

Distinguishing between Primary and Secondary Callous-Unemotional Features in Youth: The Role of Emotion Regulation

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Abstract

Background: Research on youth with callous-unemotional features (CU features; e.g., lack of empathy) has historically categorized these behaviors as biologically-driven and homogeneous across development. However, an early model proposed that two subtypes of CU features exist with different etiological factors. The first, or 'primary' group, has a genetically based deficit in emotion processing, resulting in a diminished sensitivity to others' emotional cues. The 'secondary' CU group is conceptualized as an adaptation to environmental factors such as maltreatment and are characterized by an affective deficit produced by these powerful environmental factors. Secondary youth are typically classified or grouped based on the presence of co-occurring anxiety symptoms. Understanding the presentation of regulation strategies among CU variants may give us further insight into the different pathways to their development. In addition, due to the high number of samples that have relied on justice-involved males, there is a paucity of research on gender differences across the variants.

Purpose: The aim of the current study was to evaluate whether distinct groups of youth may be identified in a clinical sample by using measures of affect dysregulation and suppression, anxiety symptoms and experience of maltreatment. It was also to examine whether these distinct groups were consistent across males and females.

Method: Participants ($N = 418$; 56.7% female) ranged in age from 12 to 19 ($M = 15.04$, $SD = 1.85$) and were drawn from the baseline of a large clinical sample.

Results: A Latent Profile Analysis (LPA) was conducted using five indicators including affect regulation, suppression, anxiety, CU features, and maltreatment. The best fitting model, a 4-class solution, had a significant Lo-Mendell- Rubin ($p = .003$), an acceptable entropy score (.78), and classification probabilities that suggested accuracy and good separation. The four groups to emerge included a low, anxious, primary CU, and secondary CU group. Gendered LPAs found a 4-class model fit for both males and females (entropy = .866). Gender did not moderate other outcomes of interest.

Discussion: This study extends previous literature by including the underlying process of dysregulated affect to the model in identifying primary and secondary subgroups and examining gender. Clinical implications are discussed.

Keywords: Callous-Unemotional; Conduct problems; trauma; adolescents

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Chapter 1. Introduction

The prevalence of behaviour disorders such as conduct disorder (CD) or oppositional defiant disorder (ODD) has been reported to be as high as 6% in North America, making behaviour problems one of the most prevalent forms of psychopathology in childhood and adolescence (Merikangas, Nakamura, & Kessler, 2009). As such, there is an increasing interest in identifying markers of serious and persistent aggression and antisocial behaviour, symptoms that can last well into adulthood (Frick & Morris, 2004; Frick & White, 2008). One marker that has shown promise is the presence of callous-unemotional (CU) features, particularly when these are identified early in development (Frick, Ray, Thornton, & Kahn, 2014; Frick & White, 2008; Hawes et al., 2014).

CU features are defined by symptoms such as a lack of empathy, shallow affect, and uncaring attitude (Frick & Morris, 2004), and are associated with a severe and chronic trajectory of aggressive antisocial behaviour (Fontaine, McCrory, Boivin, Moffitt, & Viding, 2011). Compared to youth who exhibit low levels of CU features, those with high levels have been found to show low levels of fear and a higher engagement in novel and dangerous activities (Frick, Cornell, Barry, Bodin, & Dane, 2003). They also have low emotional responsiveness (e.g., Kimonis, Frick, Fazekas, & Loney, 2006) and indifference or lack of responsiveness to others' emotions, particularly

fear (e.g., Dadds, El Masry, Wimalaweera, & Guastella, 2008; Marsh et al., 2011). These core CU features are considered to be analogous to the affective component of psychopathy as assessed by the Psychopathy Checklist-Revised (PCL-R; Hare et al., 1991) or the youth version of the PCL-R (PCL-YV; Forth et al, 2003). Although there remains a debate about the total number of factors of psychopathy in adults (see Cooke, Michie, & Hart, 2006), at least three primary factors typically emerge, one of which has been called the “affect factor” (Hare, 1993) or “deficient affect” (Cooke et al., 2006). The other two dimensions of psychopathy are “interpersonal style” (e.g., arrogant and deceitful, narcissistic view of self and manipulative behaviour), and “impulsive and irresponsible behaviour” (Frick & White, 2008). Several studies have demonstrated that it is the CU or affective factor of psychopathy that designates distinct variants of children at risk for chronic levels of severe conduct problems (Frick et al, 2014).

CU features have been associated with a chronic trajectory of aggressive and antisocial behaviour, and have recently been added to the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5; APA, 2013) as an additional specifier to the diagnosis of CD. Given the recent changes in the DSM-5 and the growing literature on CU features in youth, further research is required to understand clinically relevant characteristics of youth with CU features. This paper aims first to understand potential differences in etiological pathways for youth with CU features. Next, a review of the clinical characteristics of youth in various populations may help inform both assessment and treatment. Finally, as much of the research on conduct problems has been conducted with male samples, it is imperative to consider possible gender differences in presentations.

1.1. Homogeneous or Heterogeneous?

Historically CU features have been attributed to biologically based factors (Viding, Blair, Moffitt, & Plomin, 2005) and have been referred to as a ‘traits’ (Frick et al., 2014). A recent review stated that genetic effects accounted for between 42% and 68% of the variation in CU features (Frick et al., 2014). For example, Bezdjian, Tuvblad, Raine and Baker (2011) found heritability estimates for CU features to be .64 for boys and .49 for girls in a sample of 605 twins (age 9-10 years). In support of the idea that CU features represent a genetically based trait, some research has focused on the stability of CU features from early childhood into young adulthood and the impact of genetics on that stability. In general, CU features and associated aggressive behaviour have been found to be relatively stable (up to $r = .71$; Frick, Kimonis, Dandreaux, & Farell, 2003) from late childhood to early adolescence, particularly when evaluated by parent report (Frick & White, 2008; Longman, Hawes, & Kohloff, 2016). Several studies have extended this finding, reporting stability in younger children ($r = .55$; Dadds, Fraser, Frost, & Hawes, 2005) and from adolescence into early adulthood ($r = .60$; Blonigen, Hicks, Kruger, Patrick, & Iacono, 2006). In addition, twin studies have shown that much of the stability in high CU features ($r = .81$) is due to genetic effects, particularly for boys (e.g., Fontaine, Rijdsdijk, McCrory, & Viding, 2010; Forsman, Lichtenstein, Andershed, & Larsson, 2008). Based on these relatively strong findings, research on CU features has primarily focused on understanding these youth as a homogeneous and stable group that is biologically driven (Frick et al., 2014). However, it is important to note that heritability estimates do not account for all variation in CU features, even when they are high. There

is growing evidence that CU features may have more developmental pathways than originally theorized.

An early model of subtypes of psychopathy proposed two distinct etiological pathways. This model has been subsequently extended to CU features (e.g., Bennett & Kerig, 2013; Kahn, Frick, Youngstrom, Kogos Youngstrom, Feeny, & Findling, 2013). According to Karpman's (1941) model, 'primary' psychopathy (or CU features), is a genetically based deficit in emotion processing, resulting in a lack of anxiety and diminished sensitivity to others' emotional cues. The 'secondary' subtype conceptualizes CU features and psychopathy as an adaptation to environmental factors such as parental rejection, exposure to trauma, and adverse social contexts (Bennett & Kerig, 2014; Kahn et al., 2013; Karpman, 1941). Karpman (1941) argued that those with secondary psychopathy (or CU features), are characterized by an affective deficit produced by these pathogenic environmental factors. Typically classified based on the presence of anxiety symptoms, the central premise of this view is that children who are exposed to chronic maltreatment, particularly in the context of relationships with caregivers, become emotionally detached by adopting a "mask" of callousness as a form of coping (Karpman, 1941; Porter, 1996). Porter (1996) furthered this model and postulated that the onset of CU features in these children and youth represents an adaptive process involving emotional numbing in order to cope with overwhelming interpersonal trauma. Several studies identified two variants of youth with CU features or psychopathy based on levels of anxiety (e.g., Gill & Stickle, 2016; Kahn et al., 2013; Kimonis, Frick, Munoz & Aucoin, 2008; Tatar, Cauffman, Kimonis, & Skeem, 2012), and have confirmed that youth identified with secondary CU features or psychopathy also experienced higher

levels of trauma. As only a handful of studies have examined primary and secondary variants in youth high on CU features (e.g., Bennett & Kerig, 2014; Kahn et al., 2013; Sharf, Kimonis, & Howard, 2014), and CU behaviours are a core feature of psychopathy, this paper will also supplement literature with research on psychopathy variants. What is less clear in the literature is whether a temperamental feature, such as affect dysregulation, may be underlying the anxious presentation of two variants and why only certain youth go on to develop CU features.

1.2. Affect Regulation

To better understand the heterogeneity and CU feature variants, researchers have examined differences in affect development and regulation (Bennett & Kerig, 2014; Kimonis, Frick, Cauffman, Goldweber, & Skeem, 2012; Kimonis et al., 2006; Kimonis, Frick, Munoz, & Aucoin, 2008). Affect regulation is a developmentally acquired process that emerges from both “intrinsic features and extrinsic socioemotional experiences within the context of early parent-child interactions” (Cicchetti, 2016, p. 194). As demonstrated by Blair, Colledge, Murray, and Mitchell (2001), the normative processing of emotions, or affect regulation, serves as a prerequisite for adaptive social and moral development, which directly influences the development of CU.

Children's emotional experiences in the context of committing transgressions (e.g., aggressive behaviour) shape their moral development (Kimonis et al., 2008). In typically developing children, a transgression is met with distress cues from the victim (e.g., crying) or with a parent's response (e.g., anger or disapproval) that signals a threat of

punishment. Both responses typically result in increased anxiety or discomfort in the child. The child is therefore conditioned to desist from aggressive behaviours as such acts produce an internal affective state that is unpleasant. Over time, strong emotions of fear and guilt are elicited in the child at even the thought of a future transgression, which acts as a socializing agent even in the absence of a parent or caregiver (Kimonis et al., 2008). Importantly, the behaviours in youth with CU features (e.g., lack of empathy, callousness) are not consistent with a typically socialized child who avoids transgressions. Thus, the model of moral development has been central in framing and understanding emergence of CU features, as it emphasizes a disruptive process essential in the formation of empathy. What needs to be better understood is how the process may be disrupted and occur in the development of primary and secondary CU variants.

