	.01 (.06)
	ChNonAg	-.03 (.07)	.15 (.06)*	-.09 (.06)	.08 (.06)	-.04 (.07)	.08 (.06)	.22 (.06)**	-.18 (.06)**	-.10 (.06)	-.11 (.06)	.04 (.06)
DES	Total	.20 (.07)**	-.09 (.06)	-.07 (.06)	-.03 (.06)	.20 (.07)**	.19 (.06)**	.01 (.06)	-.02 (.06)	-.06 (.06)	.10 (.06)	.17 (.06)**
EDE	Restraint	-.02 (.08)	.12 (.07)	.05 (.07)	-.04 (.07)	.11 (.07)	.07 (.07)	-.11 (.07)	-.04 (.07)	-.05 (.07)	-.03 (.06)	-.01 (.07)
	EatingCon	.07 (.07)	.05 (.07)	-.11 (.07)	-.11 (.07)	.27 (.07)**	.10 (.07)	-.10 (.06)	-.08 (.07)	.01 (.07)	-.02 (.06)	-.02 (.07)
	ShapeCon	-.12 (.07)	.04 (.07)	-.01 (.07)	-.02 (.07)	.21 (.07)**	.07 (.07)	-.17 (.06)**	-.10 (.07)	-.11 (.07)	.05 (.06)	-.02 (.07)
	WeightCon	-.07 (.07)	.06 (.07)	-.04 (.07)	-.07 (.07)	.18 (.07)*	.10 (.07)	-.18 (.06)**	-.10 (.07)	-.06 (.07)	-.01 (.06)	-.01 (.07)
FSS-III	Social	-.05 (.07)	-.11 (.06)	-.03 (.06)	.04 (.06)	.36 (.07)**	.20 (.06)**	.02 (.06)	.06 (.06)	-.04 (.06)	-.01 (.06)	.00 (.06)
	Agoraphobia	.01 (.07)	-.10 (.06)	-.04 (.07)	-.02 (.06)	.22 (.07)**	.14 (.07)*	-.03 (.06)	.03 (.07)	.20 (.06)**	-.01 (.06)	.06 (.07)
	BII	.04 (.07)	.06 (.07)	-.11 (.07)	.07 (.07)	.18 (.07)*	.04 (.07)	-.12 (.06)	-.02 (.07)	.16 (.07)*	.01 (.06)	.08 (.07)
GADI	Cognitive	-.09 (.05)	.03 (.05)	.00 (.05)	-.05 (.05)	.68 (.05)**	.01 (.05)	-.08 (.05)	.09 (.05)	-.04 (.05)	-.01 (.05)	.00 (.05)
	Somatic	.01 (.07)	-.03 (.06)	-.08 (.06)	-.04 (.06)	.31 (.07)**	.14 (.06)*	-.02 (.06)	.00 (.06)	-.05 (.06)	-.05 (.06)	.18 (.06)**
	Sleep	-.12 (.07)	.07 (.07)	-.02 (.07)	.03 (.07)	.10 (.07)	.10 (.07)	.00 (.06)	-.03 (.07)	-.04 (.07)	-.08 (.06)	.16 (.07)*
