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An Examination of Subtypes of Posttraumatic Stress Disorder Utilizing Latent Profile and Taxometric Analyses

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AN EXAMINATION OF SUBTYPES OF POSTTRAMATIC STRESS DISORDER

UTILIZING LATENT PROFILE AND TAXOMETRIC ANALYSES

by

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ABSTRACT

AN EXAMINATION OF SUBTYPES OF POSTTRAMATIC STRESS DISORDER UTILIZING LATENT PROFILE AND TAXOMETRIC ANALYSES

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Prior studies examining PTSD subtypes have yielded mixed results, likely stemming in part from the use of divergent samples and measurement techniques. This study aimed to expand upon these findings by utilizing a large nationally-representative sample in combination with sophisticated statistical analyses. Utilizing a sample of 2496 adults with a diagnosis of PTSD, latent profile analysis was used to determine the optimal number and composition of latent classes of individuals diagnosed with PTSD, and then taxometric analysis was utilized to determine whether these classes differed not only in degree, but in kind. Finally, class relationships with a number of external variables were compared in order to evaluate the external validity and clinical utility of the latent class model. Results indicated five classes of individuals diagnosed with PTSD. One of these classes was characterized by the highest endorsement of symptoms from each of the four symptom clusters of PTSD and was named the “Complex” class. Taxometric analyses indicated categorical differences between this class and all other classes. Further, the Complex class differed categorically from a group comprised of all other participants combined. The Complex class was characterized by a higher likelihood of experiencing more severe types of traumatic events and demonstrated stronger relationships with the most negative outcomes, including suicide attempts and inpatient hospitalization. Overall,

the current study appears to have provided evidence of the ability of taxometric analysis to provide further validation of classes identified through latent profile analysis.

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CHAPTER I – INTRODUCTION

Posttraumatic Stress Disorder

The *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition* (DSM-5) defines Posttraumatic Stress disorder (PTSD) as “the development of characteristic symptoms following exposure to one or more traumatic events” (American Psychiatric Association, 2013). Exposure to traumatic events can occur in a number of ways, including directly experiencing the event, witnessing the event as it occurred to others, learning the event occurred to a close family member or friend, or experiencing repeated or extreme exposure to aversive details of the traumatic event. Symptoms of PTSD have been divided into four distinct clusters. These are intrusion symptoms (e.g., intrusive memories of the traumatic event, recurring nightmares), avoidance symptoms (e.g., avoiding both internal and external reminders of the traumatic event), negative alterations in cognitions and mood associated with the traumatic event (e.g., psychogenic amnesia, persistent negative emotional state), and marked alterations in arousal and reactivity associated with the traumatic event (e.g., hypervigilance, exaggerated startle response). In order to be classified as PTSD, these symptoms must occur for longer than one month and cause the individual to experience significant distress and impairment in functioning (APA, 2013).

The DSM-5 lists the lifetime prevalence of PTSD as 8.7% and the 12-month prevalence as 3.5% in the United States. Rates are reported to be higher among veterans and others whose occupations leave them at a greater risk for experiencing a traumatic event, and the highest rates are reported to be found among survivors of rape, military combat, and genocide (APA, 2013). PTSD is associated with a number of poor outcomes, including higher rates of suicide attempts and suicidal ideation, high levels of disability, impaired functioning across a number of life areas, poor interpersonal relationships, lower income, and lower educational and occupational success (APA, 2013).

A number of changes occurred in the conceptualization of PTSD in the DSM-5 as opposed to the *Diagnostic and Statistical Manual of Mental Disorders, Fourth edition, text revision (*DSM-IV-TR; American Psychiatric Association, 2000). The first involves a change in categorization, as PTSD is no longer categorized as an anxiety disorder. Although the reactions of many individuals suffering from PTSD can be explained in the context of a fear-based reaction, the heterogeneity of the symptoms of the disorder leave it entirely possible and relatively common to exhibit a presentation of the disorder that does not fit well within an anxiety-based conceptualization. For example, an individual may present primarily with a combination of dysphoric, dissociative, or externalizing symptoms (APA, 2013). The commonality between all individuals suffering from PTSD is that their symptoms began following the experience of a traumatic event; therefore, PTSD is now classified in a new section of the DSM, namely Trauma- and Stress-Related Disorders (APA, 2013).

The symptom clusters of PTSD have also experienced changes. The DSM-IV-TR utilized a three factor structure of PTSD, consisting of the symptom clusters of re-experiencing, avoidance, and hyperarousal. Nearly all studies examining the latent structure of PTSD have failed to confirm the three-factor structure of the DSM-IV (Friedman, 2013). Although intrusion and arousal symptoms consistently emerge as distinct symptom clusters of PTSD, the avoidance/numbing cluster contained in the previous version of the DSM consistently emerges as two separate, distinct clusters. This is an important finding given that recent research has demonstrated that avoidance following a traumatic event tends to be inversely related to suicidal behavior, whereas numbing symptoms appear to be a risk factor for suicidal ideation (Guerra et al., 2011). Therefore, although all 17 symptoms present in the DSM-IV-TR are included in the DSM-5, plus three newly-added symptoms, they are now conceptualized as occurring in the four symptom clusters described above. Further, whereas in the DSM-IV-TR only seven symptoms were required to be directly tied to the traumatic event, the DSM-5 requires that all twenty symptoms must have either appeared or worsened following the traumatic event (Friedman, 2013).

A final change to the conceptualization of PTSD in the DSM-5 involves the addition of a dissociative subtype of PTSD, in which the individual not only meets criteria for PTSD, but also experiences persistent or recurrent symptoms of either depersonalization or derealization. Depersonalization involves “persistent or recurrent experiences of feeling detached from, and as if one were an outside observer of, one’s mental processes or body” (APA, 2013). Derealization involves “persistent or recurrent experiences of unreality of surroundings” (APA, 2013). Neuro-imaging studies have provided convincing evidence of dissociative reactions in PTSD. A second subtype of PTSD, Complex PTSD (Herman, 1992) was considered for inclusion in the DSM-5, but was ultimately decided against due to conflicting evidence in the current literature. This potential subtype, described in greater detail below, is conceptualized as a more severe presentation of PTSD resulting from repeated or prolonged exposure to extremely traumatic events. Studies examining these subtypes will be discussed in greater detail below.

Purposes of the present study

There were two primary purposes of the present study. The first was to examine the differences in degree or differences in kind (i.e., whether the class distinctions actually "carve nature at its joints" [Meehl, 1995]) of subtypes of PTSD utilizing both latent profile analysis and taxometric analysis of the DSM-5 criteria of PTSD. To the best of the author's knowledge, this is the first study which has applied taxometric analysis in evaluating the validity of a class model with more than two classes. First, the existence and number of PTSD subtypes were investigated using Latent Profile Analysis (LPA) in an attempt to identify how many latent classes showed the best fit to the data, using a large sample of individuals diagnosed with PTSD. Fit indices from the Latent Profile Analysis were used to evaluate the fit of the various models to the data, and these fit indices were used in combination with theoretical coherence of the solutions to determine the optimal number and composition of these subtypes.

The second primary purpose of the study was to utilize a novel application of taxometric analysis in the identification of latent categories. Meehl (1999) suggested a number of methods for studying the merit of taxometric methods, one of which states "the taxometric method should agree with other mathematically independent methods of detecting latent classes." He goes on to state that two search methods with independent rationales can be utilized to corroborate each other if they demonstrate agreement. Should the LPA identify distinct subtypes of PTSD, taxometric analyses applied to these subtypes can both provide evidence as to whether the latent classes identified by the LPA are, in fact, qualitatively distinct from one another. Put another way, the taxometric analyses will be used to determine if the differences in the latent classes are dimensional or categorical in nature. Given that taxometric analysis is designed to detect the presence of only two groups (those who belong to the taxon and those who do not), it has not historically been utilized in situations where researchers are evaluating differences between three or more classes. In order to avoid this problem, the current study compared only two classes at a time.

Another purpose of the present study was to evaluate the relationships between PTSD subtypes (if identified) and a number of external variables, including suicidal ideation, suicide attempts, and non-suicidal self-injury, as well as rates of comorbidity across the identified PTSD subtypes with a number of disorders, including Generalized Anxiety disorder, Major Depressive disorder, Borderline Personality disorder, and Antisocial Personality disorder. Evidence of meaningful relationships with relevant external variables is an important step in establishing the usefulness of the classification beyond simply similar patterns of PTSD symptoms

Cluster analytic investigations of PTSD subtypes

External variables as indicators.

A number of studies have examined whether there are distinct and meaningful subtypes of PTSD in both civilian and military samples. A majority of these studies have evaluated these subtypes utilizing comprehensive and dimensional measures of personality, such as the Minnesota Multiphasic Personality Inventory-2 (MMPI-2; Butcher et al., 1989) and the Schedule for Nonadaptive and Adaptive Personality (SNAP; Clark, 1996). As noted above, the symptoms comprising PTSD are heterogeneous in nature, such that the clinical presentations of individuals suffering from PTSD can vary greatly. They can appear predominantly depressed with pronounced sadness, anhedonia, and withdrawal; predominantly anxious with pronounced hyperarousal, exaggerated startle response, and avoidance; predominantly angry and hostile; predominantly dissociative with pronounced psychogenic amnesia and derealization/depersonalization; or any combination of these presentations. Given the heterogeneity of both the symptoms that comprise PTSD and the clinical presentations of the disorder, identifying distinct and replicable subtypes of PTSD would open the door to the development of more individualized interventions that target problem areas specific to a given subtype.

Miller et al. (2004) utilized K-means cluster analysis of the MMPI-2 profiles of a large sample of Vietnam veterans with a diagnosis of PTSD. Though they analyzed associations with all major scales of the MMPI-2, specific interest was placed in the Personality Psychopathology-Five (PSY-5; Harkness, McNulty, & Ben-Porath, 1995) scales. Thus, the PSY-5 scales were utilized as indicators in the cluster analysis, and other MMPI-2 scales were evaluated as cluster correlates. The authors hypothesized that the clinical expression of PTSD is influenced by an individual's position on the continuum of internalization to externalization of distress, and that this would be demonstrated through the identification of distinct PTSD subtypes located along this continuum.

The cluster analysis resulted in the retention of a three-cluster solution. The first cluster, labeled the "low-pathology" cluster, was associated with low scores on the PSY-5 Aggression, Psychoticism, and Negative Emotionality scales and high scores on Constraint and Positive Emotionality. Further, the low-pathology cluster produced significantly lower scores across virtually all other MMPI-2 scales. This group also demonstrated lower comorbid rates of major depressive disorder and alcohol-use disorder than the other two clusters. The second cluster, labeled the "externalizing" cluster, was characterized by significantly higher scores on the PSY-5 Aggression and Psychoticism scales, and significantly lower scores on Constraint than the other two clusters. Further, this cluster was associated with significantly higher scores on Hypomania, Anger, Cynicism, Antisocial Practices, Type-A Personality, and all addiction-related scales. This cluster was related to a higher likelihood of being diagnosed with a comorbid alcohol-related disorder and Antisocial Personality disorder. The final cluster, labeled the "internalizing" cluster, was characterized by significantly lower scores on Positive Emotionality than the low-pathology or externalizing clusters. When compared with the externalizing cluster, the internalizing cluster scored significantly lower on Aggressiveness and Psychoticism, and significantly higher on Constraint. Further, the internalizing class demonstrated significantly higher scores on Depression, Hysteria, Psychasthenia, Social Introversion, Low Self-Esteem, Social Discomfort, Welsh Repression, and Social Responsibility than the externalizing cluster. The internalizing cluster was most likely to be diagnosed with either comorbid Major Depressive disorder or Panic disorder and individuals within this cluster tended to endorse a higher severity of PTSD symptoms and a higher rate of prior suicide attempts (Miller et al., 2004).

Flood et al. (2010) examined the validity of the internalizing and externalizing subtypes of PTSD as well as the relationship between these subtypes and mortality rates. Utilizing K-means cluster analysis on the MMPI-2 PSY-5 profiles of a large sample of Vietnam veterans, a three-cluster solution was retained. The first cluster, labeled as the "low-pathology" cluster, was characterized by relatively low scores on the Aggression, Psychoticism, and Negative Emotionality/Neuroticism scales, and high scores on the

Constraint and Positive Emotionality. The second cluster, labeled as the "externalizers" cluster, was characterized by having the lowest scores on the Constraint scale and the highest scores on the Aggression scale. This cluster scored higher than all other groups on the Hostility, MacAndrews Alcoholism, and Hypochondriasis scales. The final cluster, labeled as the "internalizers" cluster, was characterized by having the highest scores on the Negative Emotionality/Neuroticism scale and the lowest scores on the Positive Emotionality scale. Internalizers scored higher than all other groups on PTSD and Depression scales (Flood et al., 2010).

As an extension of prior research on PTSD subtypes, Flood et al. (2010) examined the relationships between PTSD subtypes and a variety of causes of mortality. Although a diagnosis of PTSD was significantly related to all causes of mortality when all subtypes were combined, the low-pathology cluster was not significantly different from a non-PTSD control group. Both internalizers and externalizers had a significantly higher risk of mortality than the low-pathology cluster and the non-PTSD control group, though there were no significant differences between internalizers and externalizers with regard to all causes of mortality. Both groups also had a significantly higher risk of behavioral cause mortality (e.g., accidents, homicide, suicide, and acute and chronic effects of substance use) than the low-pathology and non-PTSD groups, but again did not differ from each other. With regard to specific cause of death, PTSD was a significant risk factor for cardiovascular and substance-related deaths. Both internalizers and externalizers had a significantly higher risk of cardiovascular death than the non-PTSD control group. Finally, externalizers were significantly more likely to die from substance-related deaths than the non-PTSD control group (Flood et al., 2010).

Thus, two separate studies (Miller et al, 2004; Flood et al., 2010) have identified three proposed subtypes of PTSD (low-pathology, internalizing, externalizing) in large samples of Vietnam veterans. In both studies, the PTSD subtypes were differentially related to various outcomes (e.g., psychopathology, risk of mortality), thus lending some evidence of external validity and utility of the categorization. However, a major limitation of these studies is that they utilized only male combat-veterans for analysis. Combat exposure is only one of many pathways to trauma exposure, and thus the generalizability of these findings to PTSD emerging from other types of trauma is still an open question. With this limitation in mind, Miller & Resick (2007) evaluated the generalizability of the internalizing and externalizing subtypes of PTSD in a sample of female sexual assault survivors. Further, the authors conceptualized the internalizing and externalizing subtypes of PTSD found in prior studies as evidence of the existence of "complex PTSD."

Herman (1992) conceptualized complex PTSD as occurring in individuals who have been exposed to prolonged and repeated trauma, and believed it was characterized by "…enduring personality changes, and high risk for repeated harm, either self-inflicted or at the hands of others" (p. 381). Miller & Resick (2007) hypothesized the "low-pathology" subtype identified in previous studies could be conceptualized as "simple PTSD" and the "internalizing" and "externalizing" subtypes could be conceptualized as forms of "complex PTSD." Thus, they defined simple PTSD as "the presence of circumscribed trauma-related symptoms accompanied by low diagnostic comorbidity and normal range personality functioning," and complex PTSD as "PTSD accompanied by marked personality dysfunction, a broad array of symptoms spanning the domains of dissociation, impaired affect regulation, disturbed interpersonal relations, identity disturbance, and higher rates of psychiatric comorbidity" (Miller & Resick, 2007). Miller and Resnick (2007) utilized K-means cluster analysis on the SNAP Temperament scales, with a priori specifications of three clusters, using a sample of women seeking treatment for sexual-assault-related PTSD. Cluster 1, labeled as the "simple PTSD" cluster, was characterized by significantly lower scores than the other two clusters on the Aggression and Self-Harm sales. Cluster 2, labeled as the "externalizers" cluster, was characterized by significantly higher scores on Disinhibition, Aggression, Exhibitionism, Impulsivity and Manipulativeness, and lower scores on Propriety and Workaholism. Further, the "externalizers" cluster scored significantly higher than the other clusters on scales measuring a number of features of personality disorders, including antisocial and borderline features, as well as a measure of dysfunctional sexual behavior and a measure assessing the use of maladaptive efforts to reduce distress. Finally, the "externalizers" cluster was significantly more likely to have met criteria for a substance-related disorder in the past (Miller & Resick, 2007).

Cluster 3, labeled as the "internalizers" cluster, was characterized by significantly lower scores on the Positive Temperament and Entitlement scales, higher scores on the Detachment and Negative Temperament scales, and significantly higher than the other clusters on scales measuring avoidant and schizoid features. Further, the "internalizers" cluster was significantly more likely to have met criteria for Major Depressive disorder in the past. Finally, the "internalizers" cluster endorsed significantly higher rates of internalized shameful feelings, deficits in identifying and describing emotions, and a higher rate of somatic complaints (Miller & Resick, 2007).

The previously mentioned studies conceptualized the identification of externalizing and internalizing subtypes of PTSD as evidence of complex PTSD; however, there are a number of problems with this conceptualization. First, the tendency to internalize or externalize can be conceptualized as a personality trait existing along a continuum. By this logic, externalizing and internalizing subtypes would likely be present in examinations of latent characteristics of many disorders. This would diminish the utility of these subtypes in explaining fundamental differences in clinical presentations of PTSD. Further, these studies either utilize a priori retention of three clusters or did not provide fit statistics utilized for determining the retention of a three-cluster solution. This is problematic in that the reader is unable to determine whether a three-cluster solution provided the best fit for the data.

A second potential problem conceptualizing the internalizing and externalizing clusters as evidence of complex PTSD stems from the fact that in the Miller and Resick study, these two clusters comprised 66% of the study participants. This would suggest that, rather than being a more severe form of PTSD, complex PTSD as conceptualized in the study would be the normative presentation of the disorder. Although this is entirely possible, it contradicts Herman's (1992) conceptualization of complex PTSD occurring only in those who have experienced prolonged or repeated trauma, given there were no differences in terms of severity or number of traumatic experiences between the simple PTSD cluster and the complex PTSD clusters. It does not appear that the study provides clarity on the existence or composition of complex PTSD.

Taylor, Asmundson, and Carleton (2006) also utilized cluster analysis to examine the validity of Herman's (1992) conceptualization of complex PTSD. Again underpowered, a cluster analysis based on responses to measures of a number of commonly associated features of PTSD was conducted for a small sample (n = 60) of individuals suffering from PTSD. Ward's method of cluster analysis indicated the retention of a two-cluster solution. The first cluster, labeled "complex PTSD," was associated with significantly greater personality pathology, including borderline, paranoid, and avoidant features, as well as a higher rate of somatic complaints. The second cluster, labeled "simple PTSD," was characterized by greater emotional distress, including symptoms of anxiety, depression, anger, and guilt, as well as a greater tendency to experience dissociation.

Though consistent in some regards with Herman's (1992) conceptualization of complex PTSD, there were some notable discrepancies. First, the fact that the "simple PTSD" cluster was more likely to experience dissociation is inconsistent with most conceptualizations of simple versus complex PTSD. Second, there were no significant differences between the clusters in terms of chronicity or severity of trauma (Taylor et al., 2006). Given the limitations related to conducting an underpowered study and the discrepancies between the study's findings and the theorized conceptualization of complex PTSD, this study also fails to provide clear evidence of the existence or composition of complex PTSD. Lack of power is a particularly important limitation of a cluster analytic study, in that clusters are only able to emerge to the extent that enough people belonging to a given cluster are a part of the analysis.

Symptom clusters as indicators.

Friedman (2013) believes the changes in PTSD criteria for the DSM-5 facilitate the ability of researchers to conduct new and more fruitful studies examining the validity of this controversial subtype of PTSD. He argues that a number of key symptoms of complex PTSD, including negative expectations, persistent negative mood, and inappropriate blaming of oneself or others, are included in the symptom cluster labeled “negative cognitions and mood.” Further, externalizing behaviors believed to play a large role in complex PTSD, such as aggressive, impulsive, and self-destructive behaviors, are now more fully covered in the symptom cluster labeled “hyperarousal and reactivity.” Friedman believes one of the most important changes to PTSD criteria is the inclusion of a dissociative subtype in the DSM-5. He points out the consistencies in the trauma profiles between those likely to experience dissociation following exposure to a traumatic event and the trauma profiles reported for those suffering from complex PTSD. A key step in identifying whether complex PTSD is a distinct diagnosis and warrants inclusion in the DSM is whether individuals with the dissociative subtype of PTSD also exhibit the emotion dysregulation which is such a large part of the conceptualization of complex PTSD (Friedman, 2013).

Previous studies have researched the existence of PTSD subtypes through cluster analyses of scores from broadband, dimensional measures of personality, such as the MMPI-2 and the SNAP. Pietrzak et al. (2014) noted that examining subtypes of PTSD at the level of the symptoms comprising the disorder may provide more important information regarding etiological models of PTSD-related symptomatology as well as in guiding the development of more personalized assessment and treatment approaches for PTSD. Thus, Pietrzak et al. utilized a latent class analysis (LCA) on symptom profiles of a large sample of U.S. adults currently diagnosed with PTSD, and retained a 3-class model, labeled “anxious/re-experiencing,” “dysphoric,” and “high symptom,” respectively (Pietrzak, 2014).

The “anxious/re-experiencing” class was characterized by high levels of anxious arousal, as well as elevated levels of re-experiencing and avoidance symptoms. The “dysphoric” class was characterized by a higher likelihood of experiencing numbing and dysphoric arousal symptoms. The “high symptom” class was characterized by higher probabilities for all symptom clusters. The “anxious/re-experiencing” and “high symptom” classes were more likely to report experiencing sexual assault, military combat exposure, and domestic violence, and were less likely to report death or serious illness/injury to someone close to them as the triggering event. Individuals in these classes had an earlier age of onset and longer duration of PTSD when compared to the “dysphoric” class. The “high symptom” class had a higher likelihood of experiencing almost all mood disorders, anxiety disorders, and personality disorders, and were more likely to have a history of suicide attempts compared to the other two classes. Finally, the “anxious/re-experiencing” class had a higher rate of suicide attempts when compared to the “dysphoric” class (Pietrzak et al., 2014).

The Pietrzak et al. (2014) study is important given that it demonstrated the existence of subtypes of PTSD based on endorsement of actual PTSD symptoms, and these subtypes differed in both type of trauma experienced and likelihood of experiencing comorbid disorders. Further, this method appears to be a more valid assessment of PTSD typology in that it examines the existence of PTSD subgroups based upon the PTSD symptoms themselves, as opposed to grouping individuals based upon general personality traits or associated symptoms. Examining subtypes of PTSD based on comparisons between the individual symptoms comprising the disorder and external measures is problematic in that it may arbitrarily create subtypes based upon an individual's tendency to internalize versus externalize and vice versa. Thus, these may very well be real and valid classes of people, but the classes may or may not have anything to do with PTSD pathology. However, there are limitations to the study as well. First, the authors did not provide the statistics utilized to determine the retention of a three-class solution. Given the sometimes subjective nature of choosing the optimal number of classes in latent analyses it is important to provide these statistics when justifying the chosen solution. Thus, in this case, it is not clear whether more or fewer groups may have been the optimal fit to the data. The fact that the class characterized by higher probabilities of all symptom clusters and higher rates of comorbidity with almost every disorder contained the highest percentage of participants is puzzling. Given that this class represents a more severe and pervasive form of PTSD, intuitively it would seem more likely this should be the smallest of the classes; however, it is also possible that PTSD is more taxonic than other disorders in that individuals who develop the disorder are likely to experience severe symptoms. This class was characterized by significantly higher levels of psychogenic amnesia and flashbacks, suggesting the possibility that a dissociative subtype of PTSD could be teased out of this class; however, without fit statistics and comparisons with other class solutions, it is not possible to examine whether the "high symptom" class could have been separated into two distinct classes. Thus, the current study will utilize a number of statistical criteria (in combination with theoretical and substantive considerations) to overcome this limitation.

Dalenberg's requirements for a subytpe

Dalenberg, Glaser, and Alhassoon (2012) put forth three "requirements" when determining the viability of a subtype, all three of which must be present to support the case for the subtype. These categories of evidence are (1) definitional requirement, (2) structure/mechanism requirement, and (3) meaningfulness requirement (Dalenberg et al., 2012). The definition requirement states "the criteria for the subtype or cutoff for the subtype on a given dimension should be clear and reliably measured" (Dalenberg, et al., 2012). The second requirement is the subtypes must show either a differing structure of PTSD or differ in regard to the mechanism of action. With regard to the structure requirement, subtypes must differ from each other on the "internal structure of PTSD symptoms" (Dalenberg et al., 2012). In terms of differing on the mechanism of action, evidence must be provided that the subtypes differ on biologically-based measures. Finally, the meaningfulness requirement states simply that the finding of the subtypes must provide some type of clinical utility, such as differences on effective treatments.

Consideration of the Dalenberg et al. (2012) criteria for a subtype raises questions regarding the validity of a number of the previously mentioned subtypes. Dalenberg et al. specifically mentions the internalizing and externalizing subtypes of PTSD, stating "it is unclear whether the use of the term 'subtype' is useful if the two clusters of symptoms defining each subtype commonly occur together, as is the case with internalizing and externalizing symptoms" (2012). Both the internalizing and externalizing subtypes are characterized by elevated levels of negative emotionality, but differ in how this negative emotionality is presented. For example, it is not surprising the externalizing subtype, characterized by low levels of constraint, would be more likely to exhibit problems related to anger, antisocial behavior, substance abuse, and aggression, as these symptoms are interrelated and likely to occur together, The same argument can be made with the internalizing subtype, where depression, anxiety, avoidance, and withdrawal are more likely to coexist. Dalenberg et al. argues subtyping should be based on differences in the central or core symptoms of a disorder, rather than clusters of comorbid symptoms. Further, he argues against subtyping based solely upon personality differences, as this method opens the door to a number of identifiable, but “virtually useless,” subtype classifications (p. 673).