Children with the primary variant of CU features demonstrate reduced negative emotional responsiveness (i.e., hypo-arousal) to the distress of others and therefore do not experience this conditioning in a normative way (Blair, Peschardt, Budhani, Mitchell, & Pine, 2006). This results in the subsequent failure to develop the associated empathic concern. In a systematic review of the literature, Frick and colleagues (2014) found that across multiple studies, children and adolescents high on general CU features often experienced impairment in their recognition of others' emotional cues, such as fear and sadness. For example, Dadds, and colleagues (2008) found that boys ($N = 100$, $M = 12.4$ years) who were high on CU features demonstrated poorer recognition of facial fear, and less attention to the eye region of the face. These findings have been replicated across several studies (e.g., Fairchild Van Goozen, Calder, Stollery, & Goodyear, 2009; Leist & Dadds, 2009; Loney, Frick, Clements, Ellis, & Kerlin, 2003; Munoz, 2009). Another

consistent finding across studies is children and youth high on CU features demonstrate less negative emotional reactivity. Blair (1999) found that boys ($N = 32$, $M = 13$ years) high on CU features had lower levels of skin conductance and were less responsive to distress cues compared to those with behavioural problems and low CU features. Likewise, Sharp, Van Goozen, and Goodyear (2006) found that psychopathic traits in children ($N = 659$; $M = 9.3$ years; 52% female) were associated with low ratings of arousal to unpleasant pictorial stimuli. Consistent with this view, research shows that deficits in affective empathy for youth with general CU features or psychopathy involve reduced amygdala and ventromedial prefrontal cortex responsiveness to others' distress cues (as measured in laboratory tasks; Blair, 2007; Blair, 2010). These findings on general CU features are in line with the conceptualization of the primary CU variant; however, they do not explain how those with the secondary variant come to develop CU features.

Youth with the secondary variant may experience disruptions in this developmental process due to hyperarousal and acute sensitivity to negative affect. In an early paper, Kochanska (1997) argued that children who are hypersensitive to emotional cues and highly reactive to environmental inputs may develop impairments in conscience because affective hyperarousal interferes with children's ability to process socialization cues from caregivers (Frick & Morris, 2004). Evidence from youth psychopathy research examining emotion regulation mechanisms supports the notion that different affective mechanisms are implicated in primary versus secondary CU features. Kimonis and colleagues (2012) examined a sample of male juvenile offenders ($N = 355$, $M = 16.42$ years) and found boys with secondary psychopathy (12% of the total sample) to be more

likely to endorse negative emotionality (e.g., depression, anxiety, anger, attention problems) and childhood abuse. Compared to boys with primary psychopathy (32.7% of the total sample), boys with secondary psychopathy were also more likely to attend to negative emotional stimuli (e.g., picture of a crying child) in a dot probe task. The authors suggest that these results provide support that boys with primary psychopathy, but not secondary psychopathy, show the emotional deficits believed to be at the core of psychopathy. These findings are consistent with the adult psychopathy literature, in that compared to individuals with primary psychopathy, those with the secondary variant were more accurate in recognizing emotional tone and detecting sad content (Bagley, Abramowitz, & Kosson, 2009). Taken together, these studies provide support that those with primary CU have a deficit in emotional recognition and emotion deficits (e.g., less sensitive to negative stimuli) which is believed to be at the core of psychopathic personality. On the other hand, individuals with the secondary variant may be overly sensitive or overwhelmed by emotional stimuli and may therefore have difficulty processing and regulating their affect. This may lead the youth to avoid attending to emotional cues as they become more dysregulated and overwhelmed (e.g., by parental anger; Frick & Morris, 2004). To this end, there is a growing literature (e.g., Bennett & Kerig, 2014; Kahn et al., 2013; Kimonis et al., 2008) examining and identifying differences in affect regulation in youth with CU features as a function of the presence or absence of trauma exposure and trauma-related symptoms.

1.3. The Role of Trauma

Cicchetti (2016) posits that exposure to caregiver-perpetrated maltreatment or trauma presents a significant risk to the development of affect regulation. More specifically, children exposed to chronic levels of parental maltreatment or trauma are likely to experience an overwhelmingly high level of emotional arousal and dysregulation. This dysregulation may disrupt their ability to manage and process negative emotions, and ultimately the moral development process (Frick & Morris, 2004; Kimonis et al., 2008; Kochanska, Aksan, Knaack, & Rhines, 2004). This has been supported by the CU literature. For example, Kerig, Bennett, Thompson, and Becker (2012) found that numbing of fear and sadness mediated the relationship between betrayal trauma and CU features in an adjudicated sample of youth ($N = 276$, $M = 16.16$ years; 32% female). Coping with trauma through emotional numbing and inhibition of empathy for others is reinforced because this strategy effectively lowers distress (e.g., reduced psychological distress and somatic symptoms) and is especially adaptive in contexts where children cannot escape trauma (Lansford, Malone, Stevens, Dodge, Bates, & Pettit, 2006). Dealing with trauma and abuse through detachment and emotional numbing may provide a psychological buffer to the threatening situations and emotions that traumatized children cannot otherwise escape (Bennett & Kerig, 2014). Although meant as a protective device, such processes may increase the risk of aggressive and antisocial behaviours, as such children may become hypersensitive to others' negative reactions or threats of punishment. Thus, understanding the presence and effect of

trauma on the development of secondary CU features may give us further insight into the different pathways to their development.

Trauma has been an important distinguishing factor for primary and secondary CU features and psychopathy. For example, in a study of incarcerated male adolescents ($N = 227$, $M = 15.72$ years), those identified as having secondary psychopathy showed greater experiences of sexual abuse compared to those identified with the primary variant (Kimonis, Fanti, Isoma, & Donoghue, 2013). Interestingly, this study also found that individuals with the primary variant were more likely to have experienced parental emotional and physical neglect. Tatar and colleagues (2012) also found in a sample of adjudicated males ($N = 355$, $M = 16.42$), that those identified as having secondary psychopathy (12% of the total sample) had a greater history of trauma compared to both the primary variant and the low psychopathy group. Importantly, this study found that those identified with secondary psychopathy also had higher levels of post-traumatic stress disorder (PTSD) symptoms and dissociation. In another sample of juvenile male offenders ($N = 238$, $M = 16.8$), those identified as having secondary CU features (18% of the sample) again were found to have higher levels of trauma and PTSD symptoms (Sharf et al., 2014). These results are consistent across studies including justice-involved males and females (e.g., Bennett & Kerig, 2014) and clinical samples (Kahn et al., 2013). Further evidence of this distinction can be found in the adult literature, with studies observing that incarcerated individuals with secondary psychopathy had more extensive trauma histories, including child abuse as well as PTSD symptoms (e.g., Blagov et al., 2011) than those with primary psychopathy. It is important to note that although some studies have found individuals with primary CU features or psychopathy have also

experienced trauma, all studies found that the secondary variant experienced greater levels of PTSD (e.g., reexperiencing trauma thoughts; avoidance of traumatic stimuli; dysregulated affect), compared to the primary variant (e.g., Bennett & Kerig, 2014, Kahn et al., 2013). Therefore, it is important to understand how trauma and PTSD symptoms, such as dysregulated affect, combined may help us understand the development or identification of youth with secondary CU features.

1.4. Trauma, Affect Regulation, and CU variants

Combining the two literatures on trauma and affect regulation, youth who have experienced high levels of trauma, particularly in relation to caregivers, show features such as dysregulated affect, emotional numbing, and disruptions in emotional development. These features have been speculated to be due to an active attempt to avoid overwhelming negative interpersonal cues (Kerig & Becker, 2010). In a sample of adjudicated adolescents ($N = 417$, $M = 16.15$ years; 25% female), Bennett and Kerig (2014) found that youth identified as having higher levels of trauma and trauma-related symptoms (i.e., youth with secondary CU features; 20% of the sample) showed less acceptance of emotions, and less ability to identify and differentiate their own emotions compared to youth with primary CU features and those with low CU features. They also showed greater emotional suppression or numbing as compared to youth with primary CU features or those with low levels of CU features. In this study, those with secondary CU features were more likely to detect negative affect in others and have higher levels of distress as compared to those with primary or low levels of CU features. The authors

suggest that youth with secondary CU features may be evoked by negative interpersonal cues to buffer or protect themselves from high levels of distress. In contrast, youth with primary CU features were less likely to detect others' negative affect, and may therefore be less distressed as a function of their fundamental cognitive-affective deficits. This study suggests that individuals with primary CU features may have deficits in emotional recognition (i.e., they are less sensitive to negative stimuli) and affect regulation, which are believed to be at the core of psychopathic personality. Conversely, youth with secondary CU features, who are exposed to chronic maltreatment or trauma may be overly sensitive or overwhelmed by emotional stimuli, and may therefore have difficulty attending to and processing information following exposure to negative stimuli (e.g., emotional numbing, suppressing of emotions).

Understanding the effects of trauma and associated affect regulation skills and strategies may be key to informing treatment targets. Those with secondary CU may require a more targeted treatment for trauma and affect regulation skills, compared to their under-aroused primary counterparts. To this end, it is important to understand how youth with primary and secondary CU may present clinically in order to provide appropriate treatment recommendations.

1.5. Clinical Features of Variants

Findings across multiple lines of research (e.g., trauma, affect regulation and emotional processing, and moral development) all support the notion of two variants of CU features. Specifically, they identify one variant (i.e., primary) that is biologically and

emotionally underaroused that interferes with moral development, and another (i.e., secondary) that is overaroused and therefore highly dysregulated, which interferes with moral development. Youth classified as having secondary CU features would be indistinguishable to their primary counterparts in that they also show the same clinical features, such as shallow affect and callous use of others. Historically however, youth with secondary CU features have been found to have high levels of PTSD symptoms such as anxiety and have more exposure to maltreatment and trauma (e.g., Bennett & Kerig, 2014; Kahn et al., 2013). In line with Karpman's original theory, youth with secondary CU features have also been shown to have higher levels of aggression that are disproportionately reactive and defensiveness (Kimonis et al., 2011). Youth classified with the secondary variant have also been shown to have higher levels of psychopathology and emotionality, including higher levels of depression, anxiety, anger, impulsivity, and attention problems (Kahn et al., 2013; Kimonis et al., 2012). Findings on psychopathology are consistent with the research that has found symptoms of these forms of psychopathology to be the behavioural expression of affect dysregulation (Leibenluft, 2011).

Only a small number of studies have examined CU features and variants in non-adjudicated samples. Kahn and colleagues (2013) identified primary and secondary youth in a clinical sample of youth ($N = 272$, $M = 13.40$, 49% female) using cluster analysis and measures of CU, anxious/ depressed, trauma exposure, and PTSD symptoms. They found three clusters: an anxious/ conduct cluster (35.3%), primary cluster (31.2%), and secondary cluster (33.5%). Using both parent and youth report, these clusters were validated using measures of impulsivity, externalizing symptoms, and

behavioural inhibition. They found that those identified as displaying the secondary CU variant to be higher on impulsivity, aggression, behavioural inhibition and activation compared to the primary variant. They did not differ on parent report of the youth's cruelty. In a community sample of Cypriot adolescents ($N = 2306$; $M = 16$, 50% female), researchers found four groups using Latent Profile Analysis using CU features, anxiety, and conduct problems (Fanti et al., 2013). These four groups included a low risk (80.5%), an anxious group (8.9%), a primary CU variant group (7.8%), and a secondary CU variant group (2.8%). They found the secondary variant to have significantly more anxiety, conduct problems, and reactive aggression, than the primary variant. However, the groups did not differ on proactive aggression. In a Canadian clinical sample of children with disruptive behaviour disorders ($N = 166$; $M = 8.64$, 21.5% female), similar groups were found including a low group (22%), an emotional/ conduct group (20%), a high CU/ conduct-low emotional group (34%), and a high CU/ emotional/ conduct group (23%)(Andrade, Sorge, Na, & Wharton- Shukster, 2015). In summary, there is evidence that primary and secondary profiles of CU features can be found in both clinical and community samples.