PCL-C	Intrusion	-.13 (.08)	-.01 (.09)	-.05 (.08)	.06 (.11)	.37 (.09)**	.05 (.09)	-.02 (.07)	.04 (.09)	.00 (.07)	.08 (.07)	.14 (.09)
	Avoidance	-.12 (.09)	-.07 (.09)	-.02 (.08)	.02 (.09)	.26 (.09)**	.08 (.10)	.01 (.07)	.04 (.09)	.02 (.07)	.13 (.07)	.02 (.08)
	Numbing	-.17 (.09)	.03 (.09)	-.14 (.09)	-.11 (.09)	.23 (.09)**	.20 (.10)	-.09 (.07)	-.02 (.10)	-.08 (.09)	.11 (.08)	.01 (.07)
	Hyperarousal	-.12 (.08)	.00 (.10)	-.01 (.08)	.04 (.12)	.35 (.12)**	.08 (.11)	.03 (.09)	-.04 (.09)	-.10 (.09)	.03 (.09)	-.07 (.09)
SCL14	Total	-.05 (.07)	.01 (.06)	.02 (.07)	.01 (.06)	.30 (.07)**	.15 (.07)*	-.09 (.06)	-.08 (.07)	-.05 (.06)	-.05 (.06)	.06 (.07)
SDAST	Total	-.09 (.07)	.04 (.07)	-.02 (.07)	.08 (.07)	.02 (.07)	-.09 (.07)	.15 (.06)*	-.07 (.07)	-.08 (.07)	.02 (.06)	.16 (.07)*
SPQ	Cognitive	-.03 (.06)	-.07 (.05)	-.05 (.06)	.02 (.06)	.13 (.06)*	.21 (.06)**	.10 (.05)	.01 (.06)	.03 (.05)	.13 (.05)*	.42 (.06)**
	Interpersonal	-.10 (.05)	-.21 (.05)**	-.09 (.05)	-.44 (.05)**	.18 (.05)**	.13 (.05)*	.01 (.05)	.05 (.05)	-.01 (.05)	.11 (.05)*	.04 (.05)
	Disorganized	.10 (.06)	-.17 (.06)**	-.09 (.06)	-.20 (.06)**	.23 (.06)**	.07 (.06)	.10 (.05)	-.01 (.06)	-.17 (.06)**	-.11 (.05)*	.23 (.06)**
SRDS	Positive	-.16 (.06)**	-.23 (.06)**	-.14 (.06)*	.04 (.06)	.30 (.06)**	.18 (.06)**	-.14 (.05)**	-.16 (.06)**	.08 (.05)	.15 (.05)**	.01 (.06)
	Negative	-.20 (.06)**	.04 (.06)	-.04 (.06)	.00 (.06)	.43 (.06)**	.19 (.06)**	-.11 (.05)*	-.08 (.06)	-.12 (.05)*	-.04 (.05)	.01 (.06)