The dissociative subtype of PTSD is an example of a subtype which appears to meet each of the above-mentioned criteria for qualification as a subtype, and was thus included as a PTSD specifier in the DSM-5. The DSM-5 refers to dissociation as the persistent and recurrent experiencing of symptoms of either depersonalization or derealization. Depersonalization refers to a feeling of detachment from one’s mind or body and derealization refers to experiences of unreality of one’s surroundings (APA, 2013). Lanius et al. (2010) examined the evidence for the external validity of a dissociative subtype of PTSD. Perhaps most notably, differences in the activation of brain areas responsible for arousal and emotion regulation have been identified in individuals suffering from PTSD and appear to explain why some individuals experience dissociative symptoms. An initial study utilized fMRI during exposure sessions involving recollection of the traumatic event. A majority (70%) of individuals reported they felt as if they were reliving the traumatic event, with a demonstrable increase in heart rate. The remaining 30% reported the experience of dissociative symptoms during the recollection and had no corresponding increase in heart rate. Further, these individuals exhibited opposite patterns of activation in brain areas related to arousal and emotion regulation (Lanius et al., 2010).

A number of studies have identified these differences in brain activation (e.g., Etkin & Wager, 2007; Felmington et al., 2008; Hopper et al., 2007) and the evidence seems to support an emotional under-modulation versus emotional over-modulation conceptualization for the development of a dissociative reaction to a traumatic event. Individuals experiencing a more prototypical re-experiencing/hyperarousal presentation of PTSD exhibit abnormally low activation of the cortical system, which is responsible for the regulation of arousal and emotion, and increased activation of the limbic system, which is responsible for fear conditioning. Thus, this presentation of PTSD can be conceptualized as failure of corticolimbic inhibition, leading individuals to experiencing hyperarousal and re-experiencing symptoms of PTSD (Lanius et al, 2010). In contrast, individuals who report experiencing dissociative symptoms when reminded of the traumatic event exhibit the opposite pattern of activation in these same brain areas. The cortical system becomes highly activated, limiting arousal and over-regulating emotions, leading to a disengagement from the emotional aspects of the traumatic event through dissociation during recollection of the event (Lanius et al., 2010).

Upon examination, the dissociative subtype of PTSD appears to meet Dalenberg's (2012) three categories of evidence for qualification as a subtype. With regard to the definitional requirement, which states criteria for a subtype should be clear and reliably measurable, taxometric and latent class analyses of individuals suffering from PTSD have consistently demonstrated base rates of the dissociative subtype ranging from 12-30% of individuals with PTSD (Lanius et al., 2012). Although the DSM-5 criterion requiring the presence of “persistent or recurrent” symptoms of dissociation in order to diagnose the specifier of “with dissociative symptoms” is relatively subjective and vague, neurobiological studies have demonstrated these individuals can be identified through the use of fMRI.

These same neurobiological studies also serve to fulfill Dalenberg’s (2012) second category of evidence for qualification as a subtype: the structure requirement. This requirement states the two subtypes should have different underlying biological mechanisms of action or should differ on biologically-based measures. Lanius et al. (2010; 2012) described a number of studies identifying differences in the activation of the corticolimbic system for individuals suffering from the dissociative subtype of PTSD. This is evidence of differing biological structures of the two forms of the disorder and serves to explain why some individuals go on to experience dissociative symptoms following exposure to a traumatic event.

Finally, Dalenberg’s third category of evidence for the qualification as a subtype states the distinction between the two subtypes must be clinically meaningful. This criterion can be met through four different routes: (1) differing course of the disorder, (2) differing risk factors, (3) differing effective treatments, and (4) differing comorbidities (Dalenberg et al., 2012). Individuals who experience pervasive and persistent dissociation appear to differ from individuals suffering from a more prototypical form of PTSD in a number of ways. For example, dissociative symptoms are associated with higher levels of suicidal behavior and non-suicidal self-injury, a finding which remained significant after controlling for both PTSD and Borderline Personality disorder (Lanius et al, 2012). Dissociation has been associated with exposure to repeated trauma, such as childhood sexual abuse (Lanius et al., 2010). Perhaps most importantly, individuals diagnosed with PTSD differ in response to treatment based upon pretreatment levels of dissociation (Resick et al., 2011). Individuals who reported low levels of dissociation demonstrated significant reductions in both severity and number of symptoms of PTSD following an intervention utilizing only the cognitive component of Cognitive Processing Therapy (CPT). Individuals who reported high levels of pretreatment dissociative symptoms, most notably depersonalization, required all components of CPT in order to reduce symptom severity. The authors proposed that individuals who experience dissociative symptoms may have fragmented memories of the traumatic event and that the component of CPT which requires the individual to write an account of the trauma may help them to reconstruct the event and identify its meaning (Resick et al., 2012).

In summary, the dissociative subtype of PTSD appears to meet the three criteria set forth by Dalenberg et al. (2012) for inclusion as a subtype, and thus its inclusion in the DSM-5 appears to be warranted. To date, this appears to be the only subtype of PTSD that has demonstrated evidence for meeting all three requirements. Further, the problems inherent in utilizing external measures of personality to establish subtypes (e.g., high number of possible subtypes, lack of usefulness in subtypes found, etc.; Dalenberg et al., 2012) has been noted and calls into question the utility of externalizing and internalizing subtypes of PTSD. The existence of a "complex" subtype of PTSD remains controversial, though Friedman (2013) notes the changes in criteria for PTSD in the DSM-5 allow for more a more productive examination of this subtype. Pietrzak et al. (2014) examined subtypes of PTSD based upon the heterogeneous nature of the symptoms comprising PTSD. The identification of both an "anxious/re-experiencing" subtype and a “dysphoric” subtype is promising, especially considering the fact they demonstrated different relationships with such important external variables as suicide attempts and substance use. However, the “high symptom” subtype is questionable given that it contained such a high percentage of the sample. Due to the fact fit statistics for the LCA were not included, it is not possible to assess the validity of the retention of this three-class solution.

Significance of the Present Study

As noted above, numerous studies have examined the existence and composition of PTSD subtypes, obtaining different results based upon both method and whether subtypes are based upon symptoms of the disorder as opposed to external measures of personality. Further, many of these studies utilized cluster analyses in the identification of subtypes. Monte Carlo studies have identified Latent Profile Analysis as superior to cluster analysis in the identification of latent constructs due to the fact that it provides fit statistics which can be utilized to examine the validity of the retained class solution (Nylund et al., 2007). Utilizing Dalenberg’s (2012) criteria for qualification as a subtype, a number of previous findings, such as the externalizing and internalizing subtypes of PTSD, fail to meet requirements for retention as a subtype. Identification of subtypes meeting the definitional, structural, and meaningful requirements set forth by Dalenberg may help to provide clarity on the controversy that is “complex” PTSD. Further, it is possible that fit statistics indicate that the “high symptom” class identified by Pietrzak et al. (2014) be divided into two distinct classes. One possible explanation for such a high percentage of the sample being included in the “high symptom” class would be that the LCA combined two classes, one characterized by high levels of dissociation and other by high levels of emotion dysregulation (dissociative vs. complex PTSD), though this is purely conjecture at this point, and is an empirical question which was addressed by the current study.

Identification of distinct and replicable subtypes of PTSD may have clinical significance as well. It has been demonstrated that individuals suffering from the dissociative subtype of PTSD respond differently to traditional exposure-based interventions for PTSD (Resick et al., 2012). Other subtypes may respond differently to treatments as well. For example, identification of a subtype characterized by numerous distorted cognitions related to the traumatic event would speak towards utilization of an intervention more cognitively-focused in nature, as opposed to a subtype characterized by avoidance and hyperarousal, where exposure-focused treatments may be more efficacious. In short, the composition of subtypes, if present, may allow for more parsimonious interventions, allowing clinicians to "break down" these interventions, thus saving the client both time and money while still adequately treating the disorder. Further, the number demographic variables provided in the NESARC dataset in conjunction with information available as to the type of trauma experienced may provide insight as to specific risk factors/vulnerabilities that are related to each of the identified subtypes.

CHAPTER II – METHOD

Participants

Approval for the study was obtained from the Institutional Review Board of The University of Southern Mississippi (see Appendix A for a copy of the approval). The present study utilized archival data from the National Epidemiological Survey on Alcohol and Related Conditions (NESARC, Grant & Kaplan, 2005). The sample consisted of 2496 adults who received a diagnosis of PTSD within the year prior to Wave 2 NESARC study. 73% of the sample was female. The sample had a mean age of approximately 47 years with a standard deviation of approximately 15 years and a range of 20-90 years. With regard to marital status, 42% of the sample was married, 20% divorced, 19% never married, 10% widowed, 5% separate, and 4% living as though married. 57% of individuals in the sample identified as Caucasian, 21.6% identified as African American, 17% as Hispanic, 2.5% as American Indian/Alaskan Native, and 1.9% as Asian. The survey from which the current study utilized data was conducted in 2004 and 2005 as a 3-year follow-up for Wave 1 NESARC (n = 43,093), although PTSD was only assessed during Wave 2. Nylund, Aspaourhov, & Muthen (2007) suggested a sample size of at least 300 subjects in order to conduct a Latent Profile Analysis; Meehl (1995) also suggested the use of at least 300 subjects in order to conduct a taxometric analysis.

Statistical Analyses

Latent Profile Analysis

Computation of symptom cluster scores. Overall scores for each symptom cluster (avoidance, intrusion, negative alterations in cognition and mood, and marked alterations in arousal and reactivity) were calculated to be utilized as indicator variables in the analysis. The intrusion symptom cluster was comprised of five items: (1) "After most stressful event, did you keep involuntarily remembering it?" (2) "After most stressful event, did you have bad dreams about it?" (3) "After most stressful event, did you feel you were reliving it?" (4) "After most stressful event, did you find yourself reacting to sights/sounds as if you were experiencing it again?" and (5) "After most stressful event, did you have physical reactions when reminded of it?" The avoidance symptom cluster was comprised of three items: (1) "After most stressful event, did you try to stop thinking about it?" (2) After most stressful event, did you try to avoid conversations about it?" and (3) "After most stressful event, did you avoid places/people that reminded you of it?" The negative alterations in cognition and mood symptom cluster was comprised of five items: (1) "After most stressful event, were you unable to recall some import ant part of it?" (2) "After most stressful event, did you have less interest/participation in activities you usually enjoyed?" (3) "After most stressful event, did you feel emotionally distant/cut off?" (4) "After most stressful event, were you unable to have positive, loving feelings?" and (5) "After most stressful event, did you feel there was no reason to plan for the future because it might be cut short?" The marked alterations in arousal and reactivity symptom cluster was comprised of five items: (1) "After most stressful event, did you have trouble falling/staying asleep?" (2) "After most stressful event, were you more angry/irritable than usual?" (3) "After most stressful event, did you have trouble concentrating?" (4) "After most stressful event, did you find yourself being more watchful/alert?" and (5) "After most stressful event, were you more jumpy/easily startled than usual?"

The NESARC WAVE-2 dataset contains questions assessing for the presence of PTSD. Participants completed a diagnostic interview and their responses during the interview were utilized to determine endorsement of each system. In the dataset, a response of "1" indicates the individual endorsed the symptom, while a "2" indicates they did not endorse the symptom. These scores were reversed in order to facilitate interpretability (1 = no endorsement, 2 = endorsement). These responses were utilized to develop an overall level of endorsement for each symptom cluster. Each participant's total score was summed for each symptom cluster, then averaged based on the number of symptoms in the cluster. Therefore, scores closer to 2 indicate more symptoms endorsed in that specific symptom cluster, while scores closer to 1 indicate fewer symptoms endorsed. This computation was used so that scores across symptom clusters would be comparable, which would be important later when evaluating the substantive content of the latent classes.

Determining number of classes. Latent Profile Analysis (LPA) was conducted using the Mplus 6.12 software (Muthen & Muthen, 1998-2007), using PTSD symptom cluster endorsement as indicators. A series of models were tested, each postulating a different number of latent classes, ranging from two classes to six classes. For any given model, based upon the response pattern a participant showed, a group membership probability statistic was generated for group membership in each of the classes. LPA assumes each participant belongs to one and only one class; the model classified individuals into the class with the highest group membership probability.

Several fit statistics were used, in combination with theoretical and substantive considerations of the resulting classes, in the determination of the optimal number of classes required to account for differences in the observed response patterns of participants. The information criteria (IC) statistics are model fit statistics which take into account both goodness of fit and model parsimony (Geiser, 2013). Although there are currently no absolute cut-offs recommended for IC statistics as indicative of goodness of fit, smaller values indicate better fit of the model. Although there are a number of IC statistics generated by Mplus, a Monte Carlo study found that the Bayesian Information Criterion (BIC) statistic demonstrated the most efficacy in determining the optimal number of classes for an LPA (Nylund et al., 2007) and therefore the BIC was used in the current study. The Bootstrapped Likelihood Ratio Test (BLRT) was also be utilized to inform the decision about the optimal number of latent classes. For the BLRT, the fit of a model with N latent classes is compared against a model with $N - 1$ latent classes (Geiser, 2013). Differences in the likelihood ratios (LR) of these models are compared and a p-value associated with the LR difference is determined using a parametric bootstrapping procedure. A significant p-value indicates that the fit of the model with N classes is statistically significantly better than the model with $N - 1$ classes. A non-significant p-value indicates that the more parsimonious model is preferred (Nylund et al., 2007; Geiser, 2013). A final statistic that was utilized to determine the best model was the number of classes for each model that contains less than 5% or less than 1% of the total sample. A class containing so few participants may be indicative of an anomaly rather than a class that is substantively noteworthy and replicable. Given the lack of cut-off scores for determining the appropriate number of classes, the theoretical coherence of the model solution was also used when determining which solution to retain. Relevant factors related to theoretical coherence included additional information gained and increased discrepancy in symptom endorsement through the inclusion of an additional class.

Taxometric analysis

Given the number of studies examining and disagreeing on the composition and number of subtypes of PTSD, taxometric analyses in the current study will provide further evidence of whether the differences in the LPA-identified groups are qualitative (i.e., taxonic) or quantitative (i.e., dimensional), indicating that the groups simply represent different ends of a continuum of symptomatology. Taxometric analysis is a family of statistical procedures used to determine whether relationships between a set of variables are indicative of a latent taxon or dimension (Meehl, 1999). It is designed to determine if there are qualitatively distinct groups that differ not just in degree, but in kind.

Given the various ways to assess for taxonicity, taxometric analysis has many advantages over other assessments of latent structure; however, it has the disadvantage of only being designed to whether the data are taxonic or dimensional in nature (McGrath & Walters, 2012). In other words, if the data are taxonic, it cannot necessarily detect whether there are more than two groups accounting for the indicator relationships. This particular drawback was overcome in the present study by first utilizing LPA to determine the best number and structure of latent classes supported by the data, then following up with taxometric analysis in order to determine whether the differences between each pair of classes were taxonic or dimensional in nature. In other words, running taxometric analyses with cases from just two of the latent classes at a time, it was determined whether the classes actually differed qualitatively or just represented different extremes of a continuum. For the current study, based on classification from the LPA, taxometric analyses were conducted separately, again using PTSD symptom cluster variables as indicators, but running the analyses separately using cases from only two

LPA-identified latent classes at a time. Meehl (1995) states that, given the lack of a gold-standard criterion for determining the existence of a taxon in psychopathology, researchers must utilize bootstrap taxometrics, suggesting the use of at least two mathematically related but statistically independent procedures. For the current study, the following three taxometric procedures were used: MAMBAC, MAXCOV, and L-Mode Factor Analysis. Simulated taxonic and dimensional datasets were created and run to create simulated output curves. These curves provide a range in which data points are likely to fall, depending on whether they are taxonic or dimensional in nature. The averaged output curve from the original dataset can then be compared to these simulated curves to facilitate interpretation.

Historically, researchers have compared base rate estimates across each of the taxometric procedures based on the assumption if a taxon exists, the estimated size of the taxon group should be consistent across procedures, whereas for dimensional data, the estimated base rates would vary because there would be no measurable entity (Ruscio et al., 2011). However, Ruscio and colleagues (2011) have asserted that rigorous studies have demonstrated this assumption is false. The researchers stated that even when utilizing idealized data, often dimensional data will result in a smaller *SD* of base rate estimates than categorical data. Therefore, the authors suggested performing multiple taxometric procedures, averaging the CCFI scores from the procedures, and utilizing a dual threshold of 0.45 to 0.55 to draw conclusions (Ruscio et al., 2011). A dual threshold of 0.45 to 0.55 essentially states that CCFI scores below 0.45 are considered to be indicative of dimensionality, scores above 0.55 are considered to be indicative of taxonicity, and scores between 0.45 and 0.55 are considered to be too ambiguous for interpretation. This method of consistency testing was utilized in the present study; however, in order to guard against spurious interpretations, a dual threshold of 0.40 to 0.60 was utilized to draw conclusions.

Ruscio et al. (2011) also asserted that MAXCOV and MAXEIG are mathematically similar in nature and only one should be utilized when determining the average CCFI score. For the present study, MAXEIG was chosen over MAXCOV due to the fact it utilizes all indicators in each comparison.

MAMBAC. The MAMBAC ("Mean Above Minus Below a Cut") procedure is conducted by computing the differences in score means for one indicator variable above and below a cut score at multiple points along an ordered range of a second indicator variable. The first cut occurs near the lowest value of the indicator and the last cut occurs near the highest scoring case on the input indicator (Roscio, Ruscio, & Carney, 2011). These values are plotted with the y-axis as the mean difference, and the x-axis represents the value of the second variable at which the cut was made. A convex, upward appearance of a graph on the cut indicates taxonicity, whereas the plot will indicate a "dish" rather than a "hump" in the case of dimensionality (Meehl, 1995). The peak of the curve will shift to the right as the base rate of the taxon decreases. The Ruscio program utilized to run the MAMBAC consistency test calculates a comparison curve fit index (CCFI) score, ranging from 0.00 to 1.00, to serve as a numerical indication of taxonicity versus dimensionality. The CCFI is an "objective measure of the extent to which the results for the empirical data are a closer match to those for the artificial categorical or dimensional comparison data" (Roscio et al., 2011). Values closer to 0.00 are an indication of dimensionality and values closer to 1.00 are an indication of taxonicity. Scores closer to 0.50 are considered to be ambiguous (Roscio et al., 2011).

MAXCOV. The MAXCOV procedure, which requires three indicator variables, examines how changes in "x" the covariance between two indicator variables (*y* and *z*) changes at different values of a third variable (*z*), with the goal being to find the cutoff in *x* that maximizes the covariance between *y* and *z*. (Meehl, 1999). MAXCOV plots are generated by plotting the covariance values (y-axis) as a function of the values of *x (*x-axis). As with MAMBAC, MAXCOV plots are expected to be peaked when the latent construct is taxonic and flat when dimensional (non-taxonic). Agreement between MAMBAC and MAXCOV on the taxonicity or dimensionality of the classes provides corroborating evidence of either taxonicity or dimensionality of the latent construct (Meehl, 1999).

MAXEIG. The Maximum Eigenvalue (MAXEIG) differs from MAXCOV in that eigenvalues are used to measure the strength of the association between indicators, as opposed to the use of covariances and allows for the use of more than three indicators, thus providing slightly more information (Ruscio et al., 2011). The procedure assigns one variable to the role of input indicator and all remaining variables to the role of output indicators. It involves the calculation of the first and largest eigenvalue of the covariance matrix for all output indicators. Results are interpreted in much the same way as in MAXCOV.

L-Mode factor analysis. A fourth taxometric procedure utilized in the present study was Latent Mode factor analysis (L-Mode; Waller & Meehl, 1998). L-mode subjects all indicator variables to a principal components analysis and a density plot of the factor scores for the first factor is generated (McGrath & Walters, 2012). If the latent factor is taxonic, the density plot should be bimodal. If the latent factor is dimensional in nature, the density plot should be unimodal. (Marcus, Fulton, & Turchik, 2011).

CHAPTER III - RESULTS

Latent Profile Analysis

Fit indices and other statistics for each model are presented in Table 1. The *BIC* value continued to decrease as the number of tested latent classes (ranging from two to six classes) increased, indicating improvement of model fit. The BLRT *p*-value was significant with the addition of each class, indicating an improvement in model fit for each additional class, with the exception of the sixth class, which did not converge and thus did not provide a BLRT statistic. The six-class model had the lowest *BIC* statistic, however, the model would not converge, despite increasing the number of random starts from 200 to 4,000. This indicated that the examination of models containing a greater than five classes were unlikely to be fruitful. The *Lo-Mendell-Rubin Adjusted LRT Test* also demonstrated improvement of fit as the number of latent classes increased, though this improvement was not statistically significant with the addition of a sixth class. No model resulted in a group with less than 5% or 1% of the cases.

Table 1 *LPA Fit Statistics*

No. Grps.	**BIC**	**BLRT**	**BLRT*p*val**	**LMR-A**	**LMR-Pval**	**LT1%**	**LT5%**
2	-1115.736	-198.663	<.001	1580.999	<.001	0	0
3	-1950.186	875.421	<.001	854.564	<.001	0	0
4	-2126.565	217.351	<.001	212.172	<.001	0	0
5	-2605.405	519.811	<.001	507.426	<.001	0	0
6	-4949.367	-5054.225	N/A	38.056	0.1126	0	0

Note. BIC = Bayesian information criterion; LMR-A = Lo-Mendell-Rubin Adjusted LRT Test; LMR-Pval= p Lo Mendel Rubin; BLRT = Bootstrapped Likelihood Ratio Test; BLRTpval = Bootstrapped Likelihood Ratio Test *p*-value; LT = Number of groups with less than 1% and 5% of cases.

Given that information indexes and tests of statistical significance consistently demonstrated improvement in fit as the number of latent classes increased, the models were also evaluated in terms of their practical significance and theoretical coherence in order to inform the decision regarding the optimal number of classes, though the LMR value appeared to have ruled out the six-class model (p = 0.1126).

Evaluation of the indicator means by class indicated that the three-class, four-class, and five-class models contained a specific similarity. All included a class characterized by individuals with very high mean endorsement rates for all four DSM-5 symptom clusters. This group comprised 37.68% (1352 participants) of the sample in the three-class model, 43.56% (1577 participants) of the sample in the four-class model, and 32.49% (1176 participants) of the sample in the five-class model. Figure 1 presents the mean symptom cluster endorsement by class for the three-class model. As seen in Figure 1, Classes 1 and 3 endorsed similar levels of symptoms of intrusion (1.632 vs. 1.667, respectively) and arousal (1.574 vs. 1.546, respectively). They differed significantly in their likelihood of endorsing symptoms of avoidance, with Class 3 reporting high levels of avoidant symptoms (1.811) and Class 1 reporting lower levels of avoidant symptoms (1.274). Classes 1 and 3 also differed in their endorsement of symptoms related to negative alterations in cognition and mood, with Class 1 exhibiting a higher likelihood of endorsing these symptoms (1.602 vs. 1.404, respectively). In summary, the three-class model contained a severe class, a class characterized by high endorsement of avoidance symptoms, and a class characterized by high endorsement of negative alterations in cognition and mood.

The four-class model contained three classes similar to those present in the three-class model. Figure 2 presents the symptom cluster endorsement means by class. As seen in Figure 2, Class 1 was characterized by high endorsement across all symptom clusters. Class 2 was characterized by relatively average endorsement of symptoms of intrusion (1.537), negative alterations in cognition and mood (1.573), and symptoms of arousal (1.463), as well as low endorsement of symptoms of avoidance (1.271). Class 4 was characterized by above-average endorsement of symptoms of intrusion (1.641) and avoidance (1.815) and relatively average endorsement of negative alterations in cognition and mood (1.446) and symptoms of arousal (1.484). In addition, a fourth class (Class 3 in the figure) was characterized by an elevated likelihood of endorsing symptoms of intrusion (1.776), negative alterations in cognition and mood (1.636), and arousal (1.747). These elevated likelihoods were similar to those seen in the class characterized by high levels of all symptoms; however, unlike the severe class, Class 3 exhibited a relatively low likelihood of endorsing symptoms of avoidance (1.284 vs. 1.919 in the severe class). In summary, the four-class model contained a severe class, two classes which differed primarily on their endorsement of symptoms of arousal, and a class with high levels of all symptoms with the exception of symptoms of arousal.

The five-class model contained both similarities and differences from the previously-described models. Figure 1 presents the symptom cluster endorsement means by class. Class 1 was characterized by relatively average endorsement of symptoms of intrusion (1.444), negative alterations in cognitions and mood (1.482), and arousal (1.529), with high endorsement of symptoms of avoidance (1.809). Class 2 was characterized by high endorsement of symptoms of intrusion (1.842), below average endorsement of symptoms of avoidance (1.288), and slightly above average endorsement of negative alterations in cognition and mood (1.622) and arousal (1.626). Class 3 was characterized by high endorsement of symptoms of intrusion (1.851) and avoidance (1.831), below average endorsement of negative alterations in cognition and mood (1.388), and relatively average endorsement of avoidance (1.582). Class 4 was characterized by below average endorsement of symptoms of intrusion (1.385) and avoidance (1.256) and relatively average endorsement of negative alterations in cognition and mood (1.576) and arousal (1.513). Finally, Class 5 was similar to classes seen in the previous two models, with the highest endorsement of all the classes in all four symptom clusters.