1.6. Gender and CU variants

Due to the large proportion of samples that have relied on justice-involved males, there is a paucity of research on gender differences across the variants. Some gender differences have been found in the general CU literature. In an adjudicated sample, females high on CU features were found to show higher levels of relational and physical

aggression ($N = 150$, $M = 15.2$, 40% female; Stickle et al. 2012). However, females also showed higher levels of distress following aggressive interactions compared to males. There is also evidence from the genetic literature that found nonshared environmental influences characterized females on the stable high and increasing CU trajectories, but not males (Fontaine et al., 2010).

In the literature examining CU variants, there has been only a handful of mixed-gender studies. In two studies, females have been found to be over-represented in the secondary CU variant (Bennett & Kerig, 2014; Euler et al., 2015). However, this finding has not been consistently observed as another study found no gender differences across the variants (Kahn et al., 2013). Gill and Stickle (2016) examined the moderating effect of gender on girls with primary and secondary psychopathy and found gender invariance, such that females in the secondary psychopathy group did not differ in their negative emotions compared to males in the secondary group. Given the small number of studies, there have been calls for increased research on gender and CU variants particularly in relation to outcomes (e.g., Gill & Stickle, 2016). No study to date has examined whether the variants are consistent across gender or for gender invariance within the same sample.

1.7. Current Study

The consistent finding across multiple areas of research is that there are two presentations of youth with CU features: one group that are insufficiently aroused by emotional cues (e.g., low levels of emotional dysregulation); and another group that is emotionally overwhelmed (e.g., dysregulated affect) and therefore learns to avoid

attending to emotional cues (e.g., suppress emotions). Although anxiety has traditionally differentiated between the variants, the inclusion of affect dysregulation and suppression as class indicators extends prior research by aiding in the classification of youth using the specific underlying temperamental factors related to the development of primary and secondary CU features.

The first aim of the current study was therefore to evaluate whether distinct groups of youth who are high on CU features may be identified by using measures of affect dysregulation and affect suppression (e.g., emotional numbing) along with related anxiety symptoms and experience of abuse in a clinical sample of youth. The second aim was to examine whether these groups are consistent with previous literature (e.g., Kahn et al., 2013), by comparing all groups on psychopathology shown to be related to CU variants (e.g., oppositional, conduct problems, depressive symptoms). Lastly, due to the lack of research on gender differences in CU features, this study also examined whether there are distinct differences as a function of gender across each of the two research questions.

It is hypothesized that two groups high on CU features will emerge as predicted by previous research. One group will be under aroused, and therefore have low levels of affect dysregulation and low levels of affect suppression, as well as low levels of anxiety (e.g., primary CU features) and abuse. The second group is hypothesized to be overaroused, and therefore have high levels of both affect dysregulation and suppression, as well as high levels of anxiety and abuse (e.g., secondary CU features). A third and fourth group are also hypothesized to emerge, one that is low on CU and abuse but high on dysregulation and anxiety and a fourth that is low on all clustering variables. Based

on validating variables, the primary CU group is expected to have lower levels of psychopathology related to affect dysregulation (i.e., ADHD symptoms, ODD symptoms, depressive symptoms) compared to those designated as secondary CU features. It is hypothesized the two variants will not differ on levels of CU features or conduct problems and that both groups will be higher on these variables than those low on CU features. Due to the lack of research on females, no specific predictions regarding gender differences will be made.

Chapter 2. Methods

2.1. Participants

Participants ($N = 418$; 56.7% female) ranged in age from 12 to 19 ($M = 15.04$, $SD = 1.85$). Of the sample that reported ethnicity ($n = 378$), over half of the sample identified as Caucasian (65.3%). The remaining sample identified as Asian (6.6%), Aboriginal (8.7%), and other (e.g., mixed race, Hispanic; 19.2%). At the time of the study, 87.6% of the sample were living with their biological parents, 5.3 % were in foster care or group homes, and 7.7% were living with other relatives or elsewhere. In total, 10.5% of the sample had been in foster care at some point in their life ranging from 1 to 6 placements. Some of the youth had contact with the law including probation (4.8%), conviction and/or probation (3.3%).

Parent education level ($n = 371$) ranged from some high school courses (8.6%), completed high school (23.5%), some college/university (14.6%), completed college/university (48%), and graduate degree (5.3%). Parent income ranges included 0-25K (24.7%), 25-50K (25%), 50-75K (21.8%), and 75K+ (28.5%).

2.2. Measures

Only youth-reported data were included in the study with the exception of demographic information (i.e., average household income, parent's education) which was drawn from parent-report data.

Demographic information. A section was completed by all participants in order to obtain basic demographic information including gender, age, ethnicity, and with whom the child was currently living. Parents reported information on their education level, and income level was also obtained.

Callous-unemotional features. The *Inventory of Callous Unemotional Traits-revised* (ICU; Hawes, Dadds, Brennan, Rhodes, & Cauchi, 2013) is a shortened 12-item self-report measure that assesses two factors associated with a higher-order CU dimension as well as a total overall score. The ICU- revised is based on the larger 20 item full ICU (Frick, 2004). Each item is rated on a 4-point Likert scale ranging from 1 (*not at all true*) to 4 (*definitely true*) meaning higher scores relate to higher levels of CU features. The callous factor includes nine items (e.g., "I don't care who I hurt to get what I want") and the uncaring factor include eight items (e.g., "I feel bad or guilty when I do something wrong," reverse coded). The revised scale has shown good psychometric properties in clinical and normative samples (e.g., Hawes et al., 2013). In the current sample, the scales showed good reliability for the callousness and uncaring subscales ($\alpha = .72$ and $.80$ respectively) and the total score ($\alpha = .83$).

Affect Dysregulation and Suppression of Affect. The *Affect Regulation Checklist* (ARC; Moretti, 2003) is a 12-item self-report measure adapted from published scales of emotion regulation (Gross & John, 1998, 2003; Shields & Cicchetti, 1997) and augmented with supplementary items to tap three aspects of affect regulation in adolescents. In keeping with contemporary models, the ARC is based on a multidimensional view of emotion regulation that includes both maladaptive (e.g., lack of control, suppression) and adaptive (e.g., reflection) aspects of regulation. Furthermore,

the ARC assesses regulatory characteristics independent of specific emotions. Items do not refer to specific emotions and avoid confounding regulatory processes with emotional states. The current study utilizes two of the ARC's three factors: Affect Dysregulation (4 items; e.g., "I have a hard time controlling my feelings"; "I find it very hard for to calm down when upset"), and Affect Suppression (5 items; e.g., "I try hard not to think about my feelings"; "I believe it is best to keep feelings in control and not to think about them"). The third subscale (i.e., Adaptive Reflection) was not used. Items are scored on a 5-point scale ranging from 1 (*Not like myself*) to 5 (*A lot like myself*) and ask about experiences of affect in general. A total mean score was used with higher scores indicating higher levels of affect dysregulation or suppression. The three-factor structure of the ARC and its relationships with emotional and behavioral problems have been confirmed in previous research (Moretti & Craig, 2013; Penney & Moretti, 2010). Both the affect dysregulation and affect suppression scales have shown good reliability in the current sample ($\alpha = .83$ and $.74$ respectively).

Psychopathology. The *Brief Child and Family Phone Interview* (BCFPI; Cunningham, Boyle, Hong, Pettingill, & Bohaychuk, 2009) is a standardized assessment and service evaluation tool. Derived from the Ontario Child Health Study (OCHS) scales, the BCFPI includes many items in common with the Child Behavior Checklist (CBCL; Achenbach, 2009; Boyle, Offord, Racine, & Fleming, 1993). In the current study the BCFPI was administered as a self-report paper and pencil measure. It possesses excellent psychometric properties and has been used in large-scale epidemiological studies (Boyle et al., 2009). Six domains of functioning related to DSM-IV diagnoses are assessed: Attention-Deficit/Hyperactivity Disorder (6 items; e.g., "Do you notice that you

are impulsive or act without stopping to think?”), Oppositional Defiant Disorder (6 items; e.g., Do you notice that you are defiant or talk back to adults?”), Conduct Disorder (6 items; e.g., “Do you destroy things belonging to others?”), Generalized Anxiety Disorder (6 items; e.g., “Do you notice that you worry about past behavior?”) and Major Mood Disorder (9 items; e.g., “Do you have no interest in your usual activities?”). Items from the Generalized Anxiety Disorder scale were used in the clustering analysis for measures of anxiety, while the other scales were used to validate the proposed groups. Each scale is rated on a Likert scale from 1 (*Never*) to 3 (*Often*) and summed, meaning higher scores relate to more symptoms. All scales had acceptable reliability ($\alpha = .68$ to $.90$), which is consistent with previous literature (e.g., Cook, Leschied, Pierre, Stewart, den Dunnen, & Johnson, 2013).

For the purposes of this study, ODD symptoms were also split based on the Burke model (Burke, Hipwell, & Loeber, 2010). This model resulted in two separate dimensions as: a behavioural dimension and an emotional/ irritable dimension. Currently no two-dimensional ODD scale has been validated; therefore, items were separated based on theoretical grounds from previous factor analytic literature (e.g., Burke et al, 2010; Evans, Pederson, Fite, Blossom, & Cooley, 2016; Herzhoff & Tackett, 2016). Using the BCFPI ODD scale, emotional symptoms of ODD were assessed by three items (i.e., “I am cranky”, “I am easily annoyed by others”, “I am angry and resentful”). Behavioural symptoms of ODD was also represented by three items (i.e., “I blame others for my mistakes”, “I argue with adults”, “I am defiant and talk back to people”).

Abuse. The *Conflicts Tactics Scale* (CTS; Straus, 1979) is a widely-used questionnaire that assesses violence and aggression within relationships (e.g., Moretti &

Craig, 2013). In the current study, we utilized a modified version of the CTS that assesses perpetration and victimization between parent and child as a screener for abuse. We focused on teens' experiences of emotional and physical abuse in their relationships with their parents (e.g., "Done to you by your parent") as well as in their experience witnessing abuse (e.g., "Done by one parent in the family to the other") in the past 6 months. Abuse was assessed by 14 items, including seven items that assessed experiencing or witnessing emotional abuse (e.g., "Insulted, put down or swore at person", "Said something to spite") and seven items that assessed physical abuse (e.g., "Pushed or shoved"; "Slapped"). Participants rated each item on a 4-point scale from 1 (*Never*) to 4 (*Always*). The mean score for each subscale as well as a total abuse score were used in the analysis. The scales showed good reliability in the total sample ($\alpha = .84$ to $.87$).