Note: First values reported are standardized beta coefficients. Values in parentheses are standard error values. \* =  $p < .05$ , \*\* =  $p < .01$ , \*\*\* =  $p < .001$ . ADS = Alcohol Dependence Scale; AQ = Autism Questionnaire; BAI = Beck Anxiety Inventory; BHR = Behavior Report on Rule Breaking; DES = Dissociative Experiences Scale; EDE = Eating Disorder Examination; FSSIII = Fear Survey Schedule-III; GADI = Generalized Anxiety Disorder Inventory; OCI = Obsessive-Compulsive Inventory – Revised; PCL-C =



PTSD Checklist for Civilians; SCL14 = Symptom Checklist (Somatization); SDAST = Short Drug Abuse Screening Test; SPQ = Schizotypal Personality Questionnaire; ZUNG = Zung Self-Rating Depression Scale; WB = Well-Being; SP = Social Potency; AC = Achievement; SR = Stress Reaction; AL = Alienation; AG = Aggression; CL = Control; HA = Harm Avoidance; TD = Traditionalism; AB = Absorption.

Table 9. *Subscale Personality Regressions with Psychopathology Subscales as Predictors*

	WB	SP	AC	SC	SR	AL	AG	CL	HA	TD	AB
ADS	-.03 (.09)	-.02 (.08)	-.09 (.08)	.03 (.07)	.03 (.05)	.08 (.07)	-.07 (.09)	-.08 (.09)	.04 (.08)	-.05 (.08)	.03 (.07)
AQ											
Social Skills	-.28 (.10)**	-.31 (.12)*	.03 (.11)	-.11 (.09)	-.01 (.07)	.03 (.11)	-.06 (.10)	-.09 (.12)	.15 (.10)	.11 (.10)	.02 (.11)
Attention to Detail	.10 (.08)	.05 (.08)	.04 (.10)	-.01 (.08)	.12 (.06)	.11 (.07)	-.02 (.07)	.05 (.07)	.13 (.09)	.05 (.08)	.18 (.06)**
Communication	.10 (.08)	.08 (.09)	.06 (.10)	-.09 (.09)	.05 (.07)	.03 (.09)	.15 (.09)	.03 (.10)	.02 (.10)	.03 (.09)	-.06 (.08)
Attention Switching	-.01 (.07)	-.01 (.08)	.02 (.09)	.05 (.08)	.11 (.06)	-.02 (.08)	-.09 (.07)	.26 (.10)*	.17 (.10)	-.02 (.09)	-.01 (.08)
Imagination	.03 (.08)	-.02 (.09)	-.01 (.09)	.00 (.08)	-.01 (.06)	-.02 (.08)	.11 (.09)	-.08 (.08)	.05 (.08)	.00 (.11)	-.12 (.07)
BAI	-.06 (.13)	.31 (.11)**	.11 (.13)	.22 (.10)*	.07 (.10)	.05 (.10)	-.02 (.12)	.02 (.14)	.21 (.14)	.14 (.17)	-.24 (.10)*
BHR											
Adult Aggressive	-.04 (.08)	.05 (.09)	.09 (.09)	-.09 (.08)	.09 (.06)	.01 (.08)	.12 (.09)	.11 (.09)	.00 (.09)	.17 (.09)	-.03 (.08)
Adult Nonaggressive	-.12 (.09)	-.07 (.10)	-.07 (.10)	.07 (.09)	.02 (.07)	-.15 (.09)	.23 (.11)*	-.15 (.12)	-.15 (.10)	-.09 (.10)	-.08 (.09)
Child Aggressive	-.05 (.09)	-.01 (.08)	.08 (.10)	.00 (.08)	.06 (.06)	.14 (.08)	.18 (.09)	.04 (.09)	-.03 (.09)	-.13 (.09)	.01 (.08)
Child Nonaggressive	.03 (.10)	.12 (.10)	-.23 (.12)	.02 (.09)	-.03 (.08)	.10 (.10)	.10 (.10)	-.30 (.11)**	.02 (.10)	-.02 (.11)	-.03 (.09)
DES	.28 (.06)**	-.02 (.07)	.02 (.08)	.09 (.06)	.02 (.05)	.06 (.07)	-.05 (.07)	-.08 (.07)	-.08 (.08)	.07 (.08)	.21 (.07)**
EDE											
Restraint	.10 (.07)	.09 (.08)	.21 (.08)*	-.09 (.07)	-.05 (.06)	.04 (.07)	.00 (.07)	.12 (.08)	.01 (.08)	-.02 (.08)	.02 (.07)