As a result of fit indices demonstrating a statistically significant improvement in fit with each additional class, as well as a consideration of the interpretability of each model, the five-class model was chosen as the optimal representation of the latent classes contained within the data. All analyzed models contained a class characterized by the highest endorsement of all symptom clusters, and this class had a relatively stable base rate across models (32%-43%). Although the four-class model contained four relatively disparate classes, the inclusion of a fifth class increased discrepancies across classes in endorsement of each of the symptom clusters and thus, in conjunction with fit indices indicating it was a significantly better fit than models with fewer classes, the five-class model was determined to be the most likely to provide clinically-useful information.

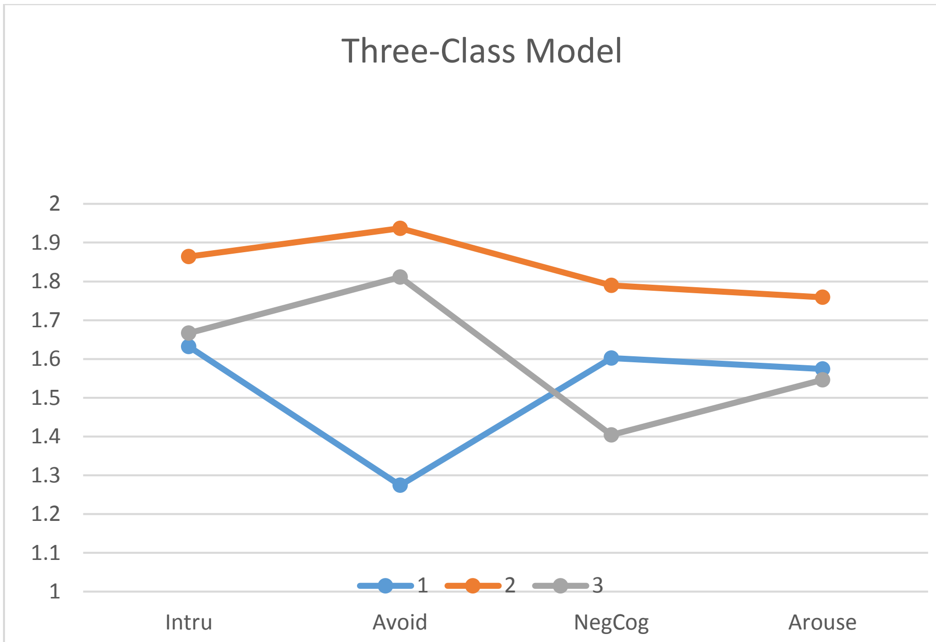

Figure 1. Three Class Model Endorsement

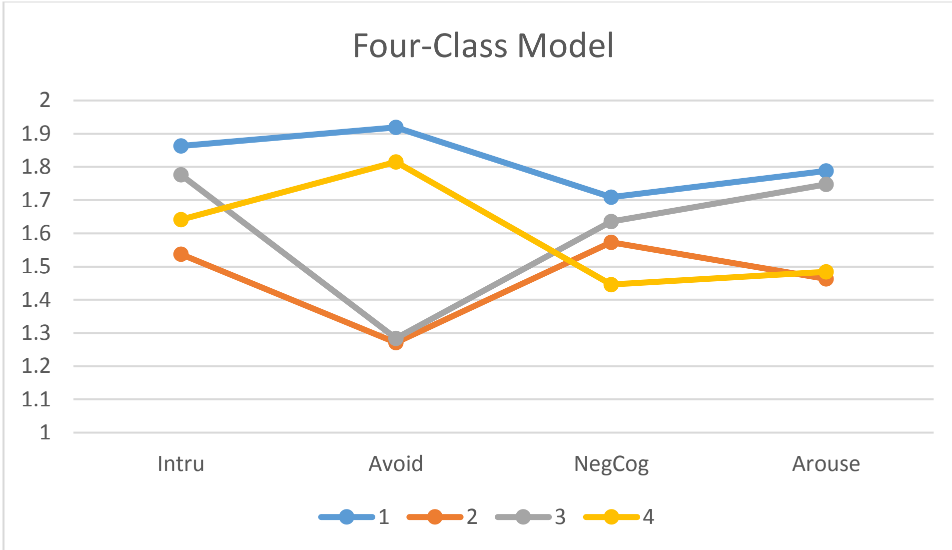

Figure 2. Four-Class Model Endorsement

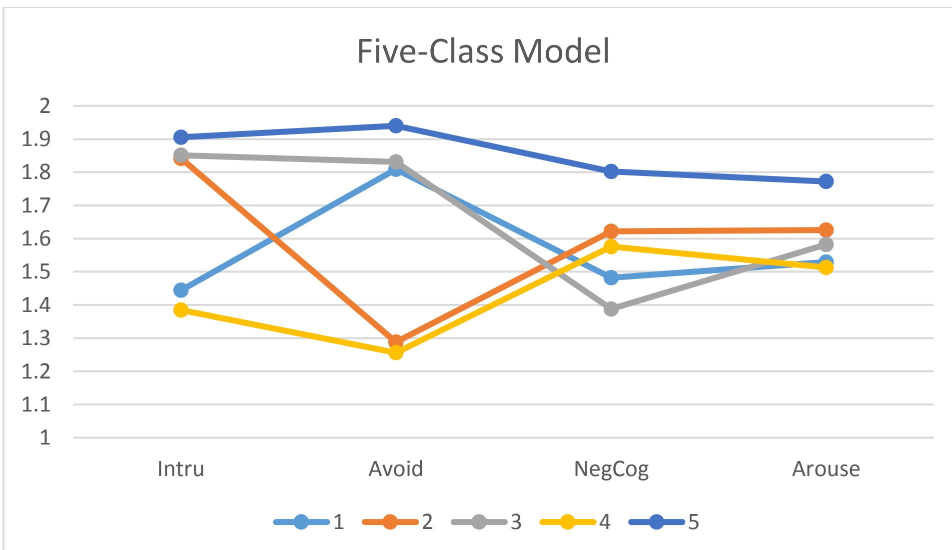

Figure 3. Five-Class Model Endorsement

Substantive interpretation of the five-class model.

Following the decision to retain the five-class model, classes were named in order to facilitate interpretation. Class 1 was characterized by relatively average endorsement of symptoms of intrusion, negative alterations in cognitions and mood, and arousal, with high endorsement of symptoms of avoidance and was thus deemed the "Avoidance" class. Class 2 was characterized by high endorsement of symptoms of intrusion, below average endorsement of symptoms of avoidance, and slightly above average endorsement of negative alterations in cognition and mood and arousal and was thus deemed the "Intrusion" class. Class 3 was characterized by high endorsement of symptoms of intrusion and avoidance, below average endorsement of negative alterations in cognition and mood, and relatively average endorsement of avoidance, and was thus deemed the "Avoidant/Intrusive" class. Class 4 was characterized by below average endorsement of symptoms of intrusion and avoidance and relatively average endorsement of negative alterations in cognition and mood and arousal. Given its low endorsement of symptoms, it was deemed the "Low Severity" class. Finally, Class 5 was characterized by the highest endorsement of all the classes in all four symptom clusters and was thus deemed the "Complex" class.

The five classes demonstrated a wide range of base rates (Table 2). The Avoidance class (Class 1) contained 25.58% of the sample (926 participants). The Intrusion class (Class 2) contained 9.97% of the sample (361 participants). The Avoidant/Intrusive class (Class 3) contained 23.20% of the sample (840 participants). The Low Severity class (Class 4) contained 8.76% of the sample (317 participants). The Complex class (Class 5) contained 32.49% of the sample (1176 participants).

Table 2 *Indicator Characteristics by Class*

Class	INTR M	INTR SD	AVD M	AVD SD	NEG M	NEG SD	ARO M	ARO SD
1	1.444	0.274	1.809	0.243	1.482	0.304	1.529	0.213
2	1.842	0.285	1.288	0.190	1.622	0.209	1.626	0.228

3	1.851	0.261	1.831	0.232	1.388	0.261	1.582	0.290
4	1.385	0.338	1.256	0.196	1.576	0.196	1.513	0.178
5	1.905	0.206	1.940	0.137	1.802	0.309	1.772	0.172

INTR M = Intrusion Mean, INTR SD = Intrusion Standard Deviation, AVD M = Avoidance Mean, AVD SD = Avoidance Standard Deviation, NEG M = Negative Alterations in Cognition and Mood Mean, NEG SD = Negative Alterations in Cognition and Mood Standard Deviation, ARO M = Arousal Mean, ARO SD = Arousal Standard Deviation

Taxometric Analyses

Following the decision to retain the five-class model, the next step in the process was to utilize taxometric analyses to determine whether the identified classes are different from each other not only in degree, but in kind. Taxometric analyses do not utilize traditional statistical significance testing; therefore, multiple consistency tests were utilized in order to maximize the ability to identify misleading results. The use of multiple consistency tests is based on the idea that a dimensional group may appear taxonic in one of the consistency tests, but such a result is unlikely replicate across multiple statistically independent procedures. The four symptom clusters were again utilized as indicators. Each of the five retained classes were compared with each of the remaining classes in isolated pairs. These comparisons were made utilizing MAMBAC, MAXCOV, MAXEIG, and L-Mode Factor Analysis. Thus, all taxometric analyses were run separately for all unique pairs of the five classes.

MAMBAC analyses were conducted as the initial taxometric analysis. For MAMBAC analyses, all possible combinations of indicators are analyzed, because the analysis of indicator 1 across the range of indicator 2 is unique from that of indicator 2 across the range of indicator 1. The four indicators generated a total of 120 MAMBAC plots. Fifty evenly-spaced cuts along the input indicator were made, starting at the 25^{th}

case from the beginning and ending before the 25th case from the end. This trimming of cases at the extremes of the distribution serves to enhance reliability and interpretability of the output graphs (Rhudy, Green, Arnau, & France, 2008).

As mentioned above, multiple consistency tests are utilized in order to ensure any indicated taxonicity is replicable and not an artifact of the data. Following MAMBAC analyses, data were subjected to MAXCOV, MAXEIG, and L-Mode factor analyses. The four indicators generated a total of 120 MAXCOV and 40 MAXEIG plots. The same parameters were utilized for the MAXCOV and MAXEIG analyses, with fifty evenly-spaced cuts along the input indicator were made, starting at the 25th case from the beginning and ending before the 25th case from the end.

Avoidance class and Intrusion class.

For the MAMBAC analyses of the Avoidance class and the Intrusion class together, seven of the twelve MAMBAC graphs appeared to be dimensional, given they lacked the peak that indicates taxonicity. Two of the remaining individual graphs appeared to be indicative of taxonicity and the remaining three graphs were ambiguous in nature. Figure 4 presents the averaged output curve for the MAMBAC analysis of the Avoidance and Intrusion classes (represented by solid black dots) compared with the averaged output curve for simulated categorical and dimensional data. As seen in Figure 4, the averaged curve from the comparison between the Avoidance and Intrusion classes more closely resembled the simulated output curve for dimensional data. Comparison of the Avoidance and Intrusion classes resulted in a CCFI value of 0.42, which is in the direction of dimensionality but lies within a range of scores which are considered ambiguous and must be interpreted with caution.

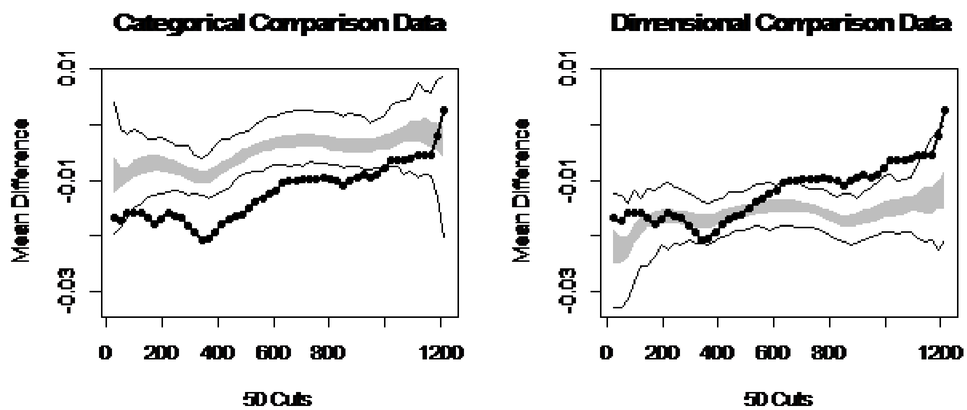

Figure 4. MAMBAC Averaged Output Curve 1v2

**Grey area between solid black lines represents the expected curve for simulated datasets. Line comprised of black dots represents the curve of the actual data.*

Results from the MAXCOV analysis were more ambiguous. Of the twelve generated individual graphs, five contained peaks indicative of taxonicity, three were flat indicating dimensionality, and four were ambiguous in nature. Figure 5 presents the averaged output curve for the MAXCOV analysis of the Avoidance and Intrusion classes (represented by solid black dots) compared with the averaged output curve for simulated categorical and dimensional data. As seen in Figure 5, the averaged curve from the comparison between the Avoidance and Intrusion classes did not fit either the simulated taxonic or dimensional curves particularly well, but was a closer match to the taxonic curve. This comparison resulted in a CCFI value of 0.478, which is also ambiguous regarding taxonicity versus dimensionality and is similar to the CCFI (0.42) produced by the MAMBAC analysis.

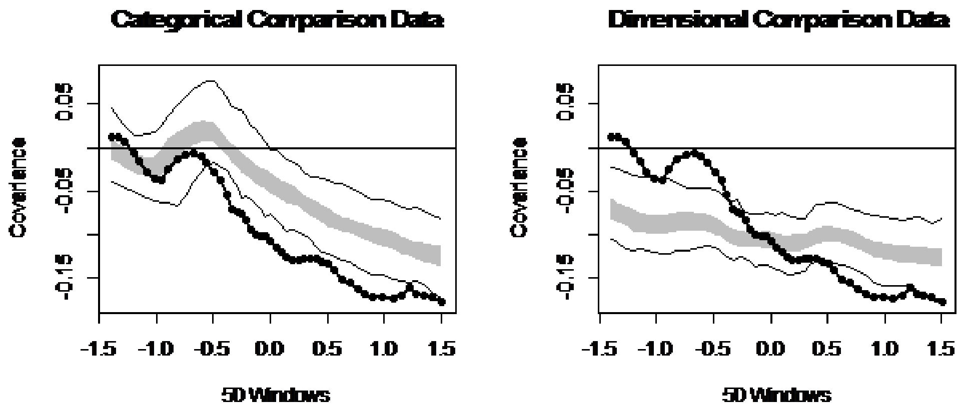

Figure 5. MAXCOV Averaged Output Curve 1v2

**Grey area between solid black lines represents the expected curve for simulated datasets. Line comprised of black dots represents the curve of the actual data.*

The MAXEIG analysis generated four individual graphs, two of which indicated taxonicity, one which indicated dimensionality, and one graph which was uninterpretable. Figure 6 presents the averaged output curve for the MAXEIG analysis of the Avoidance and Intrusion classes (represented by solid black dots) compared with the averaged output curve for simulated categorical and dimensional data. As seen in Figure 6, the averaged curve from the comparison between the Avoidance and Intrusion classes was indicative of taxonicity. The comparison resulted in a CCFI value of 0.623, which is indicative of categorical differences between the two classes and is discrepant from the CCFI values generated from the MAMBAC and MAXCOV analyses.

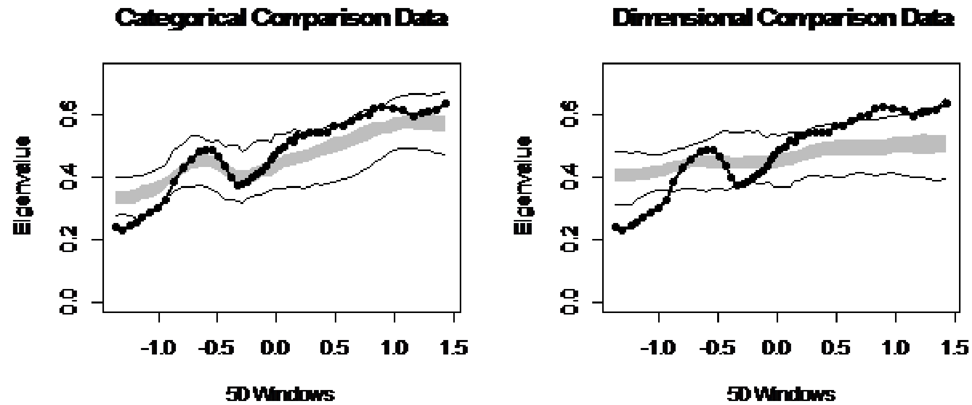

Figure 6. MAXEIG Averaged Output Curve 1v2

**Grey area between solid black lines represents the expected curve for simulated datasets. Line comprised of black dots represents the curve of the actual data.*

Figure 7 presents the averaged output curve for the L-Mode factor analysis of the Avoidance and Intrusion classes (represented by solid black dots) compared with the averaged output curve of simulated categorical and dimensional data. As seen in Figure 7, the L-Mode analysis resulted in an averaged curve which more closely resembled the simulated categorical data. The analysis resulted in a CCFI of 0.592, which is in the direction of taxonicity, though still slightly within the range of ambiguous scores.

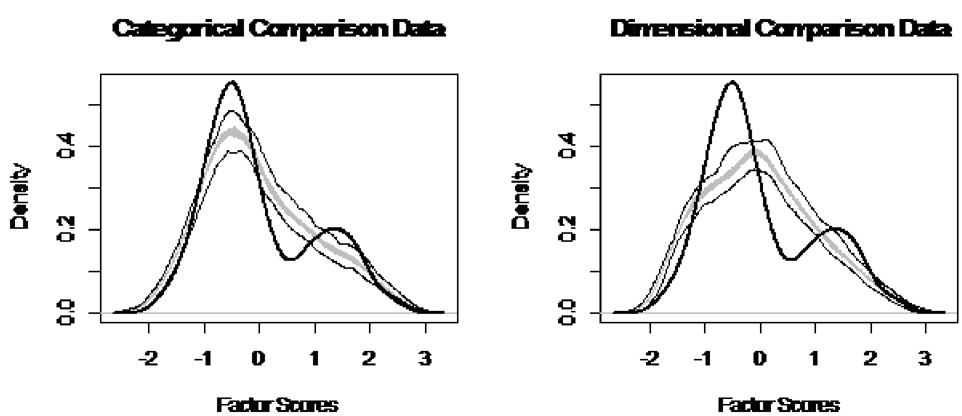

Figure 7. L-Mode Averaged Output Curve 1v2

Grey area between solid black lines represents the expected curve for simulated datasets. Line comprised of black dots represents the curve of the actual data.

The comparison of the Avoidance and Intrusion classes resulted in an average CCFI score of 0.545, which lies within the ambiguous range of scores and does not provide conclusive evidence of qualitative differences between the two classes.

Avoidance Class and Avoidant/Intrusive Class

Utilizing all possible pairings of the four indicator variables when comparing the Avoidance (Class 1) and the Avoidant/Intrusive (Class 3) classes, three of twelve MAMBAC individual graphs indicated taxonicity, one indicated dimensionality, and eight were unclear. Figure 8 presents the averaged output curve for the MAMBAC analysis of the Avoidance and Avoidant/Intrusive classes (represented by solid black dots) compared with the averaged output curve of simulated categorical and dimensional data. As seen in Figure 8, the MAMBAC analysis resulted in an averaged curve which more closely resembled the simulated dimensional data. The comparison resulted in a CCFI value of 0.231, which provided further evidence for the dimensional nature of the differences between the two classes.

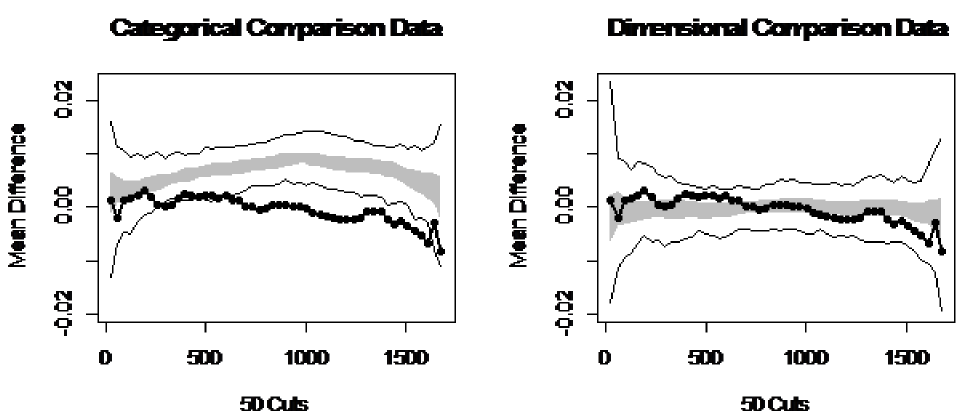

Figure 8. MAMBAC Averaged Output Curve 1v3

**Grey area between solid black lines represents the expected curve for simulated datasets. Line comprised of black dots represents the curve of the actual data.*

Results from the MAXCOV analysis were again more ambiguous. Eight of the twelve generated individual graphs indicated taxonicity and the remaining four indicated dimensionality. Figure 9 presents the averaged output curve for the MAXCOV analysis of the Avoidance and Avoidant/Intrusive classes (represented by solid black dots) compared with the averaged output curve of simulated categorical and dimensional data. As seen in Figure 9, the MAXCOV analysis resulted in an averaged curve which more closely resembled the simulated categorical data. The comparison resulted in a CCFI value of 0.532, a value too ambiguous to be interpretable and discrepant from the MAMBAC CCFI of 0.231.

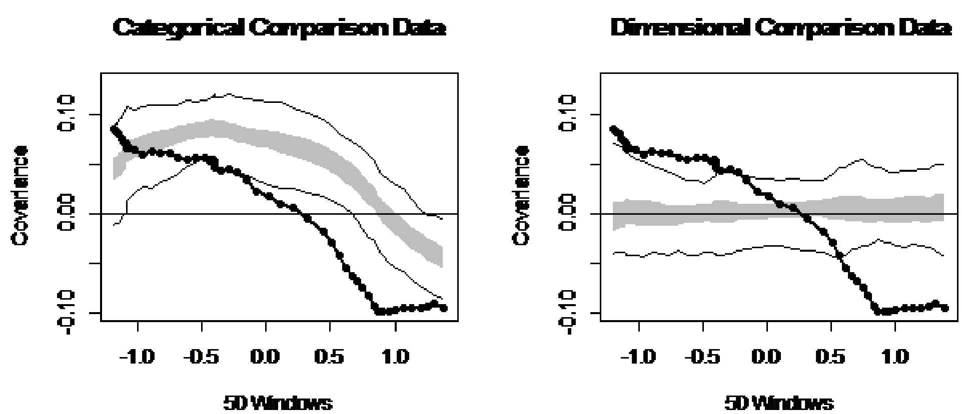

Figure 9. MAXCOV Averaged Output Curve 1v3

**Grey area between solid black lines represents the expected curve for simulated datasets. Line comprised of black dots represents the curve of the actual data.*

Results from the MAXEIG analysis produced a similar level of ambiguity as seen from the MAXCOV results. All four individual graphs generated were ambiguous in nature. Figure 10 presents the averaged output curve for the MAXEIG analysis of the

Avoidance and Avoidant/Intrusive classes (represented by solid black dots) compared with the averaged output curve of simulated categorical and dimensional data. As seen in Figure 10, the MAXEIG analysis resulted in an averaged curve which was uninterpretable. The comparison resulted in a CCFI value of 0.511, a value which is also uninterpretable due to ambiguity.

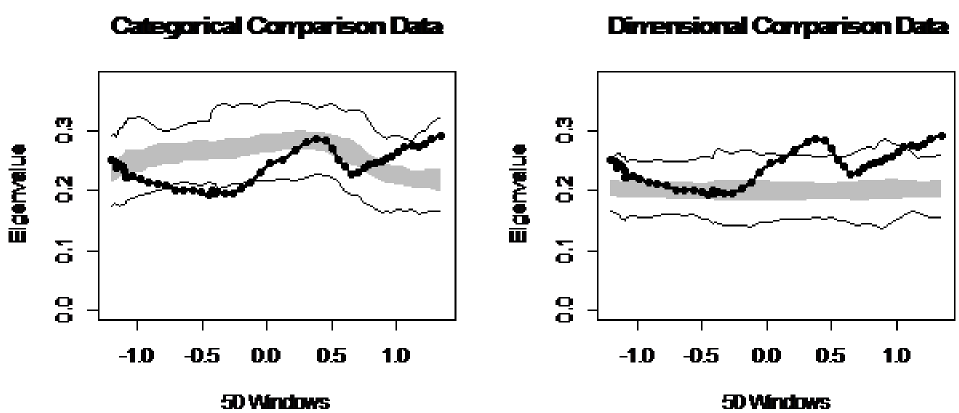

Figure 10. MAXEIG Averaged Output Curve 1v3

**Grey area between solid black lines represents the expected curve for simulated datasets. Line comprised of black dots represents the curve of the actual data.*

Figure 11 presents the averaged output curve for the MAXCOV analysis of the Avoidance and Avoidant/Intrusive classes (represented by solid black dots) compared with the averaged output curve of simulated categorical and dimensional data. As seen in Figure 11, the L-Mode factor analysis resulted in an averaged curve which did not demonstrate a distinguishable difference in its similarity to the simulated categorical or dimensional data. The comparison of the Avoidance and Avoidant/Intrusive classes resulted in a CCFI score of 0.447, which lies within the range of scores considered uninterpretable due to ambiguity.