2.3. Procedures

Participants from this study were drawn from a provincial-wide intervention evaluation for the Connect program (Moretti & Braber, 2013). Connect is a 10-week manualized group program for parents or alternative caregivers of pre-teens and teens with serious behavior problems. The majority of parents who attended the group were either referred by community mental health teams, schools or other mental health professionals due to concerns about their child's mental health and behavioural functioning. One child from each parent participant was asked to complete a set of questionnaires at the baseline, middle, and end of the treatment. Before the beginning of

the group, each parent received a research package that included study information, consent and child assent forms and baseline questionnaires from their group leader. Both parent and child were asked to return the questionnaires prior to the beginning of the first session. Each group leader collected all information and then returned the research materials to the study co-ordinator. Of those that attended Connect, 75% ($n = 612$) of parents and 50% ($n = 450$) of youth filled out questionnaires. Every participant in the current study had parental consent to complete the study. Exclusion criteria included the presence of a major mental illness (e.g., schizophrenia) or low IQ, as reported by the parent. The current study utilizes data collected from 85 groups beginning in the Spring of 2014 until the end of the Summer of 2015. Participants in the current study included youth age 12 and older ($n = 32$ excluded) to ensure the participants understood the questionnaires, which were evaluated to be at the 7th grade reading level.

2.4. Analytic plan

Analyses were conducted using MPlus 7 (Muthén & Muthén, 2012) and the Statistical Package for the Social Sciences (SPSS 22, IBM, 2013). Latent profile analysis (LPA), otherwise known as Latent Class Cluster Analysis (LCCA) is a statistical analysis that allows for the identification of unique subgroups based on the profiles indicated by continuous variables of interest (Vermunt & Magidson, 2002). LPA is based on a measurement theory that posits that an underlying grouping variable (i.e. the latent profile variable) is not observed but can be inferred (Muthén, 2004). This technique is often used to organize multiple measures of behaviour such that each individual within a class

share common patterns in their behaviour (Lanza, Patrick, & Maggs, 2010). LPA has many favourable properties compared to more traditional clustering techniques. As a model-based approach, it is flexible in that it can handle continuous data; it yields a probabilistic classifying approach, which means that each person is assumed to belong to one cluster or another; and it takes into account any uncertainty about that membership (Vermunt & Madison, 2002). After the number of latent classes is determined, correlates of the latent class variable can be examined (e.g., gender, age, psychopathology; Wang & Hanges, 2011). LPA also allows for both exploratory analysis as well as hypothesis testing by allowing the researcher to estimate multiple models in order to determine the best fit. Using group probabilities, the researcher can also examine each individual's probability of being placed in each subgroup as well as which individuals moved groups between models, allowing for more person-centered analyses. Unlike more traditional methods (e.g., k-means), LPA has more formal criteria and fit statistics and can handle abnormal distributions, modest correlations between variables, and missing data.

Data underwent standard procedures for cleaning and verifying assumptions for multivariate and univariate normality. Univariate outliers were detected using tests of normality as well as examination of z-scores (Fidell & Tabachnick, 2003). Only five cases were identified as falling outside the acceptable range of $Z = 3.29$ for ICU and/or maltreatment; however, given the purpose of the study to examine those at the highest risk of developing CU features, these cases were retained for analysis. In addition, the analyses were conducted with and without these cases, which did not affect the findings; therefore, the cases were retained. Multivariate normality was examined using Mahalanobis distance (Fidell & Tabachnick, 2003). Four cases were found to violate this

assumption. Again, the analyses were conducted with and without these cases, which did not affect the findings; therefore, the cases were retained. Missing data analysis revealed that data was missing at random (MAR; $\chi^2(14) = 12.57, p = .56$; Little, 1988), as LPA utilizes maximum likelihood estimation and is able to handle missing data. 4.3% of cases were missing the affect suppression and dysregulation scales, 2.4% were missing a score for abuse. Missing item data were substituted with the person mean if the scale was missing 80% or less¹. Related measures (e.g., CBCL; Achenbach, 2009) employ the use of person mean in calculating scores when less than 80% are missing. In addition, the LPA was conducted using FIML with no change to the results. No significant differences were found on all variables of interest for those cases that were missing data versus those that had all variables.

To determine which model best fit the data, several fit indices were calculated. Overall, no formal cutoffs for the LPA indicators currently exist to aid in deciding how many groups exist; instead, analyses rely on comparing indices and examining probabilities to determine the best-fitting model. The Akaike Information Criterion (AIC; Akaike, 1987), the Bayesian Information Criterion (BIC; Schwarz, 1978), and the Sample-Size Adjusted Bayesian Information Criterion (SABIC; Sclove, 1987) are all goodness-of-fit indices, with the lower value indicating the better fitting model. The larger the difference in AIC or BIC indicates stronger evidence for one model over the other. Entropy scores are used to determine the accuracy of the classification. The Lo-Mendell-Rubin (LMR; Lo, Mendell, & Rubin, 2001) adjusted likelihood test provides an

¹ Inputted person means for missing data, the scale means did not change when missing data were inputted.

inferential statistic that can infer whether the currently specified model fits the data better than the model with one less class. This is a robust test in which a significant value indicates that the number of classes specified in the current model is a good fit (Meghani, Lee, Hanlon, & Bruner, 2009; Nylund, Asparouhov, & Muthén, 2007). Finally, for each person, MPlus estimates how likely it is that the person belongs to each class, allowing the researcher to examine which people move into new classes (e.g., moving from a 2- to a 3-class model; Muthén, 2004). This study relied on these three methods as well as an examination of the class probabilities and residual variances in order to determine the best-fitting model. Residual covariance represents the correlation between variables not accounted for by the model, which could be important in determining which is the better model. To ensure the stability of the model, 500 and 1000 starts were computed in order to replicate the best loglikelihood. In addition, 5000 iterations were computed.

As a 4-class solution was predicted, 3-, 4-, and 5- class models were estimated. Once each model was identified, class probabilities and assignments were extracted and added to the original dataset to examine mean differences and associated correlates. A series of ANCOVAs were performed to examine group differences on the clustering variables in the emerging profiles while controlling for age and gender effects. Tukey HSD post-hoc tests were performed to further examine any mean differences across groups for the final class solutions. Due to the large number of ANCOVAs, a Bonferroni correction was applied (Bland & Altman, 1995). This step was then repeated with theoretically relevant psychopathology variables that have been found to be associated with primary and secondary youth.

To test for gender differences, several properties were examined including whether the number of latent classes, the class specific item response probabilities, and the prevalence of the classes were the same across boys and girls (Collins & Lanza, 2010; Finch, 2015). In order to determine if boys and girls had the same number of classes, 3-, 4-, and 5- class models were estimated separately for boys and girls using LPA in Mplus 7.0 (Muthén & Muthén, 2012) following the same steps laid out above. Once the same number of classes was established for boys and girls, the next step was to determine if the class specific item response probabilities differed. This was done by comparing two nested models. The first model allowed item response probabilities to vary across gender; the second model constrained item responses probabilities to be equal. The two models were compared on fit indices (e.g., AIC, BIC, sample-adjusted BIC) and by conducting a chi-square difference test based on the calculated log loglikelihood (Finch, 2015). If the constrained model fit the data as well or better than the unconstrained model and the chi-square difference test was insignificant, the conclusion could be made that item responses do not differ between the groups and there are no gender differences (Collin & Lanza, 2010). Sample size allowed for the detection of medium effect sizes (Faul, Erdfelder, Buchner, & Lang, 2014). To determine whether prevalence of the classes was the same across boys and girls, two nested models were again compared. The first model allowed class prevalence to vary across gender; the second constrained class prevalence to be equal across groups. Both models constrained item response to be equal (Collins & Lanza, 2010). These models were compared on AIC, BIC, sample size adjusted BIC and chi-square difference test (Finch, 2015). If the chi-square difference was significant, the more parsimonious constrained model caould be concluded to be the

better fitting model. If the unrestricted model fit the data significantly better, than the conclusion could be made that there were proportion differences within the classes.

Chapter 3. Results

3.1. Sample description

The descriptive statistics on the variables of interest for whole sample can be found in Table 1. Gender differences revealed that females scored significantly higher than males on affect dysregulation ($t(410) = -5.86, p \leq .001$) affect suppression ($t(398) = -3.60, p \leq .001$) anxiety ($t(415) = -5.61, p \leq .001$), ODD symptoms ($t(414) = -2.98, p < .01$) and depressive symptoms ($t(410) = -6.34, p \leq .001$). Males scored higher than females on CU features ($t(412) = 1.99, p < .05$). There were no gender differences for abuse, CD symptoms or ADHD symptoms. Correlations for the overall sample (Table 2) and by gender (Table 3) were examined prior to completing the Latent Profile Analysis to examine the relationship between the variable without the clusters.

Table 1. Psychometric properties of the major study variables.

Variable	Overall			Males (n = 178)		Females (n = 237)		
	M	SD	Skew	M	SD	M	SD	
CU features	10.21	5.82	0.71	10.85	5.89	9.71	5.72	$t(412) = 1.99^*$
Affect dysregulation	3.02	1.13	-0.10	2.66	1.11	3.30	1.06	$t(410) = -5.86^{***}$
Affect suppression	2.96	0.95	0.05	2.76	.91	3.10	.96	$t(398) = -3.60^{***}$
Anxiety	13.02	3.32	-0.21	12.00	3.14	13.77	3.24	$t(415) = -5.61^{***}$
Abuse	1.25	0.37	2.99	1.44	.45	1.51	.47	$t(412) = -1.59$
CD symptoms	6.85	1.38	2.30	6.87	1.39	6.45	1.41	$t(415) = .135$
ODD symptoms	12.04	2.77	-0.04	11.57	2.71	12.38	2.77	$t(414) = -2.98^{**}$
ADHD symptoms	12.58	2.93	-0.09	12.30	2.78	12.79	3.00	$t(413) = -1.69$
Depressive symptoms	15.77	4.95	0.46	14.04	4.20	17.00	5.02	$t(410) = -6.34^{***}$

Note. M = Mean; SD = standard deviation; * $p < .05$, ** $p < .01$, *** $p < .001$

Table 2. Correlations for all variables of interest for full sample.