Eating Concerns	-.05 (.09)	-.02 (.10)	-.13 (.10)	-.16 (.08)*	.11 (.07)	.04 (.09)	.19 (.09)*	-.06 (.09)	.19 (.09)*	-.01 (.09)	-.17 (.09)
Shape Concerns	-.23 (.14)	-.05 (.15)	-.03 (.17)	.06 (.13)	.03 (.13)	-.15 (.14)	-.02 (.16)	-.21 (.16)	-.24 (.15)	.26 (.16)	-.07 (.14)
Weight Concerns	.15 (.16)	.00 (.16)	-.03 (.18)	.00 (.14)	-.12 (.14)	.06 (.15)	-.23 (.17)	.03 (.16)	.04 (.16)	-.22 (.18)	.17 (.16)
FSS-III											
Social	-.04 (.08)	-.05 (.09)	.00 (.09)	.04 (.08)	.01 (.06)	.20 (.08)*	.12 (.09)	.12 (.09)	-.03 (.09)	-.02 (.09)	-.01 (.08)
Agoraphobia	-.01 (.07)	-.05 (.07)	.04 (.08)	-.03 (.06)	.06 (.05)	.06 (.07)	.07 (.07)	.08 (.07)	.22 (.08)**	-.05 (.07)	-.04 (.07)
Blood-Injection-Injury	.10 (.07)	.06 (.07)	-.10 (.08)	.03 (.06)	.00 (.06)	-.07 (.07)	-.12 (.07)	-.05 (.07)	.02 (.07)	.08 (.08)	.04 (.07)
GADI											
Cognitive	-.12 (.08)	.08 (.09)	.21 (.10)*	-.10 (.08)	.50 (.07)**	.01 (.09)	-.04 (.09)	.19 (.09)	.08 (.09)	.02 (.09)	.01 (.08)
Somatic	.17 (.09)*	-.02 (.10)	-.15 (.10)	.06 (.08)	-.11 (.07)	-.01 (.09)	.02 (.09)	-.03 (.09)	-.05 (.10)	-.12 (.10)	.12 (.09)
Sleep	-.02 (.06)	-.07 (.07)	.05 (.07)	-.06 (.06)	-.05 (.05)	.07 (.06)	-.05 (.07)	.09 (.07)	.01 (.08)	-.06 (.07)	.13 (.07)
OCI	.14 (.07)	.09 (.08)	.07 (.08)	.00 (.06)	-.03 (.06)	.05 (.07)	.02 (.07)	.06 (.07)	.08 (.08)	.26 (.08)**	.11 (.07)
PCL-C											
Intrusion	-.01 (.10)	-.12 (.15)	.02 (.13)	-.01 (.13)	.09 (.10)	-.07 (.11)	.11 (.12)	-.01 (.15)	-.14 (.13)	-.05 (.13)	.20 (.12)
Avoidance	-.03 (.12)	.03 (.12)	-.01 (.11)	.13 (.09)	-.05 (.09)	-.07 (.11)	.02 (.12)	-.05 (.14)	.09 (.11)	.07 (.12)	-.09 (.10)
Numbing	-.20 (.14)	.05 (.10)	-.16 (.16)	-.17 (.12)	.02 (.10)	.27 (.11)*	-.17 (.12)	.07 (.13)	-.01 (.16)	.01 (.12)	.02 (.12)
Hyperarousal	-.05 (.13)	-.03 (.12)	-.02 (.14)	.08 (.10)	.07 (.11)	-.11 (.10)	.25 (.14)	-.13 (.12)	-.05 (.16)	.00 (.12)	-.16 (.11)
SCL14	.02 (.11)	-.16 (.11)	.12 (.12)	-.15 (.10)	-.16 (.09)	-.12 (.10)	-.18 (.11)	.00 (.11)	-.15 (.13)	-.08 (.13)	.03 (.10)
SDAST	.07 (.07)	.00 (.07)	.06 (.08)	-.03 (.07)	-.01 (.06)	-.12 (.07)	.00 (.08)	.07 (.08)	-.07 (.08)	.07 (.08)	.14 (.07)*
SPQ											
Cognitive	-.03 (.07)	.06 (.09)	.06 (.09)	.15 (.08)	.08 (.06)	.25 (.08)**	.12 (.09)	.03 (.09)	.09 (.09)	.24 (.08)**	.28 (.09)**
Interpersonal	-.25 (.08)**	-.24 (.09)**	-.14 (.10)	-.54 (.08)**	.03 (.07)	.01 (.09)	.00 (.09)	.07 (.09)	-.06 (.10)	-.06 (.09)	-.11 (.09)
Disorganized	.05 (.07)	-.10 (.08)	-.06 (.08)	-.07 (.07)	.03 (.06)	-.05 (.07)	.03 (.07)	-.13 (.08)	-.31 (.08)**	-.27 (.08)**	.20 (.07)**
SRDS											
Positive	-.09 (.06)	-.19 (.07)**	-.23 (.07)**	.08 (.06)	.18 (.05)**	.15 (.07)*	-.06 (.07)	-.10 (.07)	.11 (.07)	.08 (.07)	.04 (.07)
Negative	-.16 (.09)	.10 (.09)	-.09 (.10)	-.03 (.08)	.19 (.07)**	.11 (.09)	-.04 (.10)	-.11 (.10)	-.13 (.10)	-.15 (.10)	-.01 (.09)