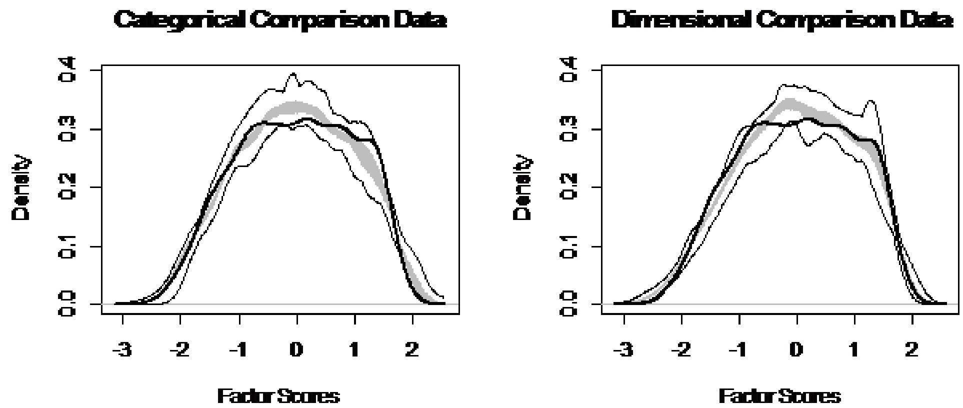

Figure 11. L-Mode Averaged Output Curve 1v3

**Grey area between solid black lines represents the expected curve for simulated datasets. Line comprised of black dots represents the curve of the actual data.*

Overall, the various taxometric procedures resulted in an averaged CCFI score of 0.396, which does not provide evidence of qualitative differences between the classes, but rather indicates the differences between the classes are dimensional in nature.

Avoidance Class and Low Severity Class

Utilizing all possible pairings of the four indicator variables when comparing the Avoidance (Class 1) and the Low Severity (Class 4) classes, three individual plots indicated taxonicity, three indicated dimensionality, and six were unclear in their nature. Figure 12 presents the averaged output curve for the MAMBAC analysis of the Avoidance and Low Severity classes (represented by solid black dots) compared with the averaged output curve of simulated categorical and dimensional data. As seen in Figure 12, the MAMBAC analysis resulted in an averaged curve which more closely resembled the simulated dimensional data. The comparison resulted in a CCFI value of 0.201, providing further evidence for a dimensional conceptualization of the differences between the classes.

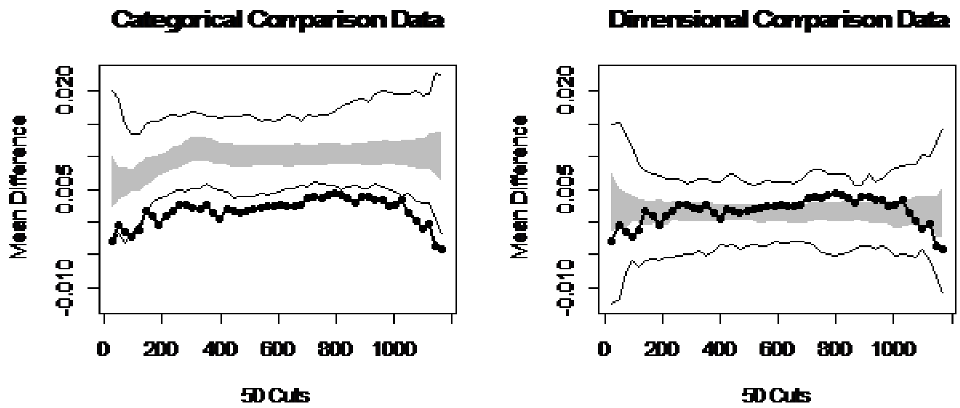

Figure 12. MAMBAC Averaged Output Curve 1v4

**Grey area between solid black lines represents the expected curve for simulated datasets. Line comprised of black dots represents the curve of the actual data.*

The MAXCOV results are again less clear than the results generated by MAMBAC analyses. Five of the twelve generated individual graphs when comparing the Avoidant and Low Severity classes indicated taxonicity, five suggested dimensionality and two were unclear in nature. Figure 13 presents the averaged output curve for the MAXCOV analysis of the Avoidance and Low Severity classes (represented by solid black dots) compared with the averaged output curve of simulated categorical and dimensional data. As seen in Figure 13, the MAXCOV analysis resulted in an averaged curve which more closely resembled the simulated dimensional data. The averaged output curve more closely resembled the simulated dimensional data (Figure 13), and the comparison resulted in a CCFI value of 0.342, which also indicates dimensionality.

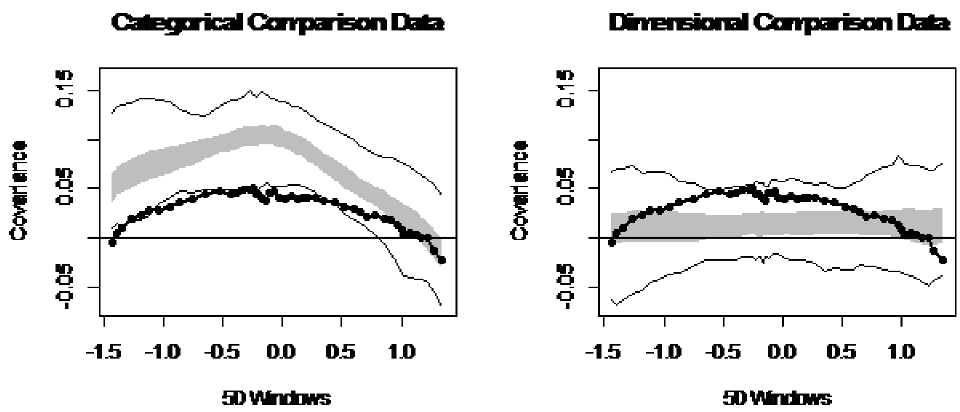

Figure 13. MAXCOV Averaged Output Curve 1v4

**Grey area between solid black lines represents the expected curve for simulated datasets. Line comprised of black dots represents the curve of the actual data.*

The MAXEIG results provide further support for the dimensional conceptualization of the differences between the Avoidant and Low Severity classes. Two of the generated individual graphs were indicative of dimensionality and two were uninterpretable due to ambiguity. Figure 14 presents the averaged output curve for the MAXEIG analysis of the Avoidance and Low Severity classes (represented by solid black dots) compared with the averaged output curve of simulated categorical and dimensional data. As seen in Figure 14, the MAXEIG analysis resulted in an averaged curve which more closely resembled the simulated dimensional data. The comparison generated a CCFI of 0.397, which is similar to the CCFI generated by the MAMBAC and MAXCOV analyses.

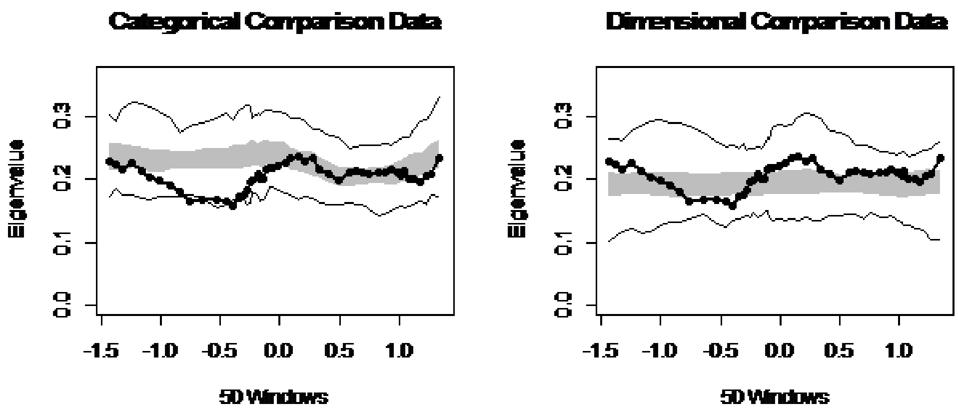

Figure 14. MAXEIG Averaged Output Curve 1v4

**Grey area between solid black lines represents the expected curve for simulated datasets. Line comprised of black dots represents the curve of the actual data.*

Figure 15 presents the averaged output curve for the L-Mode factor analysis of the Avoidance and Low Severity classes (represented by solid black dots) compared with the averaged output curve of simulated categorical and dimensional data. As seen in Figure 15, the L-Mode factor analysis resulted in an averaged curve which more closely resembled the simulated dimensional data. Comparison of the Avoidance and Low Severity classes resulted in a CCFI score of 0.480, which lies within the range of scores too ambiguous to be interpreted.

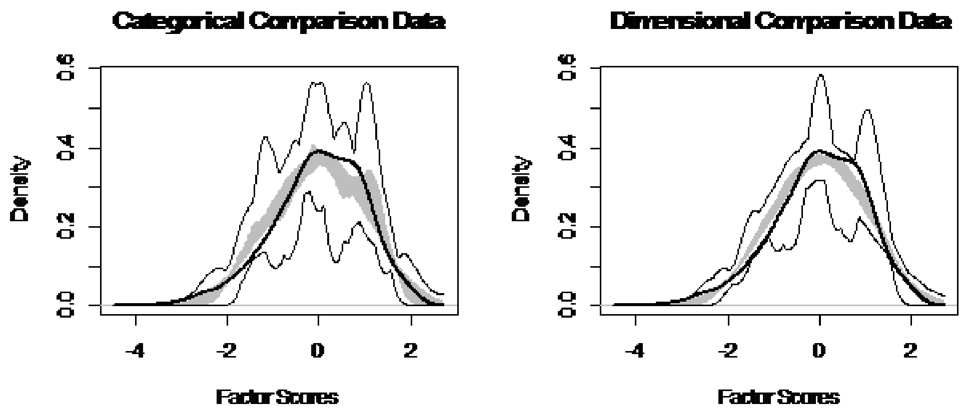

Figure 15. L-Mode Averaged Output Curve 1v4

**Grey area between solid black lines represents the expected curve for simulated datasets. Line comprised of black dots represents the curve of the actual data.*

Overall, the various taxometric procedures resulted in an average CCFI score of 0.359, which provides evidence of a dimensional nature of the differences between the Avoidance and Low Severity classes.

Avoidance Class and Complex Class

Utilizing all possible pairings of the four indicator variables when comparing the Avoidance (Class 1) and the Complex (Class 5) classes, nine of twelve generated MAMBAC individual graphs contained peaks indicative of taxonicity, while the remaining three were unclear. Figure 16 presents the averaged output curve for the MAMBAC analysis of the Avoidance and Complex classes (represented by solid black dots) compared with the averaged output curve of simulated categorical and dimensional data. As seen in Figure 16, the MAMBAC analysis resulted in an averaged curve which more closely resembled the simulated categorical data. The comparison resulted in a CCFI value of 0.767, providing further evidence for a taxonic conceptualization of the differences between the classes.

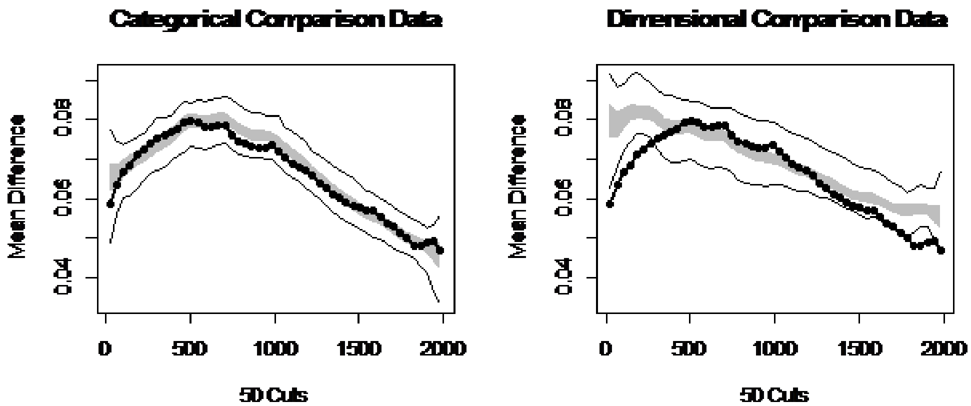

Figure 16. MAMBAC Averaged Output Curve 1v5

**Grey area between solid black lines represents the expected curve for simulated datasets. Line comprised of black dots represents the curve of the actual data.*

Continuing the trend, the MAXCOV results were more ambiguous than the results generated by MAMBAC analyses. Seven of the twelve graphs comparing the Avoidant and Complex classes indicated taxonicity and the remaining five suggested dimensionality. Figure 17 presents the averaged output curve for the MAXCOV analysis of the Avoidance and Complex classes (represented by solid black dots) compared with the averaged output curve of simulated categorical and dimensional data. As seen in Figure 17, the MAXCOV analysis resulted in an averaged curve which more closely resembled the simulated categorical data. The comparison resulted in a CCFI value of 0.546, which is in the direction of taxonicity, but lies within the range which must be interpreted with caution. However, despite some deviation from the simulated data curve, the shape of the curve is clearly the taxonic signature.

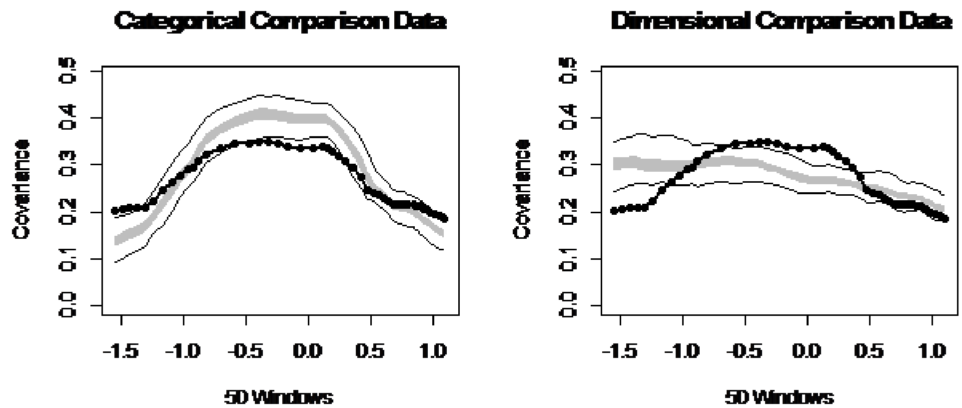

Figure 17. MAXCOV Averaged Output Curve 1v5

**Grey area between solid black lines represents the expected curve for simulated datasets. Line comprised of black dots represents the curve of the actual data.*

The MAXEIG analysis supported the conceptualization of qualitative differences between the Avoidant and Complex classes. Three of the four graphs indicated taxonicity and one was dimensional in nature. Figure 18 presents the averaged output curve for the MAXEIG analysis of the Avoidance and Complex classes (represented by solid black dots) compared with the averaged output curve of simulated categorical and dimensional data. As seen in Figure 18, the MAXEIG analysis resulted in an averaged curve which strongly resembled the simulated categorical data. The comparison resulted in a CCFI of 0.632, which, similar to the CCFI scores generated by MAMBAC and MAXCOV analyses, is indicative of a qualitative difference between the two classes.

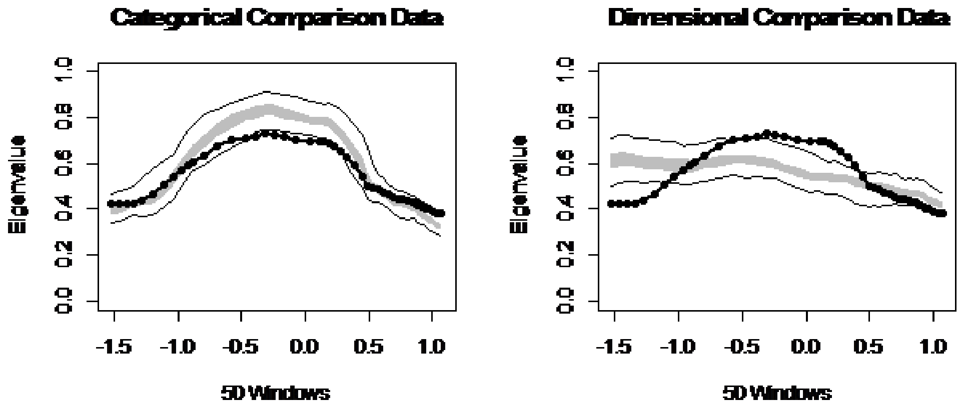

Figure 18. MAXEIG Averaged Output Curve 1v5

**Grey area between solid black lines represents the expected curve for simulated datasets. Line comprised of black dots represents the curve of the actual data.*

Figure 19 presents the averaged output curve for the L-Mode factor analysis of the Avoidance and Complex classes (represented by solid black dots) compared with the averaged output curve of simulated categorical and dimensional data. As seen in Figure 19, the L-Mode factor analysis resulted in an averaged curve which strongly resembled the simulated categorical data. The comparison of the Avoidance and Complex classes resulted in a CCFI score of 0.798 and strongly suggests a qualitative nature of the differences between the classes.

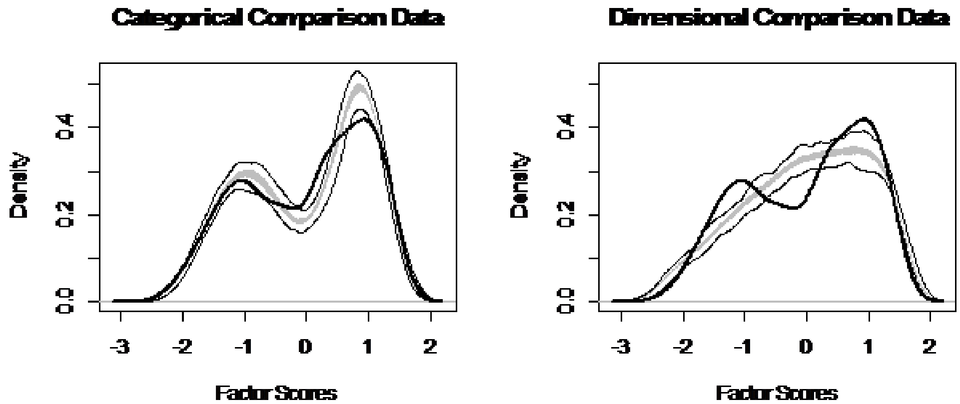

Figure 19. L-Mode Averaged Output Curve 1v5

**Grey area between solid black lines represents the expected curve for simulated datasets. Line comprised of black dots represents the curve of the actual data.*

Overall, the various taxometric procedures resulted in an average CCFI score of 0.732. These results strongly suggest there are distinct qualitative differences between the Avoidance and Complex classes identified by the LPA.

Intrusion vs. Avoidant/Intrusive Classes

Utilizing all possible pairings of the four indicator variables when comparing the Intrusion (Class 2) and the Avoidant/Intrusive (Class 3) classes, three of the generated MAMBAC individual graphs are indicative of a taxon, three are indicative of a dimensional conceptualization, and six of the graphs are unclear. Figure 20 presents the averaged output curve for the MAMBAC analysis of the Intrusion and Avoidant/Intrusive classes (represented by solid black dots) compared with the averaged output curve of simulated categorical and dimensional data. As seen in Figure 20, the MAMBAC analysis resulted in an averaged curve which more closely resembled the simulated dimensional data. The comparison resulted in a CCFI value of 0.429, which lies in the direction of a dimensional conceptualization but lies within the ambiguous range of scores.

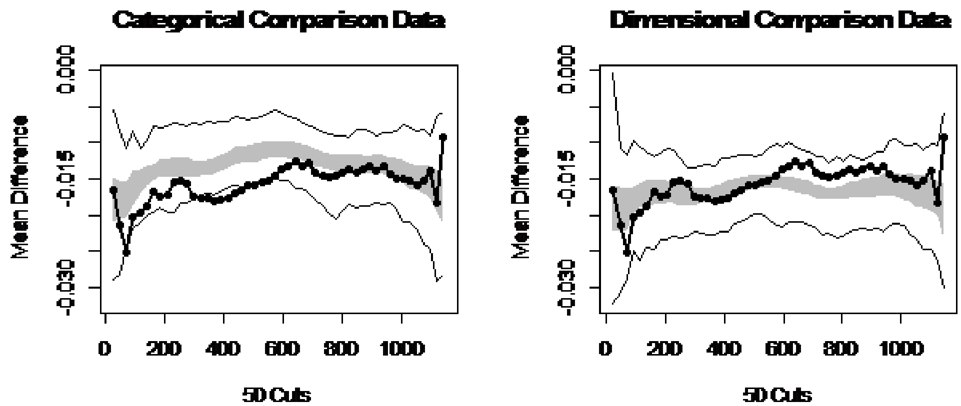

Figure 20. MAMBAC Averaged Output Curve 2v3

**Grey area between solid black lines represents the expected curve for simulated datasets. Line comprised of black dots represents the curve of the actual data.*

The MAXCOV analysis resulted in seven individual graphs indicative of a taxon, three indicative of dimensionality, and two are unclear. Figure 21 presents the averaged output curve for the MAXCOV analysis of the Intrusion and Avoidant/Intrusive classes (represented by solid black dots) compared with the averaged output curve of simulated categorical and dimensional data. As seen in Figure 21, the MAXCOV analysis resulted in an averaged curve which more closely resembled the simulated dimensional data. The comparison of the Intrusion and Avoidant/Intrusive classes resulted in a MAXCOV CCFI score of 0.453, which closely resembles the MAMBAC CCFI (0.429) and slightly suggests dimensionality but is too vague to interpret with any sense of confidence.

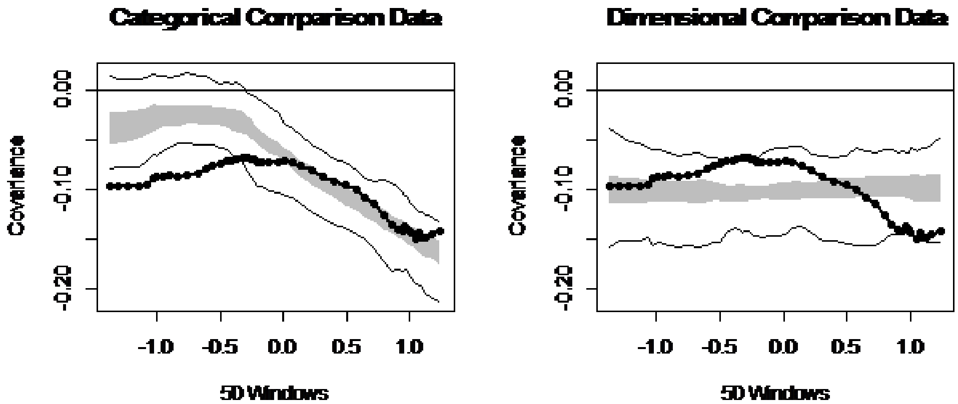

Figure 21. MAXCOV Averaged Output Curve 2v3

**Grey area between solid black lines represents the expected curve for simulated datasets. Line comprised of black dots represents the curve of the actual data.*

The MAXEIG analysis produced similar results as seen in the MAMBAC and MAXCOV analyses. Three of four generated individual graphs were indicative of dimensionality and the remaining graph was uninterpretable due to ambiguity. Figure 22 presents the averaged output curve for the MAXEIG analysis of the Intrusion and Avoidant/Intrusive classes (represented by solid black dots) compared with the averaged output curve of simulated categorical and dimensional data. As seen in Figure 22, the MAXEIG analysis resulted in an averaged curve which did not more closely resemble either the simulated categorical or dimensional data. The comparison of the Intrusion and Avoidant/Intrusive classes resulted in a CCFI of 0.513, which lies within the range of uninterpretable scores.

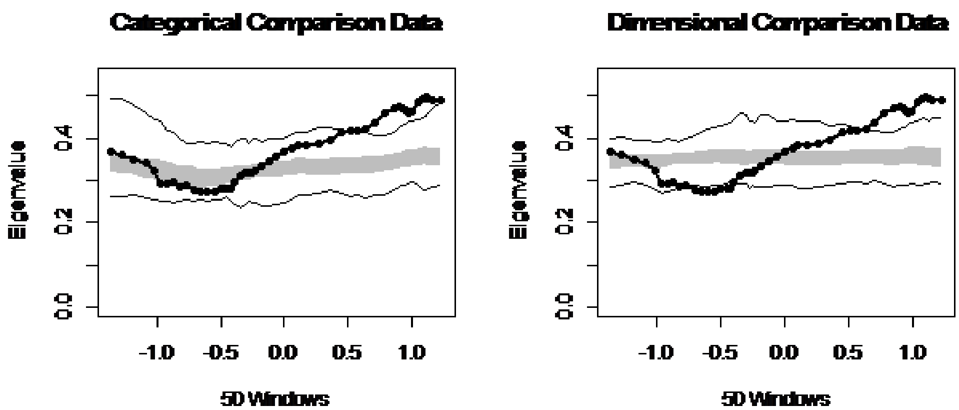

Figure 22. MAXEIG Averaged Output Curve 2v3

**Grey area between solid black lines represents the expected curve for simulated datasets. Line comprised of black dots represents the curve of the actual data.*

Figure 23 presents the averaged output curve for the L-Mode factor analysis of the Intrusion and Avoidant/Intrusive classes (represented by solid black dots) compared with the averaged output curve of simulated categorical and dimensional data. As seen in Figure 23, the L-Mode analysis resulted in an averaged curve which did not more closely resemble either the simulated dimensional or categorical data. The comparison of the Intrusion and Avoidant/Intrusive classes resulted in a CCFI score of 0.512, which, similar to the CCFI generated by the other taxometric procedures, is uninterpretable due to ambiguity.