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Gender										
2. Age	.10*									
3. CU features	-.10*	-.01								
4. Affect dysregulation	.28***	.03	.14**							
5. Affect suppression	.18***	.20***	.14**	.56***						
6. Anxiety	.27***	.23***	-.15**	.53***	.46***					
7. Abuse	.08	.09	.25***	.30***	.21***	.17**				
8. ADHD symptoms	.08	.10*	.22***	.50***	.35***	.37***	.22***			
9. ODD symptoms	.15**	.00	.38***	.55***	.32***	.30***	.32***	.54***		
10. CD symptoms	-.01	-.04	.43***	.23***	.21***	.030	.28***	.33***	.44***	
11. Depressive symptoms	.30***	.19***	.22***	.60***	.51***	.53***	.29***	.47***	.45***	.29***

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

Table 3. Correlations for all variables of interest by gender.

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Age		.05	.12	.24***	.21**	.14*	.21*	.03	.02	.22**
2. CU features	-.05		.21**	.13	-.14*	.22**	.24***	.42***	.46***	.28***
3. Affect dysregulation	-.15	.16*		.54***	.55***	.34***	.51***	.55***	.22**	.58***
4. Affect suppression	.11	.21**	.53**		.45***	.16*	.31***	.27***	.16*	.47***
5. Anxiety	.21**	.10	.42**	.42***		.22**	.37***	.29***	.07	.51***
6. Abuse	.02	.31***	.24**	.27***	.06		.29***	.31***	.29***	.33***
7. ADHD symptoms	-.09	.23**	.48***	.36***	.36***	.12		.53***	.33***	.50***
8. ODD symptoms	.07	.36***	.51***	.36***	.29***	.33***	.54***		.41***	.44***
9. CD symptoms	-.10	.39***	.26***	.27***	-.04	.28***	.33***	.50***		.34***
10. Depressive symptoms	.09	.26**	.55***	.52***	.49***	.22**	.42***	.39***	.25**	

Note. Females are displayed in the top right of the correlation table and males are displayed in the bottom left *p < .05, ** p < .01, *** p < .001

3.2. Can distinct groups, including two groups of youth who are high on CU features may be identified?

The LPA was conducted using five continuous indicators including measures of CU features, abuse, anxiety, affect regulation, and affect suppression. Results of the analysis (see Table 4) revealed the best-fitting model to be the 4-class solution as indicated through examination of multiple indicators of best fit. The entropy score (.786), suggests good classification accuracy and good separation between the classes. Classification probabilities also confirmed that the groups were well-specified (.91, .90, .79, and .92, respectively). Finally, examination of the residuals for mixed covariance revealed that the model accounted for the relationship between all variables of interest. The 4-class model was an improvement over the 3-class model in that the BIC was lower. The 3-class model also did not account for the relationship between key indicators, CU features and anxiety as indicated by the residual variance ($r = .45$). The 4-class solution had a significant Lo-Mendell-Rubin ($p = .003$), suggesting that it fit the data better than a three-class solution. Although the 5-class model did have drops in both the AIC and BIC, the decrease was minimal, and the Lo-Mendell-Rubin was not significant, indicating a 4-class model was the best fit across the multiple indicators and will therefore be interpreted further. The 5-class model revealed similar clusters as the 4-class model, with the addition of a medium anxious group- low CU group.

The final model consisted of four classes (see Figure 1) and indicated 126 youth belonged to class 1 (30%), 184 youth belonged to class 2 (44%), 81 youth were in class 3 (19%), and class 4 had 27 youth (6%). The latent class indicators were merged back into

the SPSS file to examine the model indicators using ANCOVA while controlling for age and gender (see Table 5). The clusters differed significantly on reports of CU features, $F(3, 394) = 176.79, p \leq .001, \eta^2 = .25$, and Anxiety Symptoms, $F(3, 411) = 195.17, p \leq .001, \eta^2 = .59$. The classes also differed on Affect Dysregulation $F(3, 394) = 176.79, p \leq .001, \eta^2 = .57$, and Affect Suppression, $F(3, 394) = 94.63, p \leq .001, \eta^2 = .57$. Finally, the groups differed on Abuse $F(3, 401) = 160.17, p \leq .001, \eta^2 = .55$.

Table 4. Latent Profile Analysis model fit statistics for full sample.

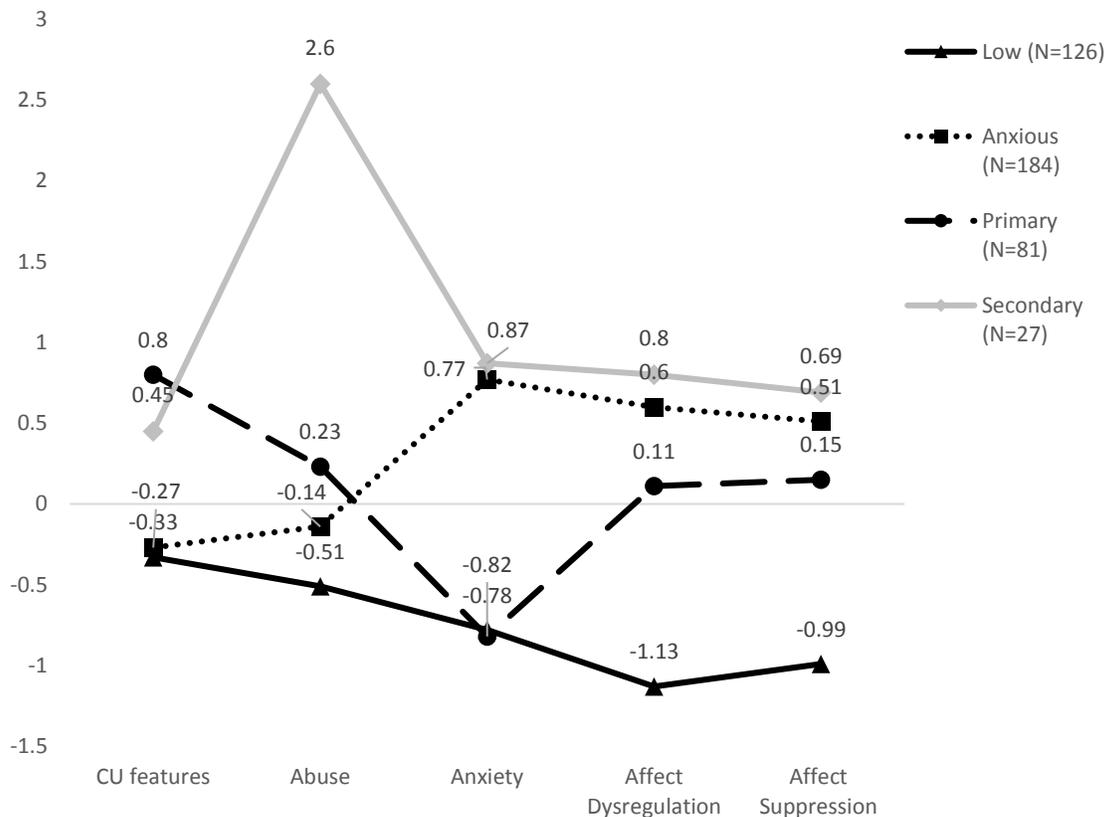
	3 Class	4 Classes	5 Classes
AIC	7257	7185	7155
BIC	7346	7298	7292
Sample Adjusted BIC	7276	7209	7184
Entropy	.811	.786	.759
Lo- Mendell-Rubin	2 v 3 Value = 116 $p = .02$	3 v 4 Value = 82 $p = .003$	3 v 2 Value = 40 $p = .07$
N for each class	C1 = 154 (36.8%) C2 = 229 (54.8%) C3 = 35 (8.4%)	C1 = 126 (30.1%) C2 = 184 (44%) C3 = 81 (19.4%) C4 = 27 (6.5%)	C1 = 109 (26%) C2 = 67 (16%) C3 = 85 (20.3%) C4 = 134 (32.1%) C5 = 23 (5.5%)

Note. AIC= Akaike information criterion; BIC = Bayesian information criteria; C1= class 1; C2 = class2; C3 = class 3; C4 = class 4; C5 = class 5

Findings suggested Class 1 ($n = 126$) represented a Low CU/ Low Symptom group or “Low” class because it scored significantly lower on CU features ($M = 8.25, SD = 4.71$) than the third class ($M = 15.59, SD = 5.32$) and fourth class ($M = 13.44, SD = 7.63$) but did not differ from the second class. This class had lower levels of anxiety ($M = 10.42, SD = 2.26$) than the second class ($M = 15.58, SD = 1.87$) and fourth class ($M = 15.85, SD = 2.05$), but did not differ from the third class. This class also had lower levels of affect dysregulation ($M = 1.75, SD = .55$) and suppression ($M = 2.01, SD = .65$) compared to the second class ($M = 3.70, SD = .81$ and $M = 3.44, SD = .76$ respectively),

the third class ($M = 3.15, SD = .74$ and $M = 3.10, SD = .70$, respectively), and the fourth class ($M = 3.93, SD = .77$ and $M = 3.61, SD = .67$ respectively). This class also had significantly lower levels of experienced abuse ($M = 1.25, SD = .28$) than classes 2, 3, or 4 ($M = 1.42, SD = .30$; $M = 1.59, SD = .36$; and $M = 2.69, SD = .42$, respectively).

Figure 1. Model indicators and resulting classes.



Class 2 ($n = 184$) represented a Low CU/ High Symptom (labelled “Anxious” class) because it scored significantly lower on CU features ($M = 8.63, SD = 4.64$) compared to the third and fourth class but did not differ from the first class. This class had significantly higher anxiety symptoms compared to the Low and the third class ($M = 10.30, SD = .30$), but not the fourth class. This class had significantly higher levels of

affect dysregulation, and affect suppression compared to the Low class and the third class, but did not differ from the fourth class on either scale. They also had significantly higher levels of abuse compared to the Low class and the third class, but had significantly lower levels compared to the fourth class.

Table 5. ANOVA results, Mean and Standard Deviations for all classes.

Variable	Low	Anxious	Primary	Secondary	Test statistic	Effect Size
CU features	(n = 126) 8.25 (4.71) ^b	(n = 181) 8.63 (4.64) ^b	(n = 81) 15.59 (5.32) ^a	(n = 27) 13.44 (7.63) ^a	F (3, 408) = 46.16 ^{***}	$\eta^2 = .25$
Anxiety symptoms	(n = 126) 10.42 (2.26) ^b	(n = 184) 15.58 (1.87) ^a	(n = 81) 10.30 (2.00) ^b	(n = 27) 15.85 (2.05) ^a	F (3, 411) = 195.17 ^{***}	$\eta^2 = .59$
Affect dysregulation	(n = 125) 1.75 (.55) ^c	(n=178) 3.70 (.81) ^a	(n = 78) 3.15 (.74) ^b	(n = 24) 3.93 (.77) ^a	F (3, 394) = 176.79 ^{***}	$\eta^2 = .57$
Affect suppression	(n = 120) 2.01 (.65) ^c	(n = 178) 3.44 (.76) ^a	(n = 78) 3.10 (.70) ^b	(n = 24) 3.61 (.67) ^a	F (3, 394) = 94.63 ^{***}	$\eta^2 = .42$
Abuse	(n = 125) 1.25 (.28) ^d	(n = 179) 1.42 (.30) ^c	(n =77) 1.59 (.36) ^b	(n = 27) 2.69 (.42) ^a	F (3, 401) = 160.17 ^{***}	$\eta^2 = .55$

Note. ^{a-d} Means in a row without a common superscript letter differ ($p \leq .001$), as analyzed by one-way ANCOVA.; η^2 = Eta squared; ^{***} $p \leq .001$

The third class ($n = 81$) represented a High CU/ Low Symptom or “Primary CU” class. This class had significantly more CU symptoms compared to the Low and Anxious class, but not compared to the fourth class. They had significantly lower anxiety, affect dysregulation, affect suppression and experienced abuse compared to the Anxious and fourth class, but significantly higher symptoms compared to the Low class.