Note: First values reported are standardized beta coefficients. Values in parentheses are standard error values. \* =  $p < .05$ , \*\* =  $p < .01$ , \*\*\* =  $p < .001$ . ADS = Alcohol Dependence Scale; AQ = Autism Questionnaire; BAI = Beck Anxiety Inventory; BHR = Behavior Report on Rule Breaking; DES = Dissociative Experiences Scale; EDE = Eating Disorder Examination; FSS-III = Fear Survey Schedule-III; GADI = Generalized Anxiety Disorder Inventory; OCI = Obsessive-Compulsive Inventory – Revised; PCL-C = PTSD Checklist for Civilians; SCL14 = Symptom Checklist (Somatization); SDAST = Short Drug Abuse Screening Test; SPQ = Schizotypal Personality Questionnaire; SRDS = Zung Self-Rating Depression Scale; WB = Well-Being; SP = Social Potency; AC = Achievement; SR = Stress Reaction; AL = Alienation; AG = Aggression; CL = Control; HA = Harm Avoidance; TD = Traditionalism; AB = Absorption

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Wilson, S., & Sponheim, S. R. (2014). Dimensions underlying psychotic and manic symptomatology: Extending normal-range personality traits to schizophrenia and bipolar spectra. *Comprehensive Psychiatry*. JOUR. <https://doi.org/10.1016/j.comppsy.2014.07.008>

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- Yudko, E., Lozhkina, O., & Fouts, A. (2007). A comprehensive review of the psychometric properties of the Drug Abuse Screening Test. *Journal of Substance Abuse Treatment*, 32(2), 189–198. JOUR.
- Zeedyk, S. M., Rodriguez, G., Tipton, L. A., Baker, B. L., & Blacher, J. (2014). Bullying of youth with autism spectrum disorder, intellectual disability, or typical development: Victim and parent perspectives. *Research in Autism Spectrum Disorders*, 8(9), 1173–1183.  
<https://doi.org/10.1016/j.rasd.2014.06.001>
- Zona, K., & Milan, S. (2011). Gender Differences in the Longitudinal Impact of Exposure to Violence on Mental Health in Urban Youth. *Journal of Youth & Adolescence*, 40(12), 1674–1690. JOUR.
- Zung, W. W. (1965). A self-rating depression scale. *Archives of General Psychiatry*, 12(1), 63–70. JOUR. <https://doi.org/10.1001/archpsyc.1965.01720310065008>

## Curriculum Vitae

# Vincent Rozalski

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### EDUCATIONAL HISTORY

UNIVERSITY OF NEVADA, LAS VEGAS 2012-Present

Degree: Ph.D. (Expected Graduation, August 2018)  
Program: Clinical Psychology Doctoral Program  
Advisor: Stephen D. Benning, Ph. D.

UNIVERSITY OF NEVADA, LAS VEGAS 2012-Present

Degree: Master of Science (May 2015)  
Program: Clinical Psychology  
Advisor: Jason M. Holland, Ph. D.

BARD COLLEGE AT SIMON'S ROCK 2005-2009

Degree: B.A.  
Major: Psychology and Pre-Medical Studies

### PROFESSIONAL MEMBERSHIPS

APA Student Affiliate

### RESEARCH INTERESTS

I am interested in the etiology, diagnosis, and treatment of Prolonged Grief Disorder, as well as the experience of coping with trauma, factors that relate to trauma resiliency, and emotion regulation. More specifically, I am interested in how people who experience extremely stressful events integrate those experiences into their lives and reformulate their sense of identity, including those who never fully recover from such experiences. I am also interested in different personality factors that influence the way individuals experience and react to grief, trauma, and stress.

### AUTHORED RESEARCH ARTICLES

Akoury, L., **Rozalski, V.**, Barchard, K., & Warren, C. S. (in press). Validation of the eating disorder quality of life scale (EDQLS) in college women. *European Eating Disorder Review*.

**Rozalski, V.**, Holland, J. M., & Neimeyer, R. A. (2017). Circumstances of death and complicated grief: Indirect associations through meaning made of loss. *Journal of Loss and Trauma*, doi: 10.1080/15325024.2016.1161426

Benning, S. D., **Rozalski, V.**, Thompson, K. L. (2015). Trait absorption is related to enhanced emotional picture processing and reduced activity to secondary acoustic probes. *Psychophysiology*, 52, 1409-1415. doi: 10.1111/psyp.12468

Holland, J. M., Graves, S., Thompson, K. L., **Rozalski, V.** (2015). Prolonged grief symptoms related to loss of physical functioning: Examining unique associations with medical service utilization. *Disability and Rehabilitation*, 38, 205-210. doi: 10.3109/09638288.2015.1031830

Currier, J. M., Holland, J. M., **Rozalski, V.**, Thompson, K. L., Rojas-Flores, L., & Herrera, S. (2013). Teaching in violent communities: The contribution of meaning made of stress on psychiatric distress and burnout. *International Journal of Stress Management*, 20(3), 254-277. doi: 10.1037/a0033985

Holland, J.M., **Rozalski, V.**, Thompson, K.L., Tiongson, R.J., Schatzberg, A.F., O'Hara, R., & Gallagher-Thompson, D. (2013). The unique impact of late-life bereavement and prolonged grief on diurnal cortisol. *Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, doi:10.1093/geronb/gbt051

Holland, J.M., Thompson, K.L., **Rozalski, V.**, & Lichtenthal, W.G. (2013). Bereavement-related regret trajectories among widowed older adults. *Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, doi:10.1093/geronb/gbt050

## MANUSCRIPTS IN PREPARATION

**Rozalski, V.**, & McKeegan, G. (2016). The impact of insight on symptom severity and quality of life in an inpatient psychiatric sample. Manuscript in preparation.