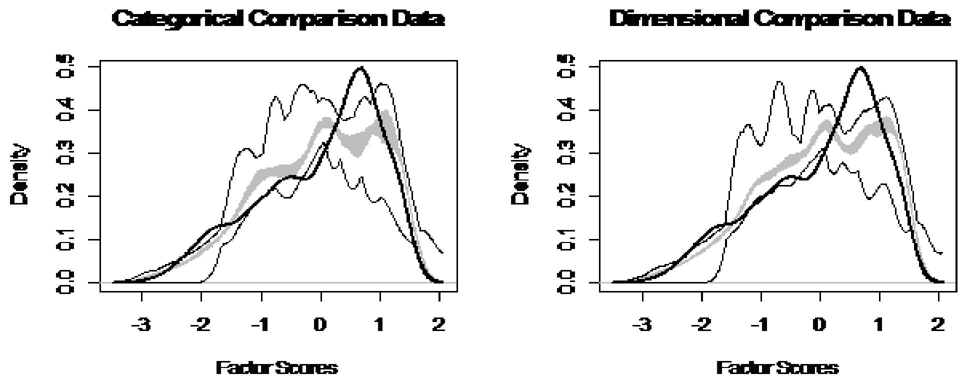

Figure 23. L-Mode Averaged Output Curve 2v3

**Grey area between solid black lines represents the expected curve for simulated datasets. Line comprised of black dots represents the curve of the actual data.*

Overall, the various taxometric procedures resulted in an average CCFI score of 0.485, which lies within the range of scores uninterpretable due to ambiguity. The results do not provide conclusive evidence of qualitative differences between the Intrusion and Avoidant/Intrusive classes.

Intrusion and Low Severity Classes

Utilizing all possible pairings of the four indicator variables when comparing the Intrusion (Class 2) and the Low Severity (Class 4) classes, one of the generated MAMBAC individual graphs is indicative of taxoncity, four are indicative of dimensionality, and seven are too ambiguous to interpret. Figure 24 presents the averaged output curve for the MAMBAC analysis of the Intrusion and Low Severity classes (represented by solid black dots) compared with the averaged output curve of simulated categorical and dimensional data. As seen in Figure 24, the MAMBAC analysis resulted in an averaged curve which was too ambiguous to be interpreted. The comparison resulted in a MAMBAC CCFI of 0.488, which is consistent with the ambiguity demonstrated by the averaged output curve.

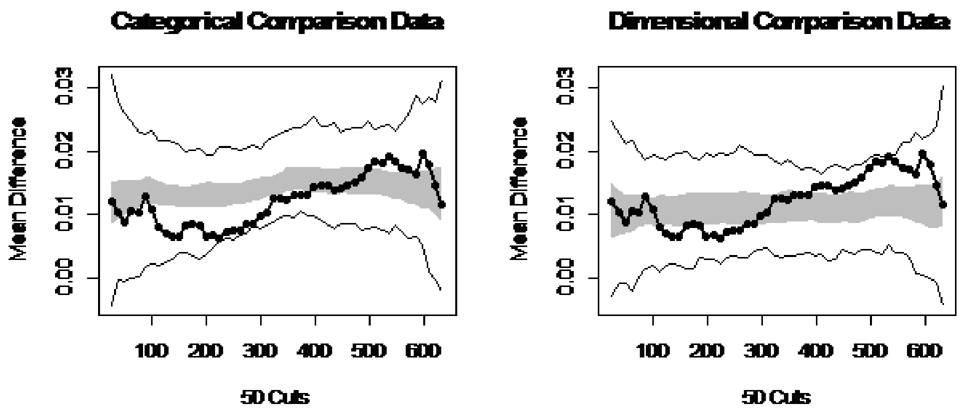

Figure 24. MAMBAC Averaged Output Curve 2v4

**Grey area between solid black lines represents the expected curve for simulated datasets. Line comprised of black dots represents the curve of the actual data.*

The MAXCOV analysis resulted in six individual graphs indicating dimensionality and six graphs indicating taxonicity. Figure 25 presents the averaged output curve for the MAXCOV analysis of the Intrusion and Low Severity classes (represented by solid black dots) compared with the averaged output curve of simulated categorical and dimensional data. As seen in Figure 25, the MAXCOV analysis resulted in an averaged curve which more closely resembled the simulated dimensional data. The comparison of the Intrusion and Avoidant/Intrusive classes resulted in a MAXCOV CCFI score of 0.303, which provides further evidence of the dimensional nature of the differences between the two classes.

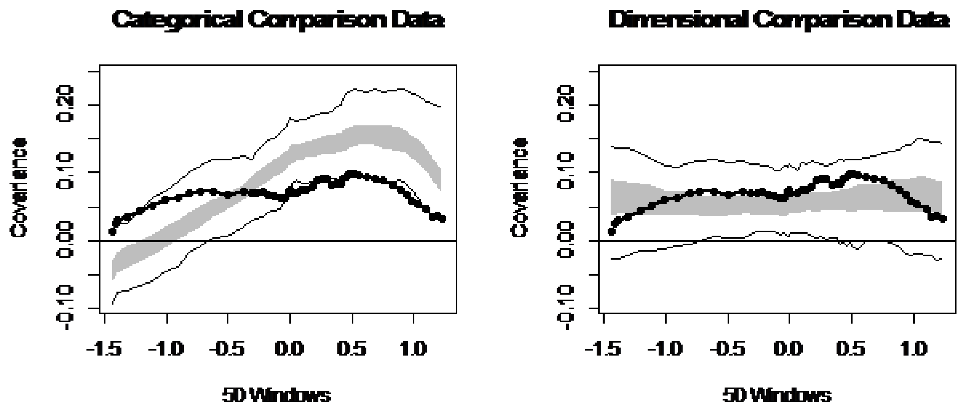

Figure 25. MAXCOV Averaged Output Curve 2v4

**Grey area between solid black lines represents the expected curve for simulated datasets. Line comprised of black dots represents the curve of the actual data.*

The MAXEIG analysis provided further support for the dimensional conceptualization of differences between the Intrusion and Low Severity classes. The analysis generated four individual graphs, all of which support the dimensional conceptualization. Figure 26 presents the averaged output curve for the MAXEIG analysis of the Intrusion and Low Severity classes (represented by solid black dots) compared with the averaged output curve of simulated categorical and dimensional data. As seen in Figure 26, the MAXEIG analysis resulted in an averaged curve which more closely resembled the simulated dimensional data. The comparison resulted in a CCFI score of 0.326, which is similar to the CCFI scores generated by the MAMBAC and MAXCOV analyses and suggests a dimensional nature of the differences between the two classes.

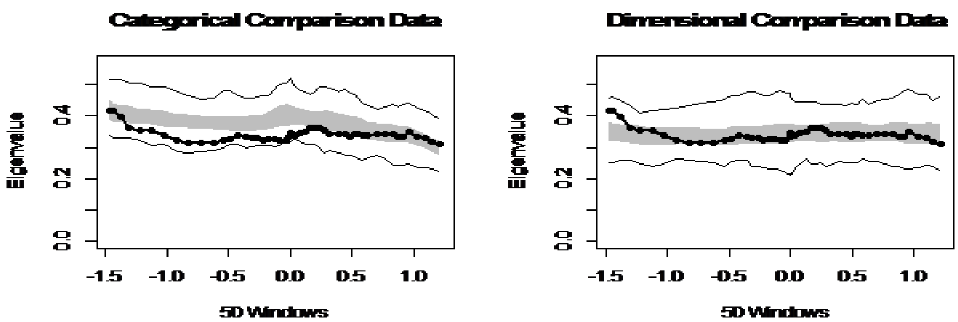

Figure 26. MAXEIG Averaged Output Curve 2v4

**Grey area between solid black lines represents the expected curve for simulated datasets. Line comprised of black dots represents the curve of the actual data.*

Figure 27 presents the averaged output curve for the L-Mode factor analysis of the Intrusion and Low Severity classes (represented by solid black dots) compared with the averaged output curve of simulated categorical and dimensional data. As seen in Figure 27, the L-Mode factor analysis resulted in an averaged curve which more closely resembled the simulated dimensional data. The comparison of the Intrusion and Low Severity classes resulted in a CCFI score of 0.246, which provides strong evidence of the dimensional nature of the differences between the two classes.

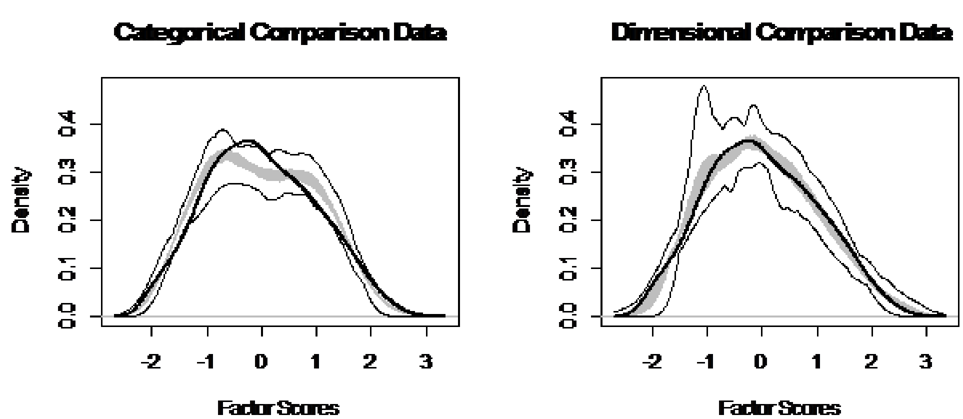

Figure 27. L-Mode Averaged Output Curve 2v4

**Grey area between solid black lines represents the expected curve for simulated datasets. Line comprised of black dots represents the curve of the actual data.*

Overall, the various taxometric procedures resulted in an average CCFI score of 0.353, which indicates the differences between the Intrusion and Low Severity classes are dimensional in nature and do not provide evidence of taxonicity.

Intrusion and Complex Classes

Utilizing all possible pairings of the four indicator variables when comparing the Intrusion (Class 2) and the Complex (Class 5) classes, eight of twelve generated MAMBAC individual graphs are indicative of taxonicity and four are indicative of dimensionality. Figure 28 presents the averaged output curve for the MAMBAC analysis of the Intrusion and Complex classes (represented by solid black dots) compared with the averaged output curve of simulated categorical and dimensional data. As seen in Figure 28, the MAMBAC analysis resulted in an averaged curve which more closely resembled the simulated categorical data. The comparison results in a MAMBAC CCFI of 0.654, which provides further evidence the differences between the two classes are qualitative in nature.

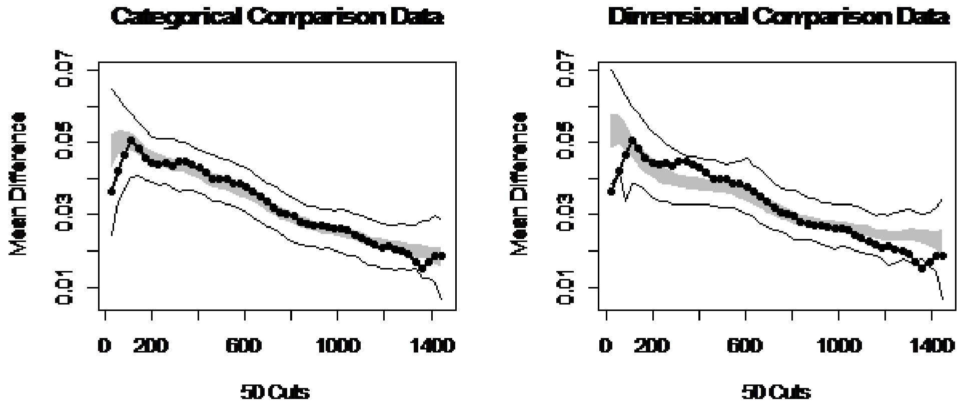

Figure 28. MAMBAC Output Curve 2v5

**Grey area between solid black lines represents the expected curve for simulated datasets. Line comprised of black dots represents the curve of the actual data.*

Results from the MAXCOV analysis appear to contradict the results from the MAMBAC analysis. The MAXCOV analysis results in five individual graphs indicative of taxonicity, five indicative of dimensionality, and two which are too ambiguous to interpret. Figure 29 presents the averaged output curve for the MAXCOV analysis of the Intrusion and Complex classes (represented by solid black dots) compared with the averaged output curve of simulated categorical and dimensional data. As seen in Figure 29, the MAXCOV analysis resulted in an averaged curve which more closely resembled the simulated dimensional data. The comparison of the Intrusion and Complex classes results in a MAXCOV CCFI score of 0.307, which, as opposed to the MAMBAC CCFI score of 0.654, indicates the differences between the two classes are dimensional in nature.

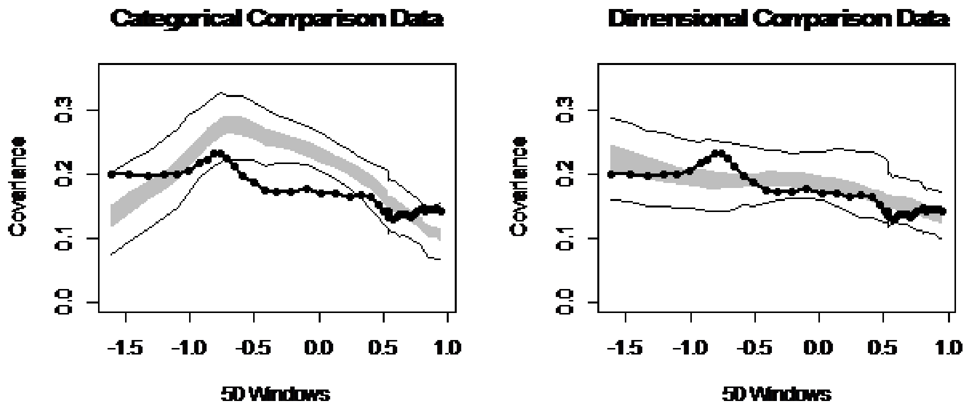

Figure 29. MAXCOV Averaged Output Curve 2v5

**Grey area between solid black lines represents the expected curve for simulated datasets. Line comprised of black dots represents the curve of the actual data.*

The MAXEIG analysis supported a dimensional conceptualization of the differences between the Intrusion and Complex classes. Two of the four individual graphs suggested dimensionality, one suggested taxonicity, and one was uninterpretable due to ambiguity. Figure 30 presents the averaged output curve for the MAXEIG analysis of the Intrusion and Complex classes (represented by solid black dots) compared with the averaged output curve of simulated categorical and dimensional data. As seen in Figure 30, the MAXEIG analysis resulted in an averaged curve which more closely resembled the simulated dimensional data. The comparison resulted in a CCFI of 0.272, which is strongly in the direction of dimensionality.

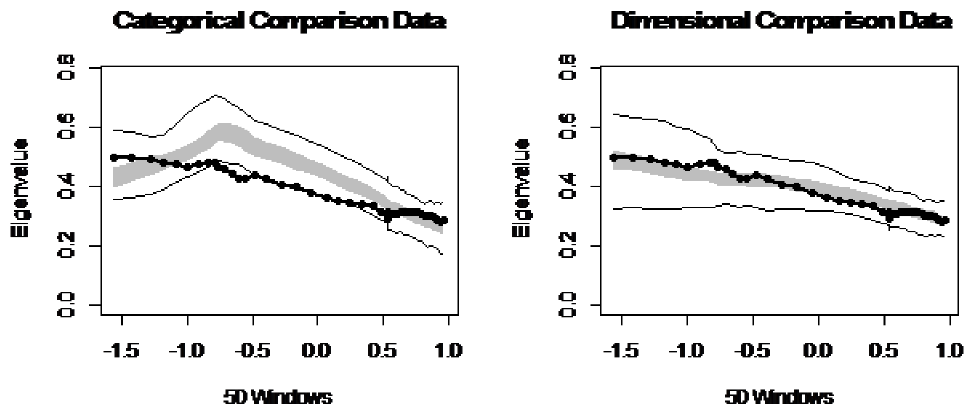

Figure 30. MAXEIG Averaged Output Curve 2v5

**Grey area between solid black lines represents the expected curve for simulated datasets. Line comprised of black dots represents the curve of the actual data.*

Figure 31 presents the averaged output curve for the L-Mode factor analysis of the Intrusion and Complex classes (represented by solid black dots) compared with the averaged output curve of simulated categorical and dimensional data. As seen in Figure 31, the L-Mode factor analysis resulted in an averaged curve which strongly resembled the simulated categorical data. The comparison of the Intrusion and Complex classes resulted in a CCFI score of 0.692, which is indicative of qualitative differences between the classes.

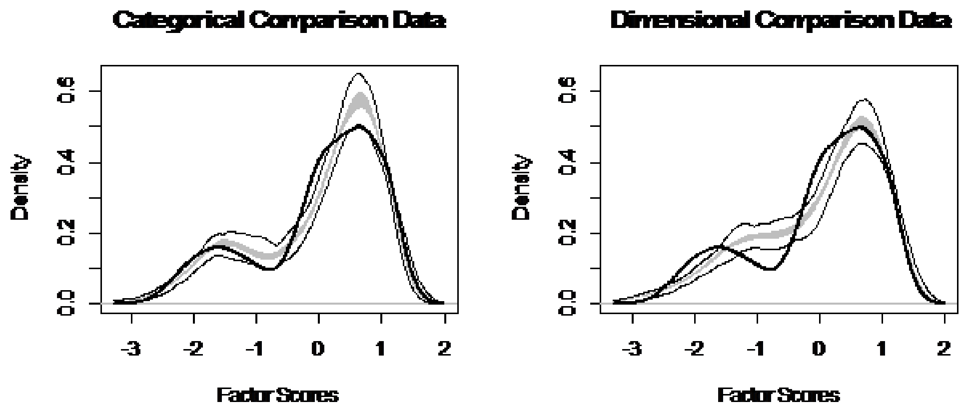

Figure 31. L-Mode Averaged Output Curve 2v5

**Grey area between solid black lines represents the expected curve for simulated datasets. Line comprised of black dots represents the curve of the actual data.*

Overall, the various taxometric procedures resulted in an average CCFI score of 0.539, which lies within the range of scores too ambiguous to interpret. It should be noted that the comparison between the Intrusion and Complex classes resulted in inconsistent CCFI scores across procedures, ranging from 0.272 (MAXEIG) to 0.692 (L-Mode).

Avoidant/Intrusive and Low Severity Classes

Utilizing all possible pairings of the four indicator variables when comparing the Avoidant/Intrusive (Class 3) and the Low Severity (Class 4) classes, five of twelve generated MAMBAC individual graphs are indicative of taxonicity, two are indicative of dimensionality, and five are unclear in nature. Figure 32 presents the averaged output curve for the MAMBAC analysis of the Avoidant/Intrusive and Low Severity classes (represented by solid black dots) compared with the averaged output curve of simulated categorical and dimensional data. As seen in Figure 32, the MAMBAC analysis resulted in an averaged curve which did not more closely resemble either the simulated categorical or dimensional data. The comparison resulted in a MAMBAC CCFI of 0.502, which lies directly between dimensionality and taxonicity and is uninterpretable.

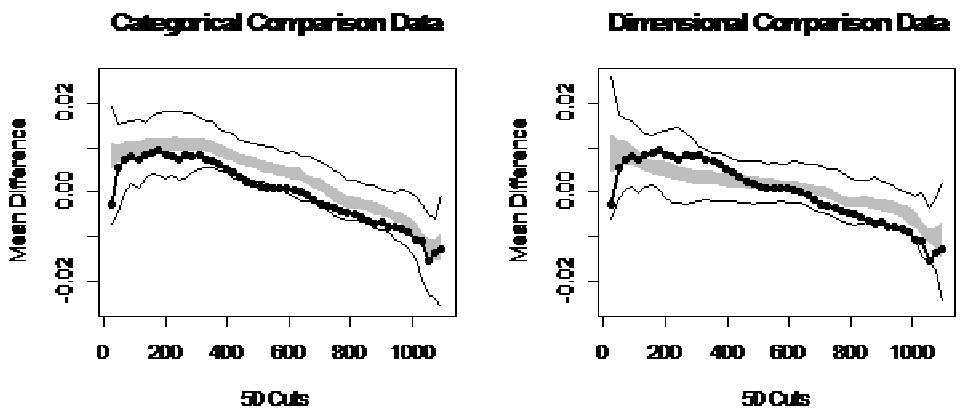

Figure 32. MAMBAC Averaged Output Curve 3v4

**Grey area between solid black lines represents the expected curve for simulated datasets. Line comprised of black dots represents the curve of the actual data.*

The MAXCOV analysis resulted in nine of twelve individual graphs indicating taxonicity and three of twelve graphs indicating dimensionality. Figure 33 presents the averaged output curve for the MAXCOV analysis of the Avoidant/Intrusive and Low Severity classes (represented by solid black dots) compared with the averaged output curve of simulated categorical and dimensional data. As seen in Figure 33, the MAXCOV analysis resulted in an averaged curve which more closely resembled the simulated categorical data. The comparison of the Avoidant/Intrusive and Low Severity classes results in a MAXCOV CCFI score of 0.574, which is in the direction of taxonicity but lies within the range of scores which must be interpreted with caution. It should be noted that despite the ambiguous nature of the CCFI score, the averaged curve strongly resembles the signature shape expected from a taxon.

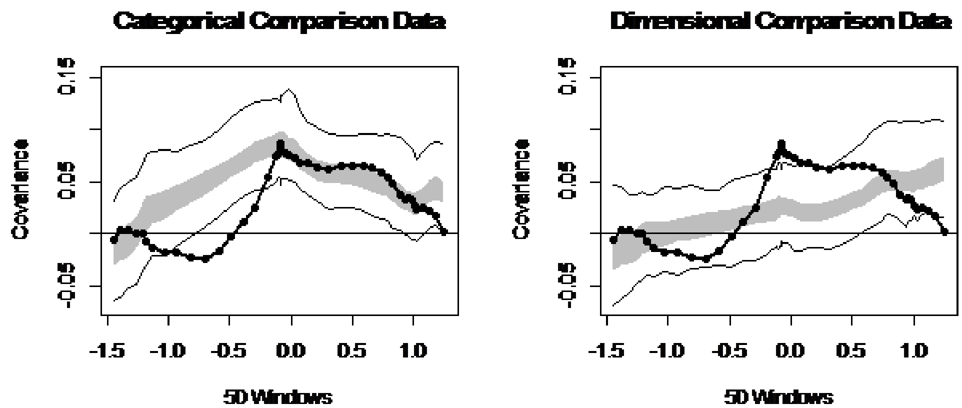

Figure 33. MAXCOV Averaged Output Curve 3v4

**Grey area between solid black lines represents the expected curve for simulated datasets. Line comprised of black dots represents the curve of the actual data.*

The MAXEIG analysis generated results similar to those of the MAMBAC and MAXCOV analyses. Three of the four individual graphs indicated taxonicity and one indicated dimensionality. Figure 34 presents the averaged output curve for the MAXEIG analysis of the Avoidant/Intrusive and Low Severity classes (represented by solid black dots) compared with the averaged output curve of simulated categorical and dimensional data. As seen in Figure 34, the MAXEIG analysis resulted in an averaged curve which did not closely resemble either the simulated categorical or dimensional data. The comparison of the Intrusive/Avoidant and Low Severity classes resulted in a CCFI of 0.507, which is uninterpretable as it lies directly between dimensionality and taxonicity. Again, despite deviance from the simulated comparison data, the averaged plot shows a strong taxonic signature.

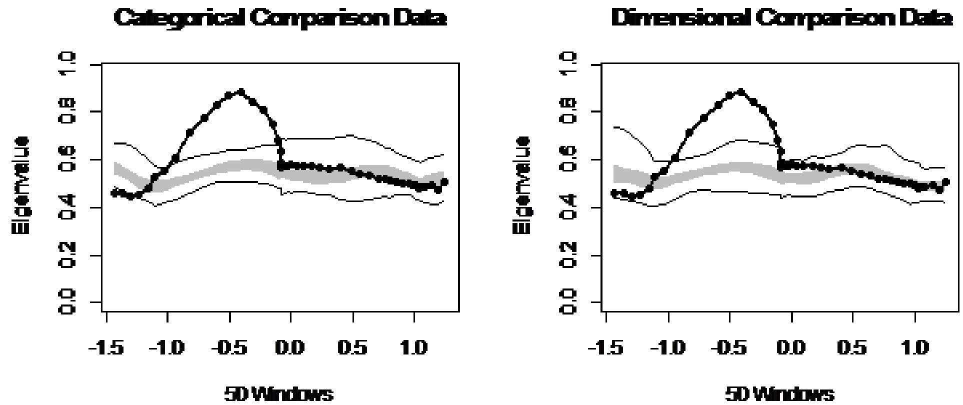

Figure 34. MAXEIG Averaged Output Curve 3v4

**Grey area between solid black lines represents the expected curve for simulated datasets. Line comprised of black dots represents the curve of the actual data.*

Figure 35 presents the averaged output curve for the L-Mode factor analysis of the Avoidant/Intrusive and Low Severity classes (represented by solid black dots) compared with the averaged output curve of simulated categorical and dimensional data. As seen in Figure 35, the L-Mode factor analysis resulted in an averaged curve which did not more closely resemble either the simulated categorical or dimensional data; however, it exhibits a perfect taxon structure as evidenced by its signature bimodal shape. The comparison of the Avoidant/Intrusive and Low Severity classes resulted in a CCFI score of 0.525, which is also uninterpretable due to ambiguity.