The fourth class ($n = 27$) was a High CU/ High Symptom, labelled “Secondary CU” class. This class had higher levels of CU features compared to the Low and Anxious classes, but not the Primary class. This class had higher levels of anxiety, affect dysregulation, and suppression compared to the Low and Primary classes, but was not different from the Anxious Class. Finally, this class had significantly higher levels of abuse compared to all other classes.

3.3. How do the classes differ in associated clinical presentations?

Using the four established classes and controlling for age and gender, an ANCOVA tested the differences on different psychopathologies (i.e., ADHD symptoms, ODD symptoms, CD symptoms, depressive symptoms) that have been found to be associated with the variants. For measures of psychopathology, the overall ANCOVAs were significant, $F(3, 409) = 236.33, p \leq .001, \eta^2 = .21$, $F(3, 410) = 40.76, p \leq .001, \eta^2 = .23$, $F(3, 411) = 14.32, p \leq .001, \eta^2 = .10$, $F(3, 406) = 55.04, p \leq .001, \eta^2 = .29$, respectively.

Post hoc comparisons revealed that the results for ADHD symptoms, CD symptoms, and depression were as expected (see Table 6). For ADHD symptoms, the Secondary class ($M = 14.85, SD = 2.48$) scored higher than the Primary class ($M = 12.78, SD = 2.60$) and Anxious class ($M = 13.48, SD = 2.65$), and the Primary and Anxious classes scored higher than the Low class ($M = 10.65, SD = 2.52$). For CD symptom, the Primary and Secondary classes ($M = 7.40, SD = 1.59$ and $M = 13.56, SD = 2.87$), were both higher than the Anxious class ($M = 6.84, SD = 1.33$) and the Anxious class was

higher than the Low class ($M = 6.35$, $SD = .76$). The Primary and Secondary classes did not differ on CD symptoms. For depressive symptoms, the Secondary class ($M = 20.69$, $SD = 4.22$) was significantly higher than the Anxious class ($M = 17.77$, $SD = 4.49$). The Anxious class was higher than the Primary class ($M = 15.56$, $SD = 4.23$), which was higher than the Low class ($M = 11.82$, $SD = 2.94$).

Table 6. ANCOVA results for clinical presentations

Variable	Low	Anxious	Primary	Secondary	Test statistic	Effect Size
Age	(n = 126) 14.75 (1.81) ^b	(n = 184) 15.43 (1.87) ^a	(n = 81) 14.56 (1.68) ^b	(n = 27) 15.26 (1.81) ^{a, b}	$F(3, 414) = 5.60^{**}$	$\eta^2 = .04$
ADHD symptoms	(n = 125) 10.65 (2.52) ^c	(n = 183) 13.48 (2.65) ^b	(n = 80) 12.78 (2.60) ^b	(n = 27) 14.85 (2.48) ^a	$F(3, 409) = 236.33^{***}$	$\eta^2 = .21$
CD symptoms	(n = 126) 6.35 (.76) ^c	(n = 183) 6.84 (1.33) ^b	(n = 81) 7.40 (1.59) ^a	(n = 27) 7.70 (2.25) ^a	$F(3, 411) = 14.32^{***}$	$\eta^2 = .10$
Depressive symptoms	(n = 125) 11.82 (2.94) ^d	(n=181) 17.77 (4.49) ^b	(n = 80) 15.56 (4.23) ^c	(n = 26) 20.69 (4.22) ^a	$F(3, 406) = 55.04^{***}$	$\eta^2 = .29$
ODD symptoms	(n = 123) 9.98 (2.36) ^b	(n=182) 12.79 (2.54) ^a	(n = 81) 12.99 (2.06) ^a	(n = 27) 13.56 (2.87) ^a	$F(3, 410) = 40.76^{***}$	$\eta^2 = .23$
ODD emotional symptoms	(n = 124) 5.23 (1.30) ^b	(n = 182) 6.94 (1.33) ^a	(n = 80) 6.65 (1.07) ^a	(n = 27) 7.23 (1.68) ^a	$F(3, 406) = 45.65^{***}$	$\eta^2 = .25$
ODD behavioural symptoms	(n = 125) 4.80 (1.30) ^b	(n = 181) 5.81 (1.41) ^a	(n = 79) 6.33 (1.41) ^a	(n = 27) 6.30 (1.66) ^a	$F(3, 406) = 47.57^{***}$	$\eta^2 = .14$

Note. ^{a-d}Means in a row without a common superscript letter differ ($p < .001$), as analyzed by one-way ANCOVA.; $\eta^2 =$ Eta squared; ** $p < .01$, *** $p \leq .001$

The results for ODD symptoms were not all as expected. The one exception was that as expected, the Low class ($M = 9.98$, $SD = 2.36$) was significantly lower than the Anxious, Primary and Secondary classes. However, unexpectedly the Anxious, Primary

and Secondary classes did not differ on ODD symptoms. Further analysis examined previously established emotional and behavioural symptoms (Burke, Hipwell & Loeber, 2010; Frick & Nigg, 2012). Both ODD emotional and behavioural symptoms demonstrated the same pattern of results as the overall scale.

Age was also examined and found to differ across the classes $F(3, 414) = 5.60, p < .01$. The Anxious class ($M = 15.32, SD = 1.87$) was significantly older than the Low and Primary classes ($M = 14.75, SD = 1.81$ and $M = 14.56, SD = 1.68$ respectively). The Secondary class ($M = 15.26, SD = 1.81$) did not differ from any of the other classes.

3.4. Are there gender differences?

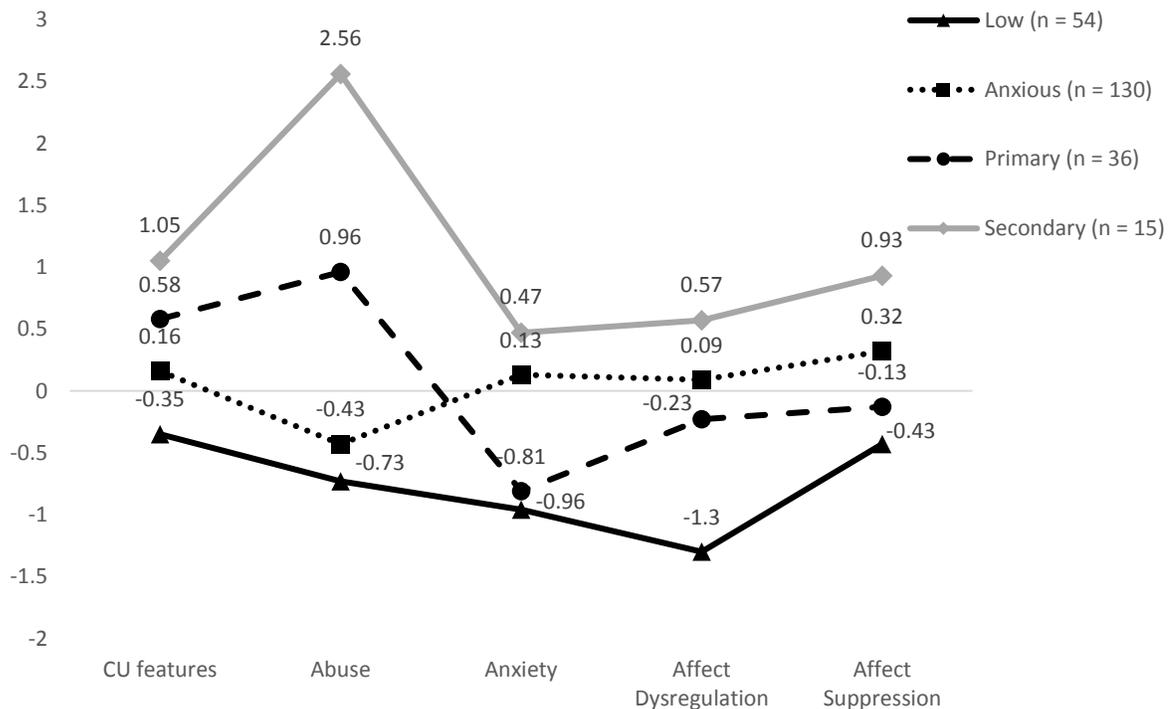
To examine gender differences, first the LPA was run separately for girls and boys. For girls (see Table 7), a 4-class model showed evidence of being a better model than the 3-class model with a drop in both AIC (30 points) and Sample adjusted BIC (27 points) with good identification ($Entropy = .824$). Upon examination of covariance residuals, CU features and anxiety symptoms continued to be highly related in the three-class model ($r = -.54$), while the 4-class model better accounted for this variance ($r = -.15; z = -4.9, p \leq .001$). Given that the relationship between CU features and anxiety is key to the distinction between Primary and Secondary CU, the 4-class model was selected as the better-fitting model for girls. Based on the 4-class model (see Figure 2), the classes that emerged had profiles consistent with the overall sample: Low class ($n = 56, 23\%$), Anxious class ($n = 130, 55\%$), Primary class ($n = 36, 15\%$) and Secondary class ($n = 15, 6\%$).

Table 7. Latent Profile Analysis model fit statistics for girls.

Girls	3 Class	4 Classes	5 Classes
AIC	4081	4051	4036
BIC	4158	4148	4154
Sample Adjusted BIC	4087	4060	4046
Entropy	.863	.824	.785
Lo- Mendell-Rubin	2 v 3 Value =73.36 <i>p</i> = .01	3 v 4 Value =40.36 <i>p</i> = .08	4 v 5 Value =26.26 <i>p</i> = .10
N for each class	C1=59 (25.1%) C2=162 (68.9%) C3=16 (6.8%)	C1= 130 (55.3%) C2= 54 (23%) C3= 36 (15.3%) C4= 15 (6.3%)	C1= 45 (19%) C2= 37 (15.6%) C3= 40 (42.6%) C4= 101 (42.6%) C5= 14 (5.9%)

Note. AIC= Akaike information criterion; BIC = Bayesian information criteria; C1= class 1; C2 = class2; C3 = class 3; C4 = class 4; C5 = class 5

Figure 2. Latent Profile Indicators and resulting classes for girls.