Holland, J.M., **Rozalski, V.**, & Beckman, L. (2015). Meaning making and hopelessness in older adults with chronic illness. Manuscript in preparation.

## POSTERS AND PRESENTATIONS

Emami, A., **Rozalski, V.**, & Holland, J. M. (2016). Grief related to loss of functioning and problematic drinking among older adults. Poster accepted for presentation at the Western Psychological Association, Long Beach, CA, USA.

Beckman, L., **Rozalski, V.**, & Holland, J. M. (2015). Difficulties in making meaning of health-related stressors as a unique predictor of hopelessness. Paper presentation at The Gerontological Society of America's 68<sup>th</sup> Annual Scientific Meeting, Orland, FL, USA. November 18<sup>th</sup>-25<sup>th</sup>.

**Rozalski, V.** & Holland, J. M. (2015). Meaning made of loss, circumstances of death, and complicated grief. Paper presentation at Western Psychological Association, Las Vegas, NV, USA.

Holland, J. M., Klingspon, K. L., Beckman, L., Plant, C., Rakhkovskaya, L., **Rozalski, V.**, & Williams, C. D. (2015, May). *Family behavior therapy for substance abuse problems in later life*. Poster presentation at the 2015 National Veterans Administration Research Week Poster Presentation, Las Vegas, NV.

**Rozalski, V.** & Holland, J. M. (2014). Objective circumstances of the death and complicated grief: Examining indirect associations through meaning made of loss. Poster presented at the American Association of Behavioral and Social Sciences, Las Vegas, NV, USA.

### **AUTHORED BOOK CHAPTERS**

Holland, J. M., & **Rozalski, V.** (in press). Clinical issues related to sibling loss in older adulthood. In B. J. Marshall & H. R. Winokuer (Eds.), *Sibling loss across the lifespan*. New York, NY: Routledge.

### **RESEARCH EXPERIENCE**

GRADUATE RESEARCH LAB ASSISTANT 2012-Present  
UNLV Psychophysiology of Emotion and Personality Laboratory  
Supervisor: Dr. Stephen D. Benning

Conducted research sessions with participants that included connecting them to complex psychophysiological sensors such as an EEG cap, learn how to read and interpret EEG and peripheral signals, troubleshoot problems with signal interference, coordinate data collection and stimuli presentation, co-author manuscripts, assist with literature reviews, co-supervise undergraduate research assistants, and attend didactic seminars on a variety of topics (e.g., related to data analysis, APA style).

GRADUATE PRACTICUM STUDENT 2015-Present  
Rawson-Neal Psychiatric Hospital  
Supervisor: Dr. Gerald McKeegan

Assist with formulating research project, conduct clinical assessments for research project, assist with literature review and data analysis.

GRADUATE RESEARCH LAB ASSISTANT 2012-2016  
UNLV Stressful Transitions and Aging Research Laboratory  
Supervisor: Dr. Jason M. Holland

Co-author manuscripts, assist with literature reviews and data analysis, co-supervise undergraduate research assistants, and attend didactic seminars on a variety of topics (e.g., related to data analysis, APA style).

**CAL MANIA RESEARCH LAB** 2011-2012  
University of California, Berkeley  
Supervisor: Dr. Sheri Johnson

Conducted research sessions with participants that included connecting them to psychophysiological sensors to take objective data, administering cognitive tasks, and administering surveys. Conducted phone interviews with potential participants to assess for a history of Bipolar I and Bipolar II.

**GOLDEN BEAR SLEEP AND MOOD RESEARCH LAB** 2011-2012  
University of California, Berkeley  
Supervisor: Dr. Allison Harvey

Conducted pre- and post-treatment sessions for an RCT that included connecting participants to psychophysiological sensors to take objective data, administering cognitive tasks, and administering surveys. Generated and organized treatment manuals, organized and entered new data from each session of the RCT.