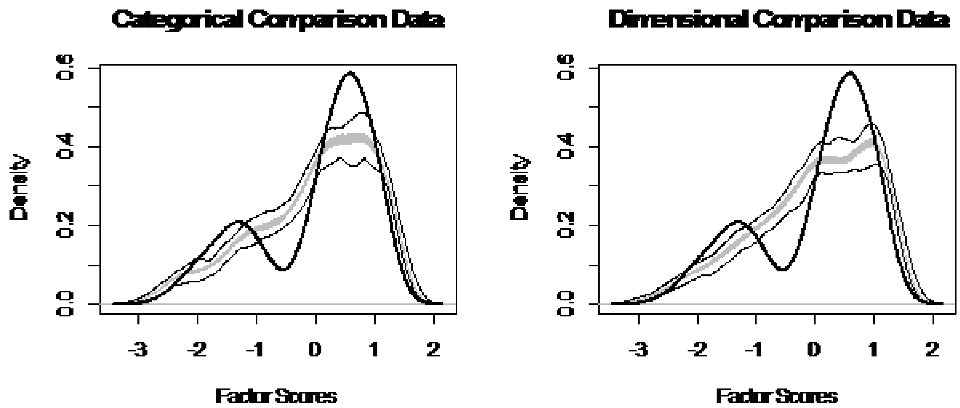

Figure 35. L-Mode Average Output Curve 3v4

**Grey area between solid black lines represents the expected curve for simulated datasets. Line comprised of black dots represents the curve of the actual data.*

Overall, the various taxometric procedures resulted in an average CCFI score of 0.511, which is uninterpretable due to ambiguity and does not provide conclusive evidence of qualitative differences between the Avoidant/Intrusive and Low Severity classes.

Avoidant/Intrusive and Complex Classes

Utilizing all possible pairings of the four indicator variables when comparing the Avoidant/Intrusive (Class 3) and the Complex (Class 5) classes, eight of twelve generated MAMBAC individual graphs are indicative of taxonicity and the remaining four graphs are too ambiguous for interpretation. Figure 36 presents the averaged output curve for the MAMBAC analysis of the Avoidant/Intrusive and Complex classes (represented by solid black dots) compared with the averaged output curve of simulated categorical and dimensional data. As seen in Figure 36, the MAMBAC analysis resulted in an averaged curve which more closely resembled the simulated categorical data. The comparison results in a MAMBAC CCFI score of 0.553, which is in the direction of taxonicity but lies within the range of scores which must be interpreted with caution. Again, the averaged plot exhibits a signature taxonic signature. It has the same shape, only lower values than the simulated data in the first half of the plot.

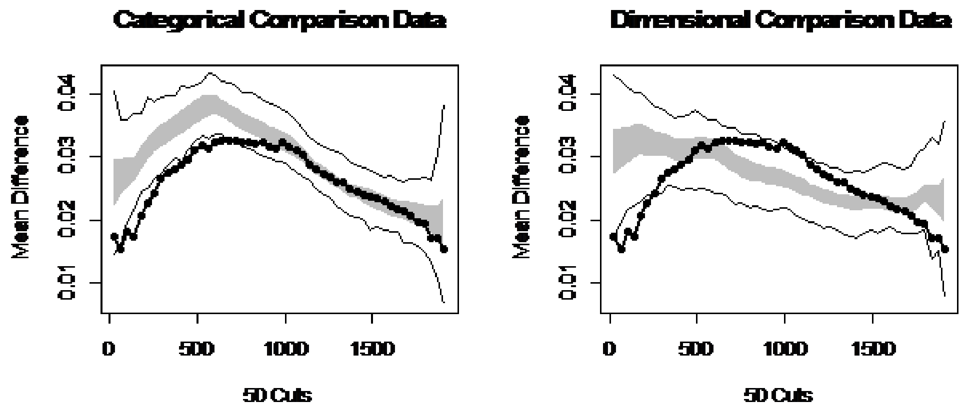

Figure 36. MAMBAC Averaged Curve 3v5

**Grey area between solid black lines represents the expected curve for simulated datasets. Line comprised of black dots represents the curve of the actual data.*

The MAXCOV analysis again appeared to contradict the results of the MAMBAC analysis. The MAXCOV analysis results in three individual graphs indicative of taxonicity, seven indicative of dimensionality, and two which are too ambiguous for interpretation. Figure 37 presents the averaged output curve for the MAXCOV analysis of the Avoidant/Intrusive and Complex classes (represented by solid black dots) compared with the averaged output curve of simulated categorical and dimensional data. As seen in Figure 37, the MAXCOV analysis resulted in an averaged curve which more closely resembled the simulated dimensional data. The comparison of the Avoidant/Intrusive and Complex classes results in a MAXCOV CCFI score of 0.329, which is strongly indicative of the differences between the classes being dimensional in nature.

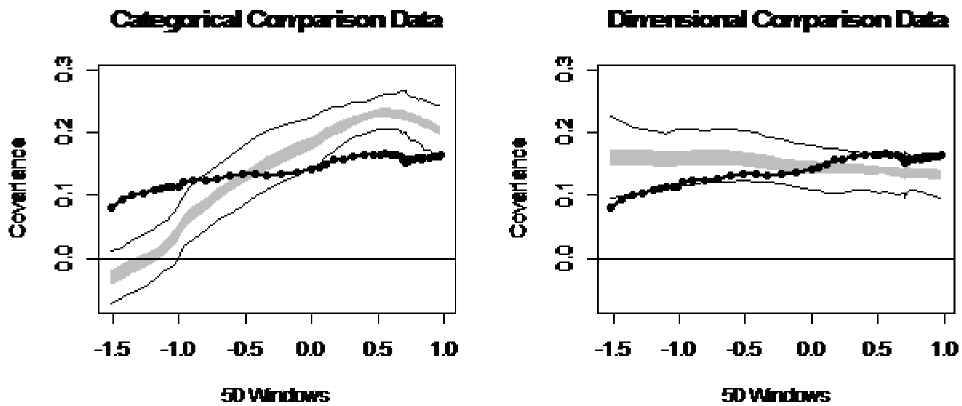

Figure 37. MAXCOV Averaged Output Curve 3v5

**Grey area between solid black lines represents the expected curve for simulated datasets. Line comprised of black dots represents the curve of the actual data.*

The MAXEIG analysis supported the dimensional conceptualization of the differences between the Intrusive/Avoidant and Complex classes. All four generated individual graphs were indicative of dimensionality. Figure 38 presents the averaged output curve for the MAXEIG analysis of the Avoidant/Intrusive and Complex classes (represented by solid black dots) compared with the averaged output curve of simulated categorical and dimensional data. As seen in Figure 38, the MAXEIG analysis resulted in an averaged curve which more closely resembled the simulated dimensional data. The comparison resulted in a CCFI of 0.291, which is strongly in the direction of dimensionality.

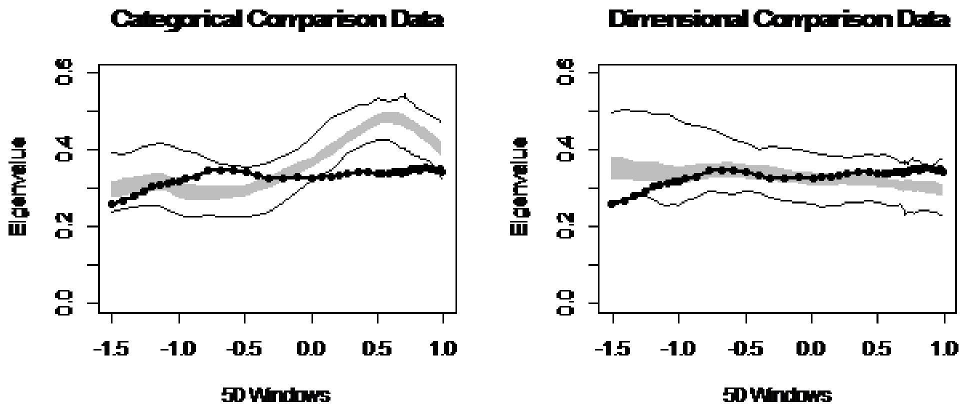

Figure 38. MAXEIG Averaged Output Curve 3v5

**Grey area between solid black lines represents the expected curve for simulated datasets. Line comprised of black dots represents the curve of the actual data.*

Figure 39 presents the averaged output curve for the L-Mode factor analysis of the Avoidant/Intrusive and Complex classes (represented by solid black dots) compared with the averaged output curve of simulated categorical and dimensional data. As seen in Figure 39, the L-Mode analysis resulted in an averaged curve which more closely resembled the simulated dimensional data. The comparison of the Avoidant/Intrusive and Complex classes resulted in a CCFI score of .338, which provides evidence of a dimensional nature of the differences between the two classes.

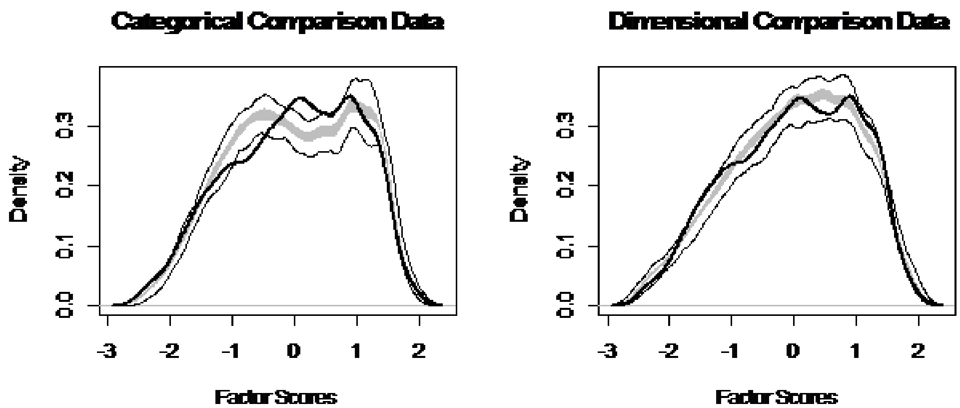

Figure 39. L-Mode Average Output Curve 3v5

**Grey area between solid black lines represents the expected curve for simulated datasets. Line comprised of black dots represents the curve of the actual data.*

Overall, the various taxometric procedures resulted in an average CCFI score of 0.394, which suggests the differences between the Avoidant/Intrusive and Complex classes are dimensional in nature.

Low Severity and Complex Classes

Utilizing all possible pairings of the four indicator variables when comparing the Low Severity (Class 4) and the Complex (Class 5) classes, twelve of twelve generated MAMBAC individual graphs are indicative of taxonicity. Figure 40 presents the averaged output curve for the MAMBAC analysis of the Low Severity and Complex classes (represented by solid black dots) compared with the averaged output curve of simulated categorical and dimensional data. As seen in Figure 40, the MAMBAC analysis resulted in an averaged curve which more closely resembled the simulated categorical data. The comparison results in a MAMBAC CCFI score of 0.863, which strongly indicates the differences between the two classes are qualitative in nature.

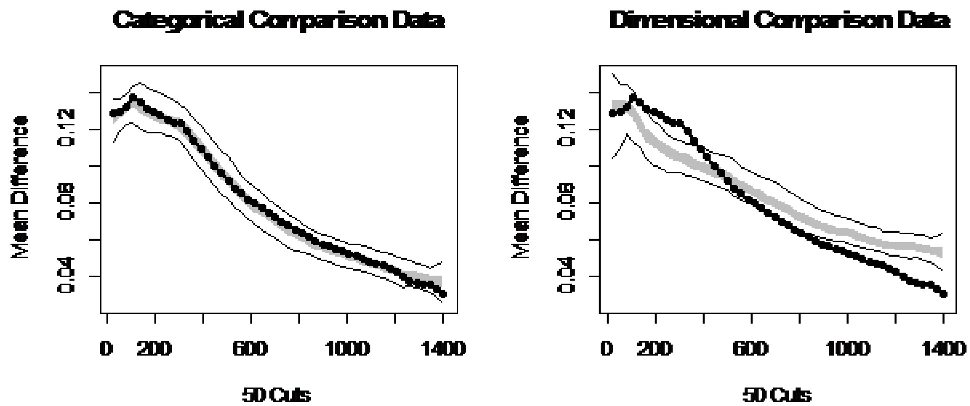

Figure 40. MAMBAC Averaged Output Curve 4v5

**Grey area between solid black lines represents the expected curve for simulated datasets. Line comprised of black dots represents the curve of the actual data.*

The MAXCOV analysis corroborated the results of the MAMBAC analysis. The MAXCOV analysis results in twelve of twelve individual graphs indicating taxonicity. Figure 41 presents the averaged output curve for the MAXCOV analysis of the Low Severity and Complex classes (represented by solid black dots) compared with the averaged output curve of simulated categorical and dimensional data. As seen in Figure 41, the MAXCOV analysis resulted in an averaged curve which more closely resembled the simulated categorical data. The comparison of the Low Severity and Complex classes results in a MAXCOV CCFI score of 0.575, which, while not as strong an indication of taxonicity as the MAMBAC CCFI score, is indicative of qualitative differences between the two classes.

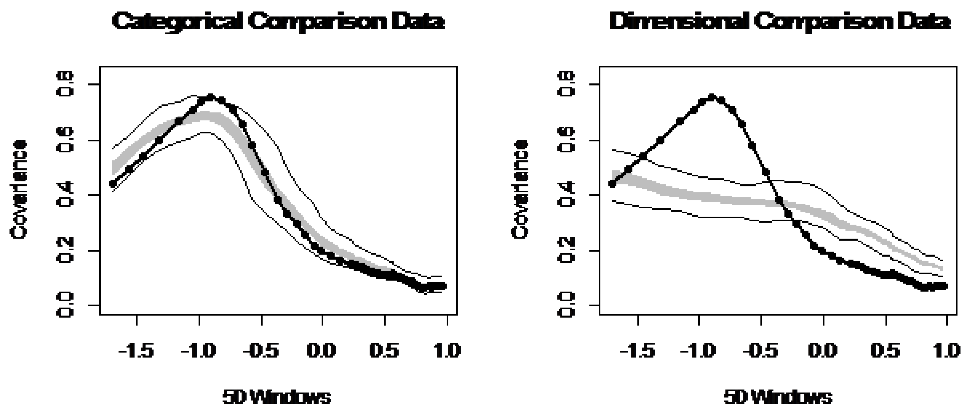

Figure 41. MAXCOV Averaged Output Curve 4v5

**Grey area between solid black lines represents the expected curve for simulated datasets. Line comprised of black dots represents the curve of the actual data.*

The MAXEIG analysis provided strong support for the conceptualization of qualitative differences between the Low Severity and Complex classes. All four generated individual graphs indicated taxonicity. Figure 42 presents the averaged output curve for the MAXEIG analysis of the Low Severity and Complex classes (represented by solid black dots) compared with the averaged output curve of simulated categorical and dimensional data. As seen in Figure 42, the MAXEIG analysis resulted in an averaged curve which strongly resembled the simulated categorical data. The comparison of the classes resulted in a CCFI of 0.878, which is strongly in the direction of taxonicity.

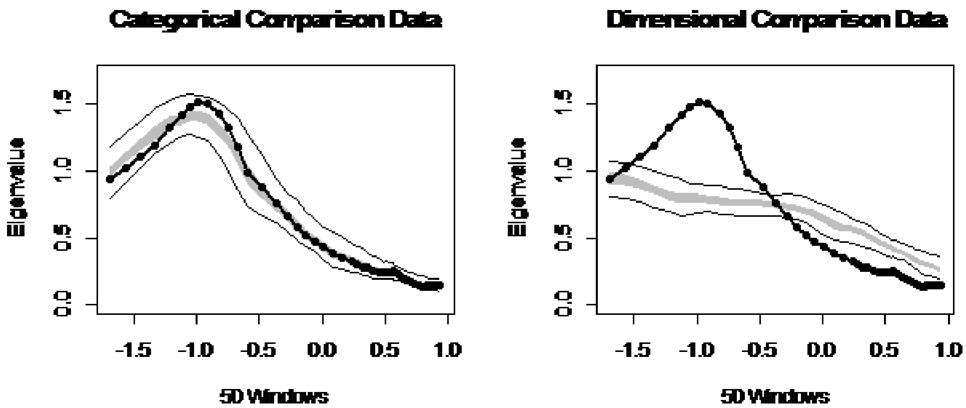

Figure 42. MAXEIG Averaged Output Curve 4v5

**Grey area between solid black lines represents the expected curve for simulated datasets. Line comprised of black dots represents the curve of the actual data.*

Figure 43 presents the averaged output curve for the L-Mode factor analysis of the Low Severity and Complex classes (represented by solid black dots) compared with the averaged output curve of simulated categorical and dimensional data. As seen in Figure 43, the L-Mode factor analysis resulted in an averaged curve which strongly resembled the simulated categorical data. The comparison of the Low Severity and Complex classes resulted in a CCFI score of .678, which provides further evidence of the qualitative nature of the differences between the two classes.

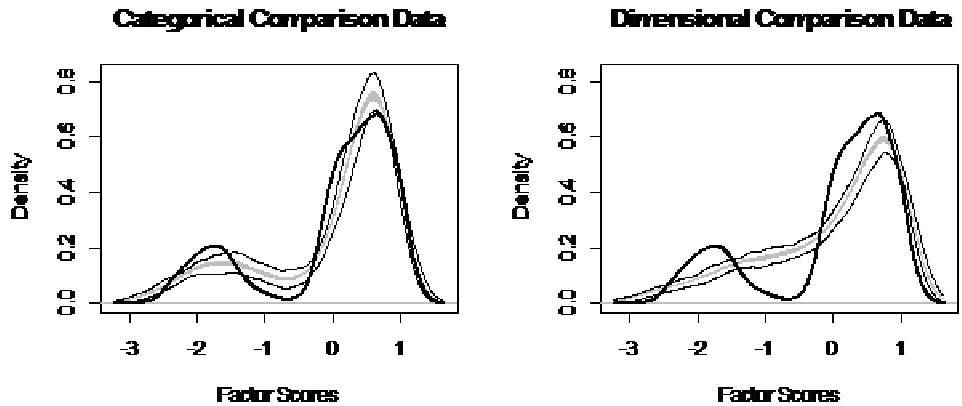

Figure 43. L-Mode Average Output Curve 4v5

**Grey area between solid black lines represents the expected curve for simulated datasets. Line comprised of black dots represents the curve of the actual data.*

Overall, the various taxometric procedures resulted in an average CCFI score of .807, which provides strong evidence of the qualitative differences between the Low Severity and Complex classes.

Complex Class vs. All Classes

Given the strong evidence of qualitative differences between the Complex class and two other classes (Avoidance and Low Severity), the decision was made to examine comparisons between the taxometric analyses using the entire sample of cases, to see if there was further evidence for a taxon for the Complex class when compared to the sample as a whole. Utilizing all possible pairings of the four indicator variables when comparing the Complex class with all other classes, nine of twelve generated MAMBAC individual graphs were indicative of taxonicity, one was indicative of dimensionality, and the remaining two were uninterpretable due to ambiguity. Figure 44 presents the averaged output curve for the MAMBAC analysis of the Complex class and all other classes (represented by solid black dots) compared with the averaged output curve of simulated categorical and dimensional data. As seen in Figure 44, the MAMBAC analysis resulted in an averaged curve which strongly resembled the simulated categorical data. The comparison results in a MAMBAC CCFI score of 0.811, which strongly indicates the differences between in symptom endorsement between individuals in the Complex and all other classes are qualitative in nature.

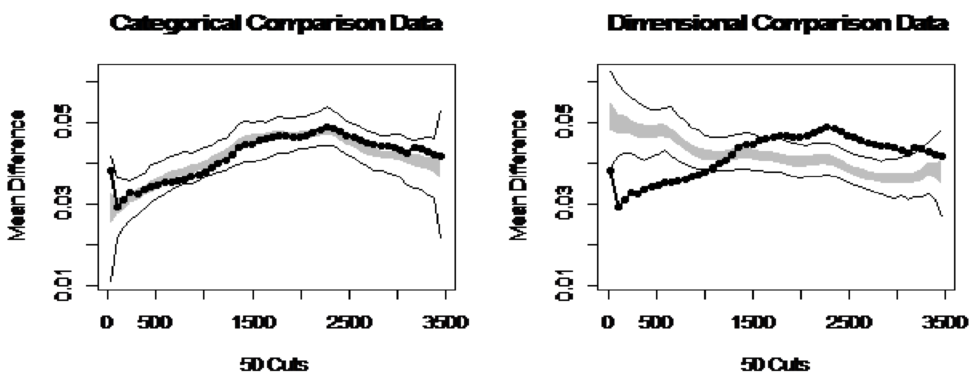

Figure 44. MAMBAC Average Output Curve ALL

**Grey area between solid black lines represents the expected curve for simulated datasets. Line comprised of black dots represents the curve of the actual data.*

The MAXCOV analysis resulted in three of twelve individual graphs indicating taxonicity, 8 indicative of dimensionality, and one which was uninterpretable. Figure 45 presents the averaged output curve for the MAXCOV analysis of the Complex class and all other classes (represented by solid black dots) compared with the averaged output curve of simulated categorical and dimensional data. As seen in Figure 45, the MAXCOV analysis resulted in an averaged curve which more closely resembled the simulated categorical data. The comparison of the Complex class with all other classes resulted in a MAXCOV CCFI score of 0.575, which, while not as strong an indication of taxonicity as the MAMBAC CCFI score (0.811), is indicative of qualitative differences in symptom endorsement.

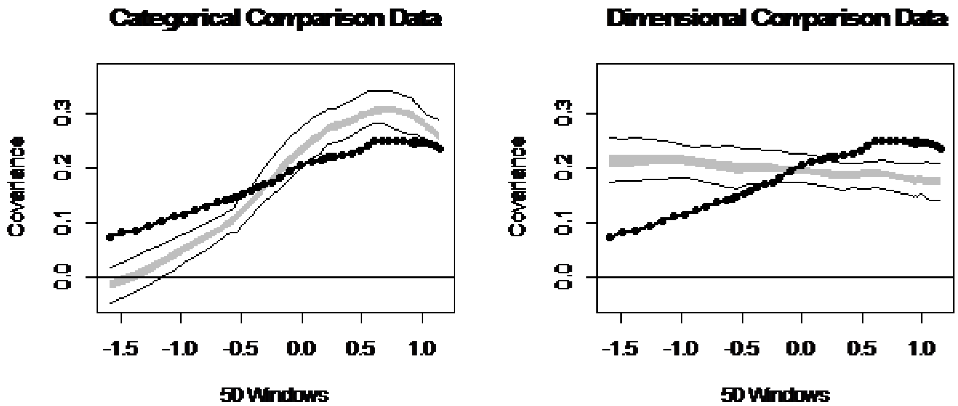

Figure 45. MAXCOV Average Output Curve ALL

**Grey area between solid black lines represents the expected curve for simulated datasets. Line comprised of black dots represents the curve of the actual data.*

The MAXEIG analysis provided additional support for the conceptualization of qualitative differences between the Complex class and all other classes. All four generated individual graphs indicated taxonicity. Figure 46 presents the averaged output curve for the MAXEIG analysis of the Complex class and all other classes (represented by solid black dots) compared with the averaged output curve of simulated categorical and dimensional data. As seen in Figure 46, the MAXEIG analysis resulted in an averaged curve which strongly resembled the simulated categorical data. The comparison of the classes resulted in a CCFI of 0.614, which is in the direction of taxonicity.

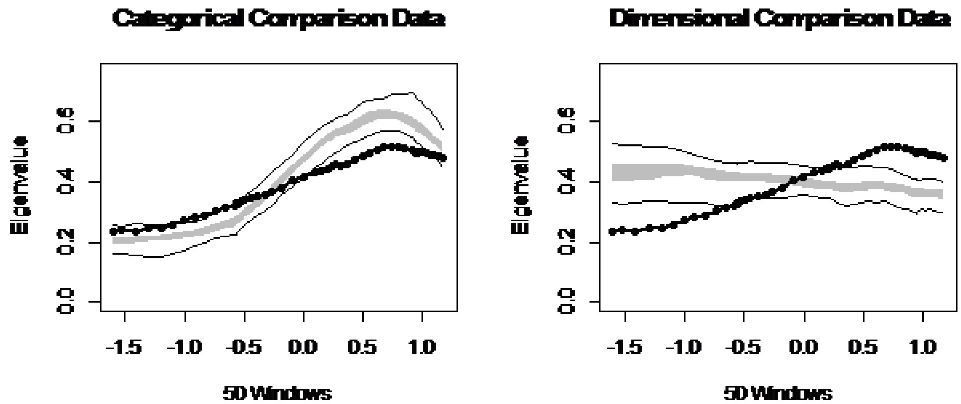

Figure 46. MAXEIG Average Output Curve ALL

**Grey area between solid black lines represents the expected curve for simulated datasets. Line comprised of black dots represents the curve of the actual data.*

Figure 47 presents the averaged output curve for the L-Mode factor analysis of the Complex class and all other classes (represented by solid black dots) compared with the averaged output curve of simulated categorical and dimensional data. As seen in Figure 47, the L-Mode factor analysis resulted in an averaged curve which demonstrated a slightly closer resemblance to the simulated dimensional data. The comparison of the Complex class with all other classes resulted in a CCFI score of .458, which lies within the range of scores considered uninterpretable due to ambiguity.