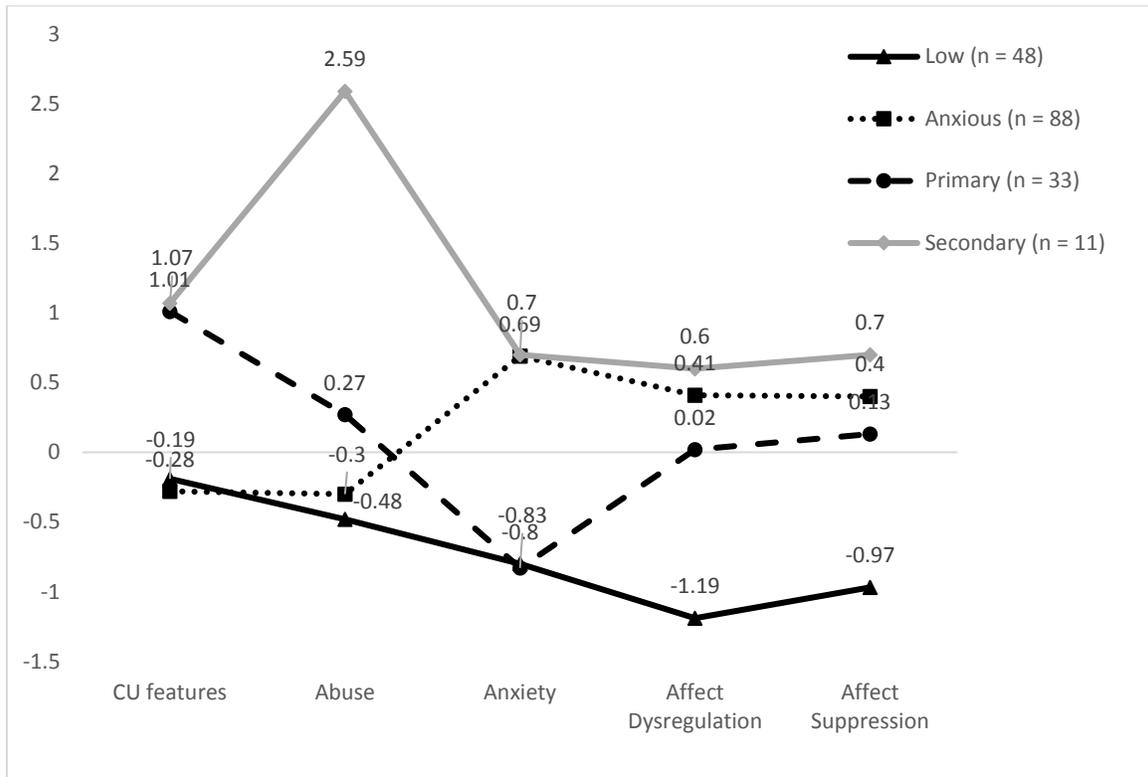
For boys, the 4-class model was also the best fitting model with good classification (*Entropy* = .850), significant Lo-Mendall-Rubin ($p = .02$), and lower AIC and sample size BIC (see Table 8). The 4-class model showed the best fit, with evidence of a significant decrease in the relationship between ICU features and anxiety symptoms ($r = -.39$; $z = 1.42$, $p = .07$). The 4 classes again were consistent with the mixed gender sample with a Low class ($n = 48$, 27%), Anxious class ($n = 88$, 49%), Primary class ($n = 33$, 18%) and Secondary class ($n = 11$, 6%).

Table 8. Latent Profile Analysis model fit statistics for boys.

BOYS	3 Classes	4 Classes	5 Classes
AIC	3120	3074	3064
BIC	3190	3164	3173
Sample Adjusted BIC	3120	3075	3065
Entropy	.775	.850	.791
Lo- Mendell-Rubin	3 v 4 Value =63.29 $p = .10$	3 v 4 Value = 55.76 $p = .02$	4 v 5 Value = 21.45 $p = .69$
N for each class	C1=64 (35.6%) C2=97 (53.9%) C3=19 (10.6%)	C1=48 (26.7%) C2=88 (48.9) C3= 33 (18.3%) C4=11 (6.1%)	C1 = 42 (23.3%) C2 = 67 (37.2%) C3 = 10 (5.6%) C4 = 31 (17.2%) C5 = 30 (16.7%)

Note. AIC= Akaike information criterion; BIC = Bayesian information criteria; C1= class 1; C2 = class2; C3 = class 3; C4 = class 4; C5 = class 5

Figure 3. Latent profile indicators and results classes for boys.



Since the 4-class model fit for both girls and boys, item response differences across gender was evaluated by examining whether constraining the item response probabilities to be equal across gender provided the same or better fit than allowing the item response probabilities to vary across gender (see Table 9). Almost all model fit statistics indicate the more parsimonious constrained model to be the better fitting model including a lower AIC (10), BIC (9), and a non-significant change in the loglikelihood ($\Delta X^2(20) = 18.76, p = .56$). Thus, the constrained model was selected as the better fitting model indicating no significant item response differences across gender.

Table 9. Latent Profile Analysis model fit statistics for nested item-response models.

	Constrained model	Unconstrained model	
Loglikelihood	-3815.123	-3829.607	$\Delta X^2(20) = 18.76$
AIC	7723.21	7734.25	
BIC	7852.27	7943.97	
Sample adjusted BIC	7750.73	7778.96	

Next, gender differences across class prevalences were examined. Nested models were compared to determine if the class prevalence varied across gender (see Table 10). This compared a model in which class prevalence was constrained to be equal to a model in which class prevalence was allowed to vary by gender. As the sample showed item-response gender invariance, item-responses were constrained to be equal across the nested models. The model indicators all revealed the unconstrained model to be the best fitting model including differences in the AIC (33 points), BIC (21 points), sample adjusted BIC (31 points) and a significant chi-square difference ($\Delta X^2(23) = 45.93, p < .01$). Thus, it can be concluded that the prevalence within each class varied by gender.

Table 10. Latent Profile Analysis model fit statistics for nested class prevalence models.

	Constrained model	Unconstrained model	
Loglikelihood	-3849.128	-3815.123	$\Delta X^2(23) = 45.93^{**}$
AIC	7756.26	7723.21	
BIC	7873.22	7852.27	
Sample adjusted BIC	7781.19	7750.73	

$p < .01$

In order to better understand the differences across gender, the prevalence for each class were then examined (see Table 11). The Low symptom profile was more prevalent for boys than girls $X^2(1) = 19.13, p \leq .001$, whereas the Anxious profile was more

prevalent for girls than boys $X^2(1) = 45.26, p \leq .001$. The prevalence for the Primary profile decreased for both boys and girls, and included a higher proportion of boys than girls $X^2(1) = 10.89, p < .01$. The Secondary profile was consistent for boys and girls, with a low prevalence for both genders.

Table 11. Latent Profile Analysis model fit statistics for nested class prevalence models.

	Boys	Girls
<i>Class descriptions</i>		
Low	0.42	0.22
Anxious	0.24	0.57
Primary	0.27	0.14
Secondary	0.06	0.07

$p < .01$

Finally, interactions were examined for clinical features in the overall model. No gender differences were found for the mean of ADHD symptoms, $F(3, 383) = 1.65, p = .18$; ODD symptoms, $F(3, 383) = .88, p = .45$; CD symptom, $F(3, 383) = 1.19, p = .32$; or depressive symptoms, $F(3, 383) = .92, p = .43$.

Chapter 4. Discussion

4.1. CU variant identification and affective processes

This study adds to our growing understanding of the clinical presentation and underlying mechanisms associated with CU variants. The first goal of the study was to examine whether two distinct groups of youth with high levels of CU features would emerge. This prediction was confirmed, with two classes of youth with high levels of CU features found in the current sample. One class reported low levels of anxiety, affect dysregulation, and affect suppression, analogous with the description of primary CU features. Consistent with secondary CU features, the other class of youth high on CU features reported high levels of anxiety, affect dysregulation and affect suppression, as well as very high (i.e., greater than 2 standard deviations above the mean) levels of abuse perpetrated by parents. A higher proportion of youth with primary CU features compared to secondary CU features were found in the current study. These proportions (19.4 % and 6.5 % for primary and secondary CU features, respectively) are in line with previous research with clinical or community populations, finding the fraction of youth with primary CU features to range from 8-35%, and those with secondary CU variants ranging from 3-31% (Andrade et al., 2015; Fanti et al., 2013; Kahn et al., 2013). The observed variability in rates seen in other studies could potentially be explained by the variability in the indicators used in identifying classes.

Although all studies have included CU features and anxiety as class indicators, other indicators such as exposure to trauma and PTSD symptoms (Bennett & Kerig, 2014; Kahn et al., 2013), externalizing symptoms (Andrade et al., 2015), and behavioural

inhibition (Gill & Stickle, 2016) have also been included in models. Sample characteristics (e.g., juvenile samples, clinics serving ODD populations; Kimonis et al., 2008, Andrade et al., 2015) could also contribute to slight differences in proportions. It is interesting to note that although there have been slight differences in model indicators across studies, there have been consistent findings in relation to the hypo- and hyperarousal model of primary and secondary CU features.

The primary class in the current study showed evidence of being under-aroused (i.e., lower levels of affect dysregulation and suppression), while the secondary class showed evidence of being over-aroused (i.e., high levels of affect dysregulation and suppression). Both over and under-aroused presentations could disrupt the process of moral development and lead to CU presentations (Kimonis et al., 2008). Previous research has found differences in affect regulation as an outcome among the CU variants (Kimonis et al., 2012); however, this study is the first to include affect dysregulation and suppression as indicators in the overall model. Higher levels of affect suppression also indicate higher levels of arousal, as these strategies typically lead to paradoxical increases in unwanted experience and physiological arousal (as cited in Hofmann, Heering, Sawyer, & Asnaani, 2009). This extends the current research base by using underlying affective mechanisms (i.e., dysregulation and suppression), thought to be essential in the development of primary and secondary CU, as well as the behavioural manifestation of these factors (i.e., anxiety) as indicators in the model definition. The results from the current study support the theory that children with a fearless and under-aroused disposition (i.e., primary variant) may be insufficiently aroused and therefore miss important social cues, whereas those with a dysregulated and reactive disposition (i.e.,

secondary variant) may miss cues as they are overwhelmed by negative social situations (Frick & Morris, 2004).