## **CLINICAL EXPERIENCE**

**PRE-DOCTORAL CLINICAL INTERN** 2017 to Present

VA Northern California Health Care System  
Martinez, CA

Four rotations will grant closely supervised training activities: a PTSD clinical rotation, General Mental Health with an emphasis on Motivational Interviewing (MI) and couples therapy, a rotation in the Community Living Center with an emphasis on working with hospice patients, and Primary Care Mental Health Integration. Each rotation provides extensive opportunities for individual and group counseling, consultation on interdisciplinary teams, and audiotaped supervision. Additionally, a junior practicum student will be supervised on a weekly basis. Weekly seminars in a variety of clinically relevant topics will be offered.

**STUDENT CLINICIAN** 2016 to 2017

VA Southern Nevada Healthcare System  
Medical Center - Main Hospital

This 9-month rotation centers on training in VA supported evidence-based psychotherapies within the context of general mental health and the Addictive Disorders Treatment Program (ADTP). A weekly caseload of four groups and approximately two

individual clients, along with one full diagnostic assessment for walk-in patients, was maintained with weekly individual supervision with both a licensed psychologist and an intern as part of ladderred supervision.

**STUDENT CLINICIAN**

2015-Present

Rawson-Neal Psychiatric Hospital  
Las Vegas, NV

Conduct symptom interviews and cognitive assessments, conduct brief psychotherapy for severely mentally ill patients, co-lead groups on Dialectical Behavioral Therapy, Cognitive Behavioral Therapy, psychoeducation, mindfulness, relaxation, and cognitive interventions, consult with interdisciplinary teams regarding best practice for patients.

**STUDENT CLINICIAN**

2014-2015

Veteran's Affairs Southern Nevada Healthcare System  
Las Vegas, NV

Conduct individual psychotherapy and intake assessments under supervision of a Licensed Clinical Psychologist with veterans who have served in wars ranging from the Vietnam era to present. Clients have a multitude of presenting problems, including PTSD, grief, depression, anxiety, marital problems, parenting problems, chronic pain management, and substance abuse. Interventions include Cognitive Processing Therapy for trauma, Cognitive Behavioral Therapy, and Dialectical Behavioral Therapy.

**STUDENT CLINICIAN**

2013-2015

University of Nevada, Las Vegas  
Las Vegas, NV

Conduct psychodiagnostic assessments and individual therapy under supervision of a Licensed Clinical Psychologist, attend didactic seminars on treatment modalities, present at and attend student case conferences, consult with other treatment professionals. Theoretical orientations and interventions include Acceptance and Commitment Therapy and Dialectical Behavioral Therapy.

**TEACHING EXPERIENCE**

**GRADUATE STUDENT INSTRUCTOR**

University of Nevada, Las Vegas

Psychology 101: General Psychology (2 sections)

Fall 2014, Fall 2015

Psychology 210: Statistics for Psychology (2 sections)

Spring 2016

Psychology 470: Health Psychology (1 section)

Fall 2016, Spring 2017

GRADUATE TEACHING ASSISTANT Fall 2013  
University of Nevada, Las Vegas  
Psychology 210: Statistics for Psychology (2 sections)

### **AWARDS AND SCHOLARSHIPS**

THE BARRICK GRADUATE FELLOWSHIP 2016-2017  
Amount: \$15,000 stipend, plus tuition and fees waiver  
Description: "These fellowships are given to outstanding doctoral students who have demonstrated excellence in scholarship during their graduate study at UNLV."

THE PATRICIA SASTAUNIK SCHOLARSHIP 2013-2017  
Amount: \$10,000 (disbursed over four separate academic years)  
Description: Merit-based scholarship for students with financial need

LOVINGER AWARD Spring 2015  
Amount: \$1177.69  
Description: Merit-based scholarship given to one experimental and one clinical psychology student per semester

### **SERVICE**

Ad-hoc reviewer: Journal of Psychopathology and Behavioral Assessment 2015-Present  
Ad-hoc reviewer: Death Studies 2013-Present  
Ad-hoc reviewer: International Journal of Therapy and Rehabilitation 2013  
Ad-hoc reviewer: Journal of Gerontology 2012