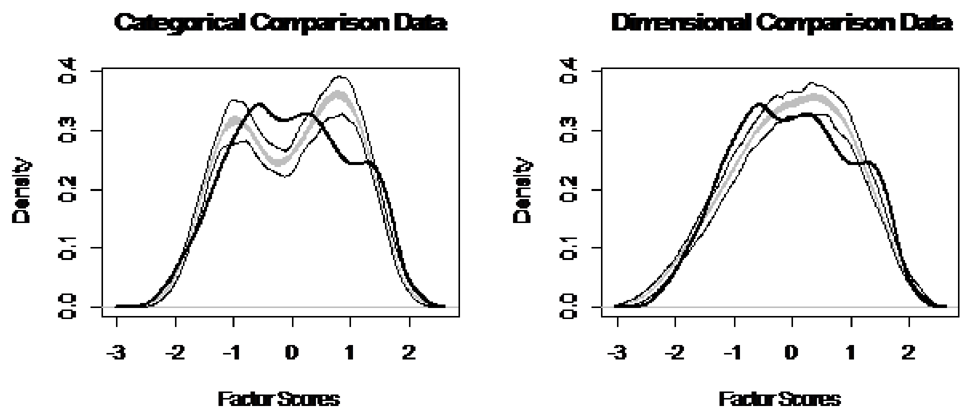

Figure 47. L-Mode Average Output Curve ALL

**Grey area between solid black lines represents the expected curve for simulated datasets. Line comprised of black dots represents the curve of the actual data.*

Overall, the various taxometric procedures resulted in an average CCFI score of 0.628, which provides evidence that symptom endorsement of individuals categorized within the Complex class is qualitatively different from symptom endorsement of individuals in all other classes. A summary of the results from the taxometric analyses is presented in Table 3. Taxon base rates, standard deviations, and CCFI scores are presented for MAMBAC comparisons in Table 4, MAXCOV comparisons in Table 5, and MAXEIG comparisons in Table 6.

Table 3 *Summary of Taxometric Analysis Results*

Class Pair	Taxonic Plots	Dimensional Plots	Ambiguous Plots	Average CCFI	Overall
1v2	9	11	8	0.545	Ambiguous
1v3	11	5	12	0.396	Dimensional
1v4	8	10	10	0.359	Dimensional
1v5	19	6	3	0.732	Taxonic
2v3	10	9	9	0.485	Ambiguous
2v4	7	14	7	0.353	Dimensional
2v5	14	11	3	0.539	Ambiguous
3v4	17	6	5	0.511	Ambiguous
3v5	11	11	6	0.394	Dimensional
4v5	28	0	0	0.878	Taxonic
5vAll	16	9	3	0.628	Taxonic

Table 4 *MAMBAC Comparisons*

Comparison	Base Rate Estimate Mean	Base Rate Estimate Standard Deviation	CCFI
1v2	0.493	0.298	0.42
1v3	0.572	0.424	0.231
1v4	0.598	0.360	0.201
1v5	0.533	0.202	0.767
2v3	0.593	0.219	0.429
2v4	0.660	0.373	0.488
2v5	0.649	0.340	0.654
3v4	0.535	0.377	0.502
3v5	0.646	0.325	0.553
4v5	0.797	0.107	0.863
5vAll	0.457	0.238	0.811

Table 5 *MAXCOV Comparisons*

Comparison	Base Rate Estimate Mean	Base Rate Estimate Standard Deviation	CCFI
1v2	0.722	0.234	0.478
1v3	0.630	0.281	0.532
1v4	0.607	0.255	0.342
1v5	0.590	0.041	0.546
2v3	0.574	0.320	0.453
2v4	0.500	0.193	0.303
2v5	0.680	0.186	0.307
3v4	0.481	0.338	0.574
3v5	0.484	0.239	0.329
5vAll	0.352	0.135	0.575

Table 6 *MAXEIG Comparisons*

Comparison	Base Rate Estimate Mean	Base Rate Estimate Standard Deviation	CCFI
1v2	0.365	0.233	0.623
1v3	0.481	0.318	0.511
1v4	0.564	0.316	0.397
1v5	0.592	0.017	0.632
2v3	0.384	0.244	0.513
2v4	0.607	0.212	0.326
2v5	0.758	0.062	0.272
3v4	0.598	0.220	0.507
3v5	0.419	0.103	0.291
4v5	0.831	0.007	0.878
5vAll	0.356	0.044	0.614

External Validity Analyses for the 5-Class Model:

After determining the appropriate number of classes and examining for taxonicity, the next step was to evaluate differences between the classes in their relationships with external variables. The variables chosen for examination included lifetime diagnoses of depression, generalized anxiety disorder, mania, panic disorder, social anxiety, and suicide attempts. In order to examine the differences in means for each by class for these variables, a one-way ANOVA was conducted for each of the external variables, with the exception of the comparison between the Complex class and all other classes combined, for which a t-test was utilized. For each of the variables, a score of 0 indicates no lifetime diagnosis of the disorder and a score of 1 indicates a lifetime diagnosis of the disorder; therefore, mean scores will range from 0 to 1, with scores closer to 1 indicating a greater likelihood of being diagnosed with the disorder. Levene's Test of Homogeneity of Variance was significant ($p < .001$), indicating significant differences in variance across groups and a violation of one of the assumptions of ANOVA across all external variables analyses. Therefore, Welch's *F* statistic was utilized in all ANOVAs. Results from these analyses are summarized in Table 4.

Major depressive episode.

Table 7 presents the means and standard deviations of all external variables, by class, as well as the Welch's *F* statistics and associated p-values for all of the ANOVA's. As seen in Table 2, there was a significant effect of class assignment on the likelihood of endorsing a lifetime diagnosis of a major depressive episode, $F(4, 1175.968) = 6.275$, $p < .001$. Post Hoc analyses revealed that individuals within the Complex class were significantly more likely to endorse a lifetime diagnosis of a major depressive episode than individuals within the Avoidance class (mean difference = .09, $p = .001$), the Avoidant/Intrusive class (mean difference = .094, $p < .001$), and the Low Severity class (mean difference = .091, $p = .038$).

Complex vs. All Classes. On average, individuals within the Complex class were more likely to endorse a lifetime diagnosis of a major depressive episode ($M = 0.624$, $SE = .015$) than individuals within all other classes (M = 0.541, $SE = 0.01$; Figure 50). This difference was significant $t(2211.095) = 4.708$, $p < .001$ and represented a small effect (r =.0.10).

Table 7 *Diagnostic and Negative Outcome Prevalence by Class*

Variable	Welch's F	Df	*p*	Class 1	Class 2	Class 3	Class 4	Class 5
Depression	6.275	1179.97	<.001	0.534[a]	0.571[a]	0.530[a]	0.533[a]	0.624[b]
Borderline	10.945	1200.33	<.001	0.222[a]	0.222[a]	0.233[a]	0.209[a]	0.332[b]
General Anxiety	4.491	1182.33	.001	0.239[a]	0.307[ab]	0.234[a]	0.245[ab]	0.301[b]
Suicidal Ideation	11.485	1239.541	<.001	0.135[a]	0.136[ab]	0.141[a]	0.075[b]	0.203[c]
Suicide Attempt	4.281	646.361	.002	0.056[ab]	0.049[ab]	0.042[a]	0.020[a]	0.089[b]
Alcohol Use	3.019	1185.807	.017	0.419[ab]	0.372[ab]	0.384[a]	0.409[a]	0.451[b]
Cannabis Use	1.325	1177.386	0.259	0.164[a]	0.159[a]	0.131[a]	0.170[a]	0.159[a]
Sedative Use	2.705	1241.245	.029	0.027[ab]	0.026[ab]	0.031[ab]	0.020[a]	0.049[b]
Opioid Use	3.110	1237.48	.015	0.043[ab]	0.040[ab]	0.045[ab]	0.029[a]	0.069[b]
Self-Injury	4.815	1193.692	<.001	0.050[a]	0.057[ab]	0.060[a]	0.069[ab]	0.098[b]
Hospitalization	8.338	1240.59	<.001	0.075[a]	0.060[a]	0.071[a]	0.046[a]	0.087[b]
Alcohol Cope	3.870	1208.29	.004	0.185[ab]	0.154[ab]	0.167[ab]	0.131[a]	0.210[b]
Drug Coping	3.789	1198.01	.005	0.047[a]	0.054[ab]	0.038[a]	0.043[ab]	0.077[b]

Differences in superscripts indicate significant differences in means.

Generalized Anxiety Disorder

There was a significant effect of class assignment on the likelihood of endorsing a lifetime diagnosis of generalized anxiety disorder, $F(4, 1178.334) = 4.491$, $p = .001$. Post Hoc analyses revealed that individuals within the Complex class were significantly more likely to endorse a lifetime diagnosis of generalized anxiety disorder than individuals within the Avoidance class (mean difference = .062, *p* = .016) and individuals within the Avoidant/Intrusive class (mean difference = .067, *p* < .001).

Complex vs. All Classes. Levene's test for equality of variance was significant (*p* < .001); therefore, equal variances were not assumed in this comparison. On average, individuals within the Complex class were more likely to endorse a comorbid diagnosis of generalized anxiety disorder (*M* = 0.301, *SE* = .014) than individuals within all other classes (*M* = 0.249, *SE* = 0.01). This difference was significant *t*(2045.698) = 3.173, *p* = .002 and represented a small effect (*r* =0.07; Figure 55).

Borderline Personality Disorder:

There was a significant effect of class assignment on the likelihood of endorsing a lifetime diagnosis of borderline personality disorder, *F*(4, 1196.33) = 10.945, *p* < .001. Post Hoc analyses revealed that individuals within the Complex class were significantly more likely to endorse a lifetime diagnosis of borderline personality disorder than individuals within the Avoidance class (mean difference = 0.11, *p* < .001), Intrusion class (mean difference = 0.11, *p* < .001), Avoidant/Intrusive class (mean difference = 0.10, *p* < .001), and individuals within the Low Severity class (mean difference = 0.123, *p* < .001).

Complex vs. All Classes. Levene's test for equality of variance was significant (*p* < .001); therefore, equal variances were not assumed in this comparison. On average, individuals within the Complex class were more likely to endorse a comorbid diagnosis of a BPD (*M* = 0.332, *SE* = .014) than individuals within all other classes (M = 0.228, *SE* = 0.01). This difference was significant *t*(1947.205) = 6.364, *p* < .001 and represented a small effect (*r* =0.143).

Suicidal Ideation

There was a significant effect of class assignment on the likelihood of endorsing a history of suicidal ideation between interviews, $F(4, 1235.541) = 11.485$, $p < .001$. Post Hoc analyses revealed that individuals within the Low Severity class were significantly *less* likely to endorse a history of suicidal ideation between interviews than individuals within the Avoidance (mean difference = -0.124, $p = .007$), Avoidant/Intrusive (mean difference = -0.132, $p < .001$), and Complex classes (mean difference = 0.20, $p < .001$). Individuals within the Complex class were significantly more likely to endorse a history of suicidal ideation between interviews than individuals within the Avoidance (mean difference = 0.068, $p < .001$), the Intrusion (mean difference = 0.067, $p = .02$), the Avoidant/Intrusive (mean difference = 0.063, $p = .002$), and Low Severity (mean difference = 0.128, $p < .001$) classes.

Complex vs. All Classes. Levene's test for equality of variance was significant ($p < .001$); therefore, equal variances were not assumed in this comparison. On average, individuals within the Complex class were more likely to endorse suicidal ideation between interviews ($M = 0.353$, $SE = .019$) than individuals within all other classes (M = 0.258, $SE = 0.012$). This difference was significant $t(1210.965) = 4.224$, $p < .001$ and represented a small effect ($r = 0.12$).

Suicide Attempts

There was a significant effect of class assignment on the likelihood of endorsing a suicide attempt between interviews, $F(4, 642.361) = 4.281$, $p = .002$. Post Hoc analyses revealed that individuals within the Complex class were significantly more likely to endorse a suicide attempt between interviews than individuals within the

Avoidant/Intrusive (mean difference = 0.041, *p* = .043) and Low Severity classes (mean difference = 0.064, *p* = .001).

Complex vs. All Classes. Levene's test for equality of variance was significant (*p* < .001*)*; therefore, equal variances were not assumed in this comparison. On average, individuals within the Complex class were more likely to have attempted suicide between interviews (*M* = 0.084, *SE* = .011) than individuals within all other classes (*M* = 0.046, *SE* = 0.006). This difference was significant *t*(1040.427) = 3.02, *p* = .003 and represented a small effect (*r* =0.093).

Alcohol Use Disorder

There was a significant effect of class assignment on the likelihood of endorsing a lifetime diagnosis of an alcohol use disorder, *F*(4, 1181.807) = 3.019, *p* = .017. Post Hoc analyses revealed that individuals within the Complex class were significantly more likely to endorse a lifetime diagnosis of an alcohol use disorder than individuals within the Avoidant/Intrusive (mean difference = 0.067, *p* = .025) class.

Complex vs. All Classes. Levene's test for equality of variance was significant (*p* < .001*)*; therefore, equal variances were not assumed in this comparison. On average, individuals within the Complex class were more likely to endorse a comorbid diagnosis of an alcohol use disorder (*M* = 0.451, *SE* = .015) than individuals within all other classes (*M* = 0.400, *SE* = 0.01). This difference was significant *t*(2124.62) = 2.885, *p* = .004 and represented a small effect (*r* =0.062).

Cannabis Use Disorder.

Class assignment did not have a significant effect on the likelihood of endorsing a lifetime diagnosis of a cannabis use disorder, $F(4, 1173.386) = 1.325$, $p = .259$. Post Hoc analyses did not reveal significant differences between individual classes.

Complex vs. All Classes. Levene's test for equality of variance was not significant ($p = .270$); therefore, equal variances were assumed in this comparison. On average, individuals within the Complex class were more likely to endorse a comorbid diagnosis of a cannabis use disorder ($M = 0.451$, $SE = .015$) than individuals within all other classes ($M = 0.400$, $SE = 0.01$). This difference was significant $t(2124.62) = 2.885$, $p = .004$ and represented a small effect ($r = 0.062$).

Sedative Use Disorder

There was a significant effect of class assignment on the likelihood of endorsing a lifetime diagnosis of a sedative use disorder, $F(4, 1237.245) = 2.705$, $p = .029$. Post Hoc analyses revealed that individuals within the Complex class were significantly more likely to endorse a lifetime diagnosis of a sedative use disorder than individuals within the Low Severity (mean difference = 0.030, $p = .033$) class. There were no other significant differences between classes.

Complex vs. All Classes. Levene's test for equality of variance was significant ($p < .001$); therefore, equal variances were not assumed in this comparison. On average, individuals within the Complex class were more likely to endorse a comorbid diagnosis of sedative use disorder ($M = 0.491$, $SE = .007$) than individuals within all other classes ($M = 0.027$, $SE = 0.03$). This difference was significant $t(1712.139) = 3.025$, $p = .003$ and represented a small effect ($r = 0.073$).

Opioid Use Disorder

There was a significant effect of class assignment on the likelihood of endorsing a lifetime diagnosis of an opioid use disorder, $F(4, 1233.48) = 3.11$, $p = .015$. Post Hoc analyses revealed that individuals within the Complex class were significantly more likely to endorse a lifetime diagnosis of an opioid use disorder than individuals within the Low Severity (mean difference = 0.039, $p = .012$) class.

Complex vs. All Classes. Levene's test for equality of variance was significant ($p < .001$); therefore, equal variances were not assumed in this comparison. On average, individuals within the Complex class were more likely to endorse a comorbid diagnosis of an opioid use disorder ($M = 0.069$, $SE = .008$) than individuals within all other classes ($M = 0.041$, $SE = 0.04$). This difference was significant $t(1759.1) = 3.269$, $p = .001$ and represented a small effect ($r = 0.078$).

Non-Suicidal Self-Injury

There was a significant effect of class assignment on the likelihood of endorsing a history of non-suicidal self-injury, $F(4, 1189.69) = 4.82$, $p = .001$. Post Hoc analyses revealed that individuals within the Complex class were significantly more likely to endorse a history of non-suicidal self-injury than individuals within the Avoidance (mean difference = 0.049, $p < .001$) and Avoidant/Intrusive (mean difference = 0.038, $p = .015$).

Complex vs. All Classes. Levene's test for equality of variance was significant ($p < .001$); therefore, equal variances were not assumed in this comparison. On average, individuals within the Complex class were more likely to endorse a history of non-suicidal self-injury ($M = 0.098$ $SE = .009$) than individuals within all other classes ($M =$

0.059, *SE* = 0.05). This difference was significant $t(1775.35) = 3.871$, $p < .001$ and represented a small effect ($r = 0.092$).

Inpatient Hospitalization:

There was a significant effect of class assignment on the likelihood of endorsing a history of inpatient hospitalization, $F(4, 1236.59) = 8.34$, $p < .001$. Post Hoc analyses revealed that individuals within the Complex class were significantly more likely to endorse a history of spending a night in a psychiatric hospital due to PTSD symptoms than individuals within the Avoidance (mean difference = 0.052, $p = .001$), Intrusion (mean difference = 0.067, $p <.001$), Avoidant/Intrusive (mean difference = 0.055, $p <.001$), and Low Severity (mean difference = 0.081, $p < .001$) classes.

Complex vs. All Classes. Levene's test for equality of variance was significant ($p < .001$); therefore, equal variances were not assumed in this comparison. On average, individuals within the Complex class were more likely to endorse a history of psychiatric hospitalization due to PTSD symptoms ($M = 0.127$ SE = .333) than individuals within all other classes ($M = .07$, $SE = 0.255$). This difference was significant $t(1719.32) = 5.087$, $p < .001$ and represented a small effect ($r = 0.122$).

Use of Alcohol to Cope with PTSD Symptoms:

There was a significant effect of class assignment on the likelihood of using alcohol to cope with PTSD symptoms, $F(4, 1204.29) = 3.87$, $p = .004$. Post Hoc analyses revealed that individuals within the Complex class were significantly more likely to use alcohol to cope with PTSD symptoms than individuals within the Low Severity class (mean difference = 0.079, $p = .005$).

Complex vs. All Classes. Levene's test for equality of variance was significant ($p < .001$); therefore, equal variances were not assumed in this comparison. On average, individuals within the Complex class were more likely to use alcohol to cope with PTSD symptoms ($M = 0.21$ $SE = .408$) than individuals within all other classes ($M = .166$, $SE = 0.372$). This difference was significant $t(1981.22) = 3.11$, $p = .002$ and represented a small effect ($r = 0.07$).

Use of Drugs to Cope with PTSD Symptoms:

There was a significant effect of class assignment on the likelihood of using drugs to cope with PTSD symptoms, $F(4, 1194.01) = 3.79$, $p < .005$. Post Hoc analyses revealed that individuals within the Complex class were significantly more likely to use drugs to cope with PTSD symptoms than individuals within the Avoidance (mean difference = 0.03, $p = .046$) and Avoidant/Intrusive (mean difference = 0.039, $p = .002$ classes.

Complex vs. All Classes. Levene's test for equality of variance was significant ($p < .001$); therefore, equal variances were not assumed in this comparison. On average, individuals within the Complex class were more likely to use drugs to cope with PTSD symptoms ($M = 0.077$ $SE = .267$) than individuals within all other classes (M = .045, $SE = 0.208$). This difference was significant $t(1765.06) = 3.516$, $p < .001$ and represented a small effect ($r = 0.084$).

Type of Trauma

Active Military Combat:

Table 8 presents the means and standard deviations of all types of trauma, by class, as well as the Welch's *F* statistics and associated p-values for all of the ANOVA's.

There was a significant effect of class assignment on the likelihood of endorsing a history of active military combat, *F*(4, 1203.427) = 3.326, *p* = .010. Post Hoc analyses revealed that individuals within the Avoidant/Intrusive class were significantly more likely to endorse a history of active military combat than individuals within the Avoidance (mean difference = 0.031, *p* = .021; Figure 89).

Complex vs. All Classes. Levene's test for equality of variance was significant (*p* = .002*)*; therefore, equal variances were not assumed in this comparison. On average, individuals within the Complex class were more likely to endorse a history of active military combat (*M* = 0.065, *SE* = .007) than individuals within all other classes (*M* = 0.052, *SE* = 0.05). This difference was not significant *t*(1970.462) = 1.476, *p* = .14 and represented a negligible effect (*r* = 0.033).

Table 8 *Trauma Type Prevalence by Class*

Variable	Welch's F	Df	*p*	Class 1	Class 2	Class 3	Class 4	Class 5
Combat	3.326	1207.427	<.010	0.039[a]	0.046[ab]	0.073[b]	0.043[ab]	0.065[ab]
Peacekeeper	0.248	3482	.911	0.016[a]	0.020[a]	0.018[a]	0.016[a]	0.021[a]
Civilian	1.41	1183.074	.228	0.021[a]	0.046[a]	0.028[a]	0.020[a]	0.031[a]
Refugee	1.104	1171.98	0353	0.011[a]	0.026[a]	0.021[a]	0.013[a]	0.018[a]
Accident	2.32	1191.82	.055	0.249[a]	0.262[a]	0.279[a]	0.222[a]	0.293[a]
Illness	2.619	1177.936	.034	0.239[a]	0.290[ab]	0.280[ab]	0.292[ab]	0.300[b]
Disaster	1.036	1194.678	0.388	0.237[a]	0.224[a]	0.233[a]	0.190[a]	0.240[a]
Sex Assault	12.042	1200.317	<.001	0.310[a]	0.293[a]	0.293[a]	0.232[a]	0.401[b]
Child Abuse	5.591	1212.071	<.001	0.122[a]	0.114[a]	0.111[a]	0.098[a]	0.173[b]
Domestic Abuse	10.752	1222.785	<.001	0.238[ac]	0.202[abc]	0.250[acd]	0.147[b]	0.299[d]
Assault	2.659	1191.658	.031	0.155[a]	0.176[ab]	0.164[ab]	0.154[ab]	0.205[b]
Kidnapped	4.262	1227.506	.002	0.039[ab]	0.040[ab]	0.027[a]	0.023[a]	0.061[b]
Mugged	2.164	1191.416	.071	0.228[a]	0.236[a]	0.239[a]	0.219[a]	0.277[a]

Different superscripts indicate significant differences in means.

Peacekeeper/Relief Worker in a Warzone:

Levene's Test of Homogeneity of Variance was not significant ($p < .411$), indicating a lack of significant differences in variance across groups. The comparison resulted in a nonsignificant effect of class assignment on the likelihood of endorsing a history of engagement as a peacekeeper or relief worker in an active warzone $F(4, 3478) = 0.248$, $p = .911$.

Complex vs. All Classes. Levene's test for equality of variance was not significant ($p = .167$); therefore, equal variances were assumed in this comparison. On average, individuals within the Complex class were more likely to endorse a history of engagement as a peacekeeper or relief worker in an active warzone ($M = 0.021$ $SE = .004$) than individuals within all other classes ($M = 0.018$, $SE = 0.003$). This difference was not significant $t(3618) = 0.692$, $p = .489$ and represented a negligible effect ($r = 0.012$).

Unarmed Citizen in a Warzone:

There was not a significant effect of class assignment on the likelihood of endorsing a history of being an unarmed civilian within a warzone, $F(4, 1179.074) = 1.41$, $p = .228$.

Complex vs. All Classes. Levene's test for equality of variance was not significant ($p = .427$); therefore, equal variances were assumed in this comparison. On average, individuals within the Complex class were more likely to endorse a history of being an unarmed civilian in a warzone ($M = 0.031$ SE $SE = .005$) than individuals within all other classes ($M = 0.029$, $SE = 0.003$). This difference was not significant $t(3619) = 0.398$, $p = .691$ and represented a negligible effect ($r = 0.007$).

Refugee:

Levene's Test of Homogeneity of Variance was significant (*p* = .002), indicating significant differences in variance across groups and violation of one of the assumptions of ANOVA. Therefore, Welch's *F* statistic was utilized in the current comparison. There was not a significant effect of class assignment on the likelihood of endorsing a history of being an unarmed civilian within a warzone, $F(4, 1167.98) = 1.104$, $p = .353$.

Complex vs. All Classes. Levene's test for equality of variance was not significant ($p = .692$); therefore, equal variances were assumed in this comparison. On average, individuals within the Complex class were less likely to endorse a history of being a refugee ($M = 0.018$ $SE = .004$) than individuals within all other classes ($M = 0.019$, $SE = 0.003$). This difference was not significant $t(3619) = -0.198$, $p = .843$ and represented a negligible effect ($r = 0.003$).

Serious or Life-Threatening Accident:

Levene's Test of Homogeneity of Variance was significant ($p < .001$), indicating significant differences in variance across groups and violation of one of the assumptions of ANOVA. Therefore, Welch's *F* statistic was utilized in the current comparison. There was not a significant effect of class assignment on the likelihood of endorsing a history of experiencing a serious or life-threatening accident, $F(4, 1187.82) = 2.32$, $p = .055$.

Complex vs. All Classes. Levene's test for equality of variance was significant ($p < .001$); therefore, equal variances were not assumed in this comparison. On average, individuals within the Complex class were more likely to endorse a history of experiencing a serious or life-threatening accident ($M = 0.293$, $SE = .014$) than individuals within all other classes ($M = 0.262$, $SE = 0.009$; Figure 102). This difference was not significant *t*(2091.06) = 1.876, *p* = .061 and represented a negligible effect (*r* = 0.041).

Serious or Life-Threatening Illness

Levene's Test of Homogeneity of Variance was significant (*p* < .001), indicating significant differences in variance across groups and violation of one of the assumptions of ANOVA. Therefore, Welch's *F* statistic was utilized in the current comparison. There was a significant effect of class assignment on the likelihood of endorsing a history of experiencing a serious or life-threatening illness, *F*(4, 1173.936) = 2.619, *p* = .034. Post Hoc analyses revealed that individuals within the Complex class were significantly more likely to endorse a history of a serious or life-threatening illness than individuals within the Avoidance (mean difference = 0.061, *p* = .018).

Complex vs. All Classes. Levene's test for equality of variance was significant (*p* = .002*)*; therefore, equal variances were not assumed in this comparison. On average, individuals within the Complex class were more likely to endorse a history of experiencing a serious or life-threatening illness (*M* = 0.300, *SE* = .014) than individuals within all other classes (*M* = 0.274, *SE* = 0.009). This difference was not significant *t*(2101.48) = 1.577, *p* = .115 and represented a negligible effect (*r* = 0.028).

Fire or Natural Disaster

Levene's Test of Homogeneity of Variance was significant (*p* = .002), indicating significant differences in variance across groups and violation of one of the assumptions of ANOVA. Therefore, Welch's *F* statistic was utilized in the current comparison. There was not a significant effect of class assignment on the likelihood of endorsing a history of experiencing fire or natural disaster *F*(4, 1190.678) = 1.036, *p* = .388.

Complex vs. All Classes. Levene's test for equality of variance was not significant ($p = .087$); therefore, equal variances were assumed in this comparison. On average, individuals within the Complex class were more likely to endorse a history of experiencing a fire or natural disaster ($M = 0.24$, $SE = .013$) than individuals within all other classes ($M = 0.227$, $SE = 0.008$). This difference was not significant $t(3618) = 0.863$, $p = .388$ and represented a negligible effect ($r = 0.014$).

Sexual Assault, Molestation, and Rape

Levene's Test of Homogeneity of Variance was significant ($p < .001$), indicating significant differences in variance across groups and violation of one of the assumptions of ANOVA. Therefore, Welch's F statistic was utilized in the current comparison. There was a significant effect of class assignment on the likelihood of endorsing a history experiencing sexual assault, molestation, or rape, $F(4, 1196.317) = 12.042$, $p < .001$. Post Hoc analyses revealed that individuals within the Complex class were significantly more likely to endorse a history of experiencing sexual assault, molestation, or rape than individuals within the Avoidance (mean difference = 0.091, $p < .001$), the Intrusion (mean difference = .108, $p = .002$), the Avoidant/Intrusive (mean difference = .108, $p < .001$), and the Low Severity (mean difference = .169, $p < .001$) classes.

Complex vs. All Classes. Levene's test for equality of variance was significant ($p < .001$); therefore, equal variances were not assumed in this comparison. On average, individuals within the Complex class were more likely to endorse a history of sexual assault, molestation, or rape ($M = 0.401$, $SE = .015$) than individuals within all other classes ($M = 0.297$, $SE = 0.009$). This difference was significant $t(2023.163) = 6.014$, $p < .001$ and represented a small effect ($r = 0.133$).

Physical Abuse as a Child

Levene's Test of Homogeneity of Variance was significant ($p < .001$), indicating significant differences in variance across groups and violation of one of the assumptions of ANOVA. Therefore, Welch's *F* statistic was utilized in the current comparison. There was a significant effect of class assignment on the likelihood of endorsing a history of experiencing childhood physical abuse, $F(4, 1208.071) = 5.591$, $p < .001$. Post Hoc analyses revealed that individuals within the Complex class were significantly more likely to endorse a history of experiencing childhood physical abuse than individuals within the Avoidance (mean difference = 0.052, $p < .010$), the Intrusion (mean difference = .060, $p = .029$), the Avoidant/Intrusive (mean difference = .062, $p = .001$), and the Low Severity (mean difference = .075, $p = .002$) classes.

Complex vs. All Classes. Levene's test for equality of variance was significant ($p < .001$); therefore, equal variances were not assumed in this comparison. On average, individuals within the Complex class were more likely to endorse a history of childhood sexual abuse ($M = 0.173$, $SE = .011$) than individuals within all other classes ($M = 0.118$, $SE = 0.007$). This difference was significant $t(1878.989) = 4.207$, $p < .001$ and represented a small effect ($r = 0.097$).

Domestic Abuse

Levene's Test of Homogeneity of Variance was significant ($p < .001$), indicating significant differences in variance across groups and violation of one of the assumptions of ANOVA. Therefore, Welch's *F* statistic was utilized in the current comparison. There was a significant effect of class assignment on the likelihood of endorsing a history of experiencing childhood physical abuse, $F(4, 1218.78) = 10.752$, $p < .001$. Post Hoc analyses revealed that individuals within the Low Severity class were significantly less likely to endorse a history of experiencing domestic abuse than individuals within the Avoidance (mean difference = -.091, p = .003), the Avoidant/Intrusive (mean difference = -.103, p = .001), and the Complex (mean difference = -.152, p < .001) classes. Individuals within the Complex class were significantly more likely to endorse a history of domestic abuse than individuals within the Avoidance (mean difference = .061, p = .017), the Intrusion (mean difference = .097, p = .001), and the Low Severity (mean difference = .152, p < .001).

Complex vs. All Classes. Levene's test for equality of variance was significant (p < .001); therefore, equal variances were not assumed in this comparison. On average, individuals within the Complex class were more likely to endorse a history of domestic abuse (M = 0.299, SE = .014) than individuals within all other classes (M = 0.228, SE = 0.008). This difference was significant t(1996.377) = 4.389, p < .001 and represented a small effect (r = 0.098).

Physical Assault from a Stranger:

Levene's Test of Homogeneity of Variance was significant (p < .001), indicating significant differences in variance across groups and violation of one of the assumptions of ANOVA. Therefore, Welch's F statistic was utilized in the current comparison. There was a significant effect of class assignment on the likelihood of endorsing a history of being physically assaulted by a stranger, F(4, 1187.658) = 2.659, p = .031. Post Hoc analyses revealed that individuals within the Complex class were significantly more likely to report a history of being assaulted by a stranger than individuals within the Avoidance (mean difference = .05, p = .03).

Complex vs. All Classes. Levene's test for equality of variance was significant ($p < .001$); therefore, equal variances were not assumed in this comparison. On average, individuals within the Complex class were more likely to endorse a history of being physically assaulted by a stranger ($M = 0.205$, $SE = .012$) than individuals within all other classes ($M = 0.161$, $SE = 0.007$). This difference was significant $t(1981.272) = 3.123$, $p = .002$ and represented a small effect ($r = 0.07$).

Kidnapped/Held Hostage

Levene's Test of Homogeneity of Variance was significant ($p < .001$), indicating significant differences in variance across groups and violation of one of the assumptions of ANOVA. Therefore, Welch's F statistic was utilized in the current comparison. There was a significant effect of class assignment on the likelihood of endorsing a history of being kidnapped or held hostage, $F(4, 1223.506) = 4.262$, $p = .002$. Post Hoc analyses revealed that individuals within the Complex class were significantly more likely to report a history of being kidnapped or held hostage than individuals within the Avoidant/Intrusive (mean difference = .034, $p = .002$) and Low Severity (mean difference = .038, $p = .007$).

Complex vs. All Classes. Levene's test for equality of variance was significant ($p < .001$); therefore, equal variances were not assumed in this comparison. On average, individuals within the Complex class were more likely to endorse a history of being kidnapped or held hostage ($M = 0.061$, $SE = .007$) than individuals within all other classes ($M = 0.032$, $SE = 0.004$). This difference was significant $t(1694.28) = 3.549$, $p < .001$ and represented a small effect ($r = 0.086$).

Mugged/Held Up/Threatened with a Weapon

Levene's Test of Homogeneity of Variance was significant ($p < .001$), indicating significant differences in variance across groups and violation of one of the assumptions of ANOVA. Therefore, Welch's *F* statistic was utilized in the current comparison. There was not a significant effect of class assignment on the likelihood of endorsing a history of mugged or threatened with a weapon, $F(4, 1187.416) = 2.164$, $p = .071$.

Complex vs. All Classes. Levene's test for equality of variance was significant ($p < .001$); therefore, equal variances were not assumed in this comparison. On average, individuals within the Complex class were more likely to endorse a history of being mugged or threatened with a weapon ($M = 0.277$, $SE = .013$) than individuals within all other classes ($M = 0.233$, $SE = 0.009$). This difference was significant $t(2048.549) = 2.766$, $p = .006$ and represented a small effect ($r = 0.061$).

CHAPTER IV – DISCUSSION

The primary purpose of the current study was twofold. First, the existence and composition of subtypes of PTSD were examined utilizing latent profile analysis and taxometric analyses of the DSM-5 criteria of PTSD. When determining which number of classes best represent the data, fit statistics improved as the number of classes increased, up to the addition of a sixth class, which would not converge. The examination of fit statistics suggested either the 4- or 5-class model be retained. The models were then compared based on theoretical interpretability. The 4-class model contained four relatively disparate classes; however, the inclusion of a fifth class increased discrepancies across classes in endorsement of each of the symptom clusters and the base rates of the resulting classes were reasonable (i.e., no base rate was low enough to be trivial). In combination with fit indices demonstrating a significant improvement in fit with the addition of a fifth class, the 5-class model was determined to be optimal model based upon the combination of fit to the data and theoretical coherence.

Following the LPA, taxometric analyses of PTSD symptoms were conducted separately for cases from pairs of isolated classes from the five-class solution. The purpose of the taxometric analyses was to determine whether differences between the LPA-derived classes were qualitative or dimensional in nature. A number of consistency tests were utilized in order to protect against spurious findings, including MAMBAC, MAXCOV, MAXEIG, and L-Mode Factor Analysis.

A second purpose of the present study was evaluate evidence for the external validity of the classification. Specifically, a series of analyses examined mean differences across the LPA-derived classes for a number of relevant external variables available in the NESARC dataset. These variables included history of being diagnosed with a major depressive episode, generalized anxiety disorder, borderline personality disorder, a cannabis, alcohol, sedative, or opioid use disorder, as well as a history of suicidal ideation, suicide attempts, or non-suicidal self-injury. In addition, class differences in the types of trauma experienced was also evaluation. A one-way ANOVA was conducted for each of the disorders in order to determine differences in mean endorsement of the disorder. Given that the Complex class identified by the LPA appeared to differ qualitatively from the other classes, a t-test was conducted for each of the disorders examining the difference in means between the Complex class and a combination of the remaining four classes.

The Avoidance class was comprised of individuals with average endorsement of symptoms of intrusion, negative alterations in cognitions and mood, and arousal, with high endorsement of symptoms of arousal. This class was comprised of 25.58% of the sample (926 participants). Taxometric analyses provided strong evidenced of qualitative differences between the Avoidance and Complex classes. Individuals within the Avoidance class were significantly less likely than individuals within the Complex class to endorse a historical diagnosis of a major depressive disorder, generalized anxiety disorder, or borderline personality disorder, and were less likely to report a history of non-suicidal self-injury, inpatient hospitalization, and use of drugs to cope with symptoms of PTSD. These individuals were significantly more likely to endorse a history of suicidal ideation than individuals within the Low Severity Class. Individuals within the Avoidance class were significantly less likely than individuals within the Avoidant/Intrusive class to endorse a history of active military combat. Individuals within the Avoidance class were significantly more likely than individuals within the Low Severity class to endorse a history of experiencing domestic abuse. Finally, individuals within the Avoidance class were significantly less likely than individuals within the Complex class to endorse a history of experiencing a significant or life-threatening illness, sexual assault, molestation, or rape, child abuse, domestic abuse, and physical assault from a stranger.

The “Intrusion” class was comprised of individuals with high endorsement of symptoms of intrusion, below average endorsement of symptoms of avoidance, and slightly above average endorsement of negative alterations in cognition and mood and arousal. This class was comprised of 9.97% of the sample (361 participants). Taxometric analyses did not indicate qualitative differences between the Intrusion class and any of the remaining classes. Individuals within the Intrusion class were significantly less likely than individuals within the Complex class to endorse a historical diagnosis of borderline personality disorder and were less likely to have spent a night in a psychiatric facility as a result of PTSD symptoms. Individuals within the Intrusion class were significantly less likely than individuals within the Complex class to endorse a history of experiencing sexual assault, molestation, or rape, child abuse, and domestic abuse.

The “Avoidant/Intrusive” class was characterized by high endorsement of symptoms of intrusion and avoidance, below average endorsement of negative alterations in cognition and mood, and relatively average endorsement of symptoms of avoidance. This class was comprised of 23.2% of the sample (840 participants). Taxometric analyses did not indicate qualitative differences between the Avoidant/Intrusive class and any of the remaining classes. Individuals within the Avoidant/Intrusive class were significantly less likely than individuals within the Complex class to endorse a historical diagnosis of a major depressive episode, generalized anxiety disorder, borderline personality disorder, an alcohol use disorder, and were significantly less likely to have reported a history of suicide attempts, non-suicidal self-injury, inpatient hospitalization, and the use of drugs to cope with PTSD symptoms. These individuals were significantly more likely than individuals within the Low Severity class to endorse a history of suicidal ideation. With regard to type of trauma experienced, individuals within the Avoidant/Intrusive class were significantly more likely than individuals within the Low Severity class to endorse a history of domestic abuse. These individuals were significantly less likely than individuals within the Complex class to endorse a history of sexual assault, molestation, or rape, child abuse, and being kidnapped.

The “Low Severity” class was characterized by below average endorsement of symptoms of intrusion and avoidance and relatively average endorsement of negative alterations in cognition and mood and arousal. This class was comprised of 8.76% of the sample (317 participants). Taxometric analyses provided strong evidence that the Low Severity class differed qualitatively from the Complex class. Individuals within this class were significantly less likely than individuals within the Complex class to endorse a historical diagnosis of major depressive disorder, borderline personality disorder, sedative and opioid use disorders, and were less likely to have reported a history of suicide attempts, inpatient hospitalization, and the use of alcohol to cope with symptoms of PTSD. These individuals were significantly less likely than individuals within the Avoidance, Avoidant/Intrusive, and Complex classes to endorse a history of domestic abuse. These individuals were significantly less likely than individuals within the

Complex class to endorse a history of experiencing sexual assault, child abuse, and being kidnapped.

The “Complex” class was characterized by the highest level of endorsement of all symptoms clusters. This class was comprised of 32.49% of the sample (1176 participants). Taxometric analyses indicated the Complex class differed qualitatively from the Intrusion and Low Severity classes. Individuals within this class were significantly more likely to have spent at least one night in a psychiatric facility as a result of PTSD symptoms. Individuals within this class were significantly more likely than individuals the Avoidance, Avoidant/Intrusive, and Low Severity classes to endorse a historical diagnosis of major depressive disorder. These individuals were significantly more likely than individuals within the Avoidance and Avoidant/Intrusive classes to endorse a historical diagnosis of generalized anxiety disorder and the use of drugs to cope with symptoms of PTSD, significantly more likely than individuals within any other class to endorse a historical diagnosis of borderline personality disorder, significantly more likely than individuals within the Avoidant/Intrusive class to endorse a historical diagnosis of an alcohol use disorder, significantly more likely than individuals within the Low Severity class to endorse historical diagnoses of sedative or opioid use disorders and suicidal ideation, significantly more likely than individuals within the Avoidant/Intrusive and Low Severity classes to have reported a history of suicide attempts and the use of alcohol in coping with PTSD symptoms, and significantly more likely than individuals within the Avoidance and Avoidant/Intrusive classes to endorse a history of non-suicidal self-injury.

With regard to type of trauma experienced, individuals within the Complex class were significantly more likely than individuals within the Avoidance class to endorse a history of experiencing a significant or life-threatening illness, sexual assault, child abuse, domestic abuse, and physical assault from a stranger. Individuals within the Complex class were significantly more likely than individuals within the Intrusion class to endorse a history of experiencing sexual assault, child abuse, and domestic abuse. Individual within the Complex class were significantly more likely than individuals within the Avoidant/Intrusive class to endorse a history of sexual assault, child abuse, and kidnapping. Finally, individuals within the Complex class were significantly more likely than individuals within the Low Severity to endorse a history of sexual assault, child abuse, domestic abuse, and kidnapping.

Taxometric analyses provided strong evidence the Complex class differed qualitatively from a combination of all other classes. Statistical analyses demonstrated that individuals within the Complex class were significantly more likely than individuals from all other classes to endorse a historical diagnosis of a major depressive disorder, generalized anxiety disorder, borderline personality disorder, alcohol, cannabis, sedative, and opioid use disorders, and were significantly more likely to have reported a history of suicidal ideation, suicide attempts, and non-suicidal self-injury. With regard to type of trauma experienced, individuals within the Complex class were significantly more likely than individuals from all other classes to report experiencing sexual assault, child abuse, domestic abuse, physical assault from a stranger, kidnapping, and being mugged/threated with a weapon.

The above results indicate the Complex class is qualitatively different from the remaining classes, whereas the Avoidance, Intrusion, Avoidant/Intrusive, and Low Severity classes differ from each other by matters of degree, rather than kind. Of note, individuals within the Complex class were more likely than individuals from all other classes to experience a number of the more violent types of traumatic experiences. For example, they were more likely to experience sexual assault, child/domestic abuse, assault from a stranger, and kidnapping. This is similar to results from previous studies which have found that individuals diagnosed with "Complex PTSD" are more likely to have experienced severe types of trauma, including sexual and physical assault (Herman, 1992).

There are a number of possible etiological factors that might account for the taxon for the Complex class versus the other classes. As noted previously, these individuals were most likely to experience the more severe types of trauma. Given Herman's (1992) hypothesis that Complex PTSD occurs following prolonged and persistent traumatic events, it is unfortunate that the number of traumatic events experienced was not measured in the dataset. It is possible, though purely speculative, that these individuals are more likely to experience multiple traumatic events, leading to more severe presentations following each event. Replication studies would benefit from the examination of the relationship between severity of symptoms and number of traumatic events experienced. Future studies should also more explicitly evaluate possible etiological factors that may lead to the complex presentation of PTSD versus one of the other less severe types.

The current study has a number of clinical implications. First, individuals from the Complex class of PTSD exhibit a higher level of symptoms across all symptom clusters and are thus likely to require all components of currently established empirically supported treatments (ESTs); however, future research may examine how current ESTs can be modified to provide the same level of care to individuals within the remaining classes while decreasing the time and money required for treatment. For example, as mentioned in the introduction, early results from exploratory studies have examined certain components of ESTs for PTSD are more effective at reducing specific symptoms. For example, individuals experiencing mainly intrusive symptoms have been identified to benefit more from cognitive components of Cognitive Processing Therapy (CPT) as opposed to individuals experiencing higher levels of avoidance symptoms, who may require extensive exposure to reminders of the traumatic event. Should the classes identified in the present study prove to be replicable, future research should examine how they differ in response to current ESTs, especially considering one of Dalenberg's criteria for a subtype requires that the subtype demonstrate relevant differences in response to treatment.

The current study suggested the presence of five distinct classes of PTSD, which is the highest number of classes of any of the studies examined in the literature review; however, there were similarities to prior studies. For example, a majority of the studies described in the introduction contained a class comprised of individuals with a less severe presentation of PTSD. This class was labeled the "Low Pathology" class by Miller et al. (2004) and Flood et al. (2010) and the "Simple PTSD" class by Miller & Resnick (2007). There are a number of possible explanations. One possibility is that all studies examined contained a small number of individuals who no longer met criteria for PTSD at the time of the study. On the other hand, it is possible that these individuals represent a small subtype of PTSD characterized by a more mild presentation and resulting from exposure to traumatic events with a lower likelihood of death. Future research would benefit from utilizing a sample of clients in a clinical setting in order to allow diagnostic interviews at the time of the study in order to determine whether participants meet diagnostic thresholds of all symptom clusters.

Another similarity between most studies examined is the presence of a class comprised of individuals with a more severe presentation of PTSD. These individuals tend to have experienced more violent types of traumatic events, and this presentation is typically associated with more negative outcomes, including suicide attempts, inpatient hospitalization, and self-injury. This finding has significant clinical implications as well. Given the negative outcomes associated with membership in the severe class, it is likely that these individuals would benefit from early intervention designed to alleviate suffering prior to the occurrence of these negative outcomes.

Limitations

The present study had a number of limitations. Perhaps most importantly, there is no way to determine whether participants met full criteria for a diagnosis of PTSD at the time of the Wave 2 interview. A lifetime diagnosis of PTSD was utilized as the inclusionary criterion for participants from the NESAARC dataset for the present study. In retrospect, utilization of PTSD diagnosis within the past year may have been the better option; however, a diagnosis in the past year does not guarantee that the participant was still suffering from the disorder at the time of the interview. Without this information, it is possible individuals within any of the classes, but most specifically the Low Severity class, were suffering from sub-diagnostic levels of symptoms at the time of the disorder. This leaves multiple explanations for the reason the Complex class exhibits higher levels of symptoms and more severe consequences. The first explanation is that the Complex class is comprised of individuals who exhibit a more severe presentation of PTSD. However, an alternative explanation is that the other classes were comprised of individuals experiencing sub-diagnostic levels of PTSD symptoms. A solution to this problem is proposed in the “Future Directions” section.

A second limitation of the present study involves the timeline of PTSD and comorbid diagnoses. The NESAARC dataset does not provide information on which disorder occurred first, which makes speculation on causes of comorbidity difficult. For example, individuals within the Complex class were more likely than all other classes to have a comorbid diagnosis of borderline personality disorder. This opens up the possibility that borderline personality traits leave one more susceptible to developing PTSD following exposure to a traumatic event or to find oneself in situations where traumatic events are more likely to occur; however, an alternative explanation would be that PTSD exacerbates borderline personality traits, leaving one more likely to be diagnosed with borderline personality disorder. Without a timeline describing which diagnosis came first, this question is not able to be addressed.

A final limitation of the present study was the fact that the NESAARC dataset utilized DSM-IV-TR diagnostic criteria for all disorders. This limitation was addressed by dividing the three DSM-IV-TR PTSD symptom clusters into the four symptom clusters contained in the DSM-5. However, the DSM-5 contains diagnostic criteria for

PTSD that are not included in the DSM-IV-TR. Attempts were made to address this by identifying questions throughout the survey which were similar to the new diagnostic criteria. No question was identified to replace the DSM-5 criterion of engaging in reckless behavior; thus, the Negative Alterations in Cognition and Mood symptom cluster in the present study was not identical to that contained within the DSM-5.

Future Directions

The present study suggests a number of pathways for future research. First, as with all research, the results from the present study must be replicated in a separate sample. As described in the "Limitations" section, problems encountered in the present study involved an inability to determine whether participants met diagnostic criteria for PTSD at the time of the interview, a lack of a timeline for comorbid disorders, and the fact that the NESAARC dataset utilized DSM-IV-TR criteria for PTSD. Both of these problems could be addressed in a longitudinal replication study conducted in a clinical setting and utilizing data from individuals currently diagnosed with PTSD. Should the present results replicate, clinicians would have the ability to develop a timeline for each participant, thus identifying specific risk factors for membership in each of the identified classes. Etiological studies should be conducted examining etiological differences between complex and non-complex classes of PTSD. For example, one possibility is that pre-existing personality traits may predispose someone to the complex type of PTSD upon exposure to trauma (i.e., a tendency to dissociate under extreme stress).

Conclusions

Overall, the present study furthered the literature in a number of ways. First, to the best of the author's knowledge, this is the first study to evaluate the use of taxometric analyses in identifying categorical and dimensional differences in LPA-derived classes. The use of taxometric analysis in the present study identified categorical differences distinguishing one class from the remaining classes based upon the number of symptoms endorsed. This class, the Complex class, exhibited a higher level of symptoms and differed significantly from the remaining classes in its relationships with a number of relevant external variables, suggesting clinical utility in identifying individuals suffering from this form of PTSD. Further, more severe traumatic events (e.g, sexual assault) predicted membership in this more severe class. Should these results replicate, the current findings may lead to earlier identification of individuals suffering from a severe form of PTSD and at risk for more negative consequences, such as suicidal behavior and hospitalization.

APPENDIX– IRB Approval Letter

THE UNIVERSITY OF
SOUTHERN MISSISSIPPI.

INSTITUTIONAL REVIEW BOARD
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NOTICE OF COMMITTEE ACTION

The project has been reviewed by The University of Southern Mississippi Institutional Review Board in accordance with Federal Drug Administration regulations (21 CFR 26, 111), Department of Health and Human Services (45 CFR Part 46), and university guidelines to ensure adherence to the following criteria:

- The risks to subjects are minimized.
- The risks to subjects are reasonable in relation to the anticipated benefits.
- The selection of subjects is equitable.
- Informed consent is adequate and appropriately documented.
- Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
- Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
- Appropriate additional safeguards have been included to protect vulnerable subjects.
- Any unanticipated, serious, or continuing problems encountered regarding risks to subjects must be reported immediately, but not later than 10 days following the event. This should be reported to the IRB Office via the "Adverse Effect Report Form".
- If approved, the maximum period of approval is limited to twelve months.
  Projects that exceed this period must submit an application for renewal or continuation.

PROTOCOL NUMBER: 16052002
PROJECT TITLE: An Examination of Subtypes of PTSD Utilizing Taxometric and Latent Profile Analyses
PROJECT TYPE: New Project
RESEARCHER(S): Joseph Finn
COLLEGE/DIVISION: College of Education and Psychology
DEPARTMENT: Psychology
FUNDING AGENCY/SPONSOR: N/A
IRB COMMITTEE ACTION: Exempt Review Approval
PERIOD OF APPROVAL: 06/01/2016 to 05/31/2017
Lawrence A. Hosman, Ph.D.
Institutional Review Board

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