Much of the research on biological underpinnings of CU features have focused on the reduced activation of the stress response system (i.e., primary CU; Marsh et al., 2008). However, the role of arousal in distinguishing between primary and secondary CU variants has also been recently supported in the neuroendocrine literature. Youth with secondary CU features have been found to have distinct high cortisol-to-dehydroepiandrosterone (DHEA) ratios, suggesting dysregulation of the HPA axis in response to chronic stress (e.g., abuse; Kimonis, Goulter, Hawes, Wilbur, & Groer, 2016) in these youths. Kimonis and colleagues also found youth with primary CU to have high DHEA levels, which is consistent with a profile that is more resistant to stress-related psychopathology (e.g., depressive symptoms), and in line with the low affect dysregulation and suppression profile found in the current study. Findings from the current study, in conjunction with the emerging research on the endocrine system, suggest that theories on CU features that focus on brain regions and the HPA axis may need to include the effects of child abuse on the stress response system.

The two remaining classes found in this study represent youth with anxious symptoms (high anxiety and affect dysregulation, low CU features) and those with low levels of all symptoms. Other studies with clinical populations have found either a 3- (Kahn et al., 2013) or 4- (Andrade et al., 2015) class solution. The differences stem from whether both low and anxious classes or just an anxious class are identified. The anxious class was distinguished from the secondary class by the presence of reported parental

abuse for the latter class, indicating that abuse may be particularly salient in the development of secondary CU features as hypothesized (Porter, 1996).

4.2. CU variants and psychopathology

It was also hypothesized that those with secondary CU features would report higher levels of psychopathology associated with affect dysregulation (e.g., ADHD and depressive symptoms) consistent with experiencing general hyperarousal. This prediction was partially supported in the current sample. Youth with secondary CU reported higher levels of ADHD symptoms and depressive symptoms compared to those with primary CU; however, they did not report higher levels of emotional or behavioural symptoms of ODD. As expected, youth with primary and secondary CU features did not differ on levels of CD symptoms. These results replicate previous findings that have shown youth with secondary CU features to be at greater risk of depression, attention problems (Kimonis et al., 2012), and impulsivity (Kahn et al., 2013). Findings suggest that differences in affect dysregulation may be helpful to consider in understanding why those with secondary CU features are at greater risk to develop these difficulties. Affect dysregulation has been linked to increased irritability, negative mood, and ADHD-like symptoms (e.g., hyperactivity, distractedness; Leibenluft, 2011). Given that youth with secondary CU features have greater levels of affect dysregulation, it is therefore more likely that they will experience comorbid conditions linked to a dysregulated temperament (e.g., depression, ADHD).

The finding that ODD symptoms did not differ between CU variants in the current sample was unexpected. In studies that have examined anger and externalizing problems more generally, clinical and justice-involved youth with secondary CU features have been found to have higher levels of general externalizing problems (Kahn et al., 2013), impulsivity (Bennett & Kerig, 2013), and anger (Kimonis et al, 2012). To our knowledge, this is the first study to specifically examine ODD symptoms across CU variants, as opposed to measures of anger or overall externalizing problems. Upon examination of the mean differences between ODD symptoms in the current sample, youth with secondary CU features appeared to have a higher mean score than those with the primary variant. However, once the Bonferroni correction was applied to reduce Type I errors, the difference was no longer significant. It is possible that the low number of youth with secondary CU features in the current study did not provide enough power to see a small to medium effect size. These inconsistent findings and trends in the data suggest more research is needed with the two dimensions of ODD to determine if there are indeed differences between the variants.

4.3. Gender and CU variants

Only a handful of studies have considered the impact of gender on CU variants. The current study therefore extends the existing literature by examining gender differences in depth, exploring potential gender differences across model fit, item-responses, in mean levels of the outcomes, and across class proportions. Prior to examining the latent classes, boys were found to have higher levels of CU features, which

is consistent with previous research (e.g., Gill & Stickle, 2016; Sevecke, Franke, Kosson, & Krischer, 2016). While examining the resulting latent classes, there was no gender difference across indicators within the overall model or across the gendered models. In other words, within each class there were no gender differences on each indicator, or on the associated psychopathology outcomes. Most importantly however, the same 4-class model was found to fit for both boys and girls, involving both a primary and secondary class. This finding is particularly noteworthy as previous research has found primary and secondary classes within male only (e.g., Kimonis et al., 2012), adult female only (e.g., Hicks, Vaidyanathan, & Patrick, 2010) and mixed gendered samples (e.g., Bennett & Kerig, 2012; Kahn et al., 2013). The current study is the first to examine whether the same classes emerge in both genders within the same sample. Finding no gender differences on both indicators and associated psychopathology underscores the importance of the affective differences between the classes. Similarly, other work found that gender did not moderate the impact of primary and secondary psychopathy on negative affect (Gill & Stickle, 2016). The results from the current study add additional evidence that differences in primary and secondary CU feature presentations hold across gender.

Gender differences were observed, however, when examining the proportion of boys and girls in each class. There was a significantly higher proportion of boys (27%) than girls (14%) in the primary class. The secondary class was consistent across gender, however, with 6% of boys and 7% of girls being classified as secondary CU. Reports in the literature on the proportion of males and females in each class has largely been mixed. Findings in the current study are in line with some studies that have found a

higher proportion of males in the primary class (Euler et al., 2014; Gill & Stickle, 2016) and no gender differences in the secondary class (Kahn et al., 2013). Findings for the secondary class have been particularly inconsistent, with some studies finding a higher proportion of girls (e.g., Bennett & Kerig, 2014, Gill & Stickle, 2016), and others (Fanti et al., 2013), boys. Further, in clinical samples, studies have found either no gender difference in the variants, or a higher proportion of males overall in the secondary class (Andrade et al., 2015; Kahn et al., 2013). Similar to the proportion of the overall sample, it is possible that slight differences in the class indicators and sample characteristics across studies may help explain the differences in proportions. The consistent finding across both boys and girls in this sample was a higher proportion of youth with primary CU features than secondary, which is in line with other studies.

4.4. Trauma and Clinical implications

Recently, research on interventions for youth with CU features has shifted from focusing on managing behavior to addressing specific etiological factors. Although no treatment studies to date have examined primary versus secondary CU, certain treatments may be more effective than others, depending on CU variant and the associated underlying temperamental factors. The high rate of abuse exposure and dysregulation in the secondary group in the current study is of interest in this regard. Despite these higher rates, the groups did not differ on demographic variables, such as SES or number of caregivers in the home, suggesting abuse may be a more powerful predictor of secondary CU features than other sociological factors. Although the current study does not examine

a causal pathway, the high rate of abuse perpetrated by parents and dysregulation in the secondary CU variant suggests abuse may be key in the development of secondary CU features. Parents serve as a primary source of emotional support and regulation for children from birth and well into early adulthood (Rosenthal & Kobak, 2010). Abuse by a parent places a child in a particularly vulnerable position, as the child is left to cope with extreme distress on their own, without the necessary skills to do so effectively (Moretti & Craig, 2012). This is supported by previous research that has shown that exposure to maltreatment, particularly by a caregiver, presents a significant risk to the development of affect regulation skills, which in turn places youth at risk for both internalizing (Moretti & Craig, 2012) and externalizing disorders (Heleniak, Jenness, Vander Stoep, McCauley, & McLaughlin, 2016). Further, understanding the potential consequences of child abuse is essential for informing and enhancing clinical, legal, and policy making decisions (Cicchetti & Doyle, 2016). Youth with secondary CU features are also at greater risk of becoming involved in the justice system, thus increasing the cost to society. The results from the current study add to the growing literature on the negative impacts of parental abuse and call for increased efforts in the delivery of early prevention and intervention programs. There are a number of early intervention programs that have been shown to be efficacious. These programs address issues of early abuse and work with parents by incorporating video feedback to the parent, home visits, and discussions around building emotional regulation strategies (Moss, Dubois-Comtois, Cyr, & Tarabulsky, 2011). Programs that address both the effect of abuse and emotion regulation may be particularly crucial to assist in the process of a child's moral development, thereby decreasing the risk of developing CU features.

Other potential targets for intervention can include addressing maladaptive coping strategies, such as affect dysregulation and suppression. Studies have found that youth who have been maltreated can engage in a variety of maladaptive patterns of responding, such as rumination (Heleniak et al., 2016) or emotional numbing (Kerig et al., 2012), which may lead to differential outcomes. The quality of the parent-child relationship has been found to mediate the relationship between maltreatment and maladaptive coping strategies (Perlman, Dawson, Dardis, Egan & Anderson, 2016). The parent-child relationship has been identified as an important area for treatment and prevention efforts for young children with CU features (Pasalich, Dadds, Hawes, & Brennan, 2012). Similarly, mentalization (i.e., the ability to understand the mental state of oneself and another person), is associated with the quality of the parent-child relationship and has been shown to moderate the association between psychopathic traits and aggression in adolescent samples (Taubner, White, Zimmerman, Fonagy, & Notle, 2013). Given the salience of the parent-child relationship in treating both maladaptive coping strategies stemming from abuse, and its role in the development of CU features, it may be an important component to address in interventions for both primary and secondary CU features.

Some research has found that parent training that focuses on positive reinforcement strategies and the promotion of parental warmth is particularly effective in changing levels of general CU features (Hawes et al., 2014). Although previous studies have been focused on more typical CU features (i.e., low dysregulation) these interventions may also have a significant impact on youth with secondary CU features. Scott and O'Connor (2012) showed that children that were emotionally dysregulated

were more sensitive to positive and negative aspects of the caregiving environment and experienced greater positive changes in their behaviour following parenting interventions. It is important to note that although the parent-child relationship appears to be a key intervention target for both primary and secondary CU features, intervention selection needs to account for the differences in etiological factors and clinical presentations. Children and youth with primary CU features may benefit from interventions that focus on developing empathy skills through the parent-child relationship (Hawes et al., 2014). Likewise, as secondary CU variants had greater impairments in affect dysregulation in the current study, this suggests that programs aimed at addressing affect dysregulation processes through the parent-child relationship may be more effective for youth with secondary CU features. Although early prevention and intervention is preferred, there is recent research that suggests in extreme situations, adolescents who are placed in the care of foster parents who demonstrate high levels of parental sensitivity form secure connections with their caregivers even though they lack attachment security with their biological parents. In turn, attachment security with foster parents predicts fewer disruptive behaviour problems (Joseph, O'Connor, Briskman, Maughan, & Scott, 2014). Other research has shown that parenting groups focused on the parent-child relationship can decrease a teen's maladaptive coping as well as internalizing and externalizing psychopathology (Moretti, Obsuth, Craig, & Bartolo, 2014). These studies suggest that although early intervention is preferred, it is also possible to address negative consequences of abuse later in development.

Finally, although the current study found no significant gender differences among the classes for the indicators and associated psychopathology, there may be important

gender socialization processes that are important to consider when planning interventions. For example, adolescent girls who exhibit antisocial or aggressive behaviour may exhibit more comorbid substance use (Euler et al., 2014) and relational aggression compared to boys, which has been linked to peer rejection and loneliness (Hankin & Abramson, 2001). The social consequences of CU may also be gendered. Girls with CU features may be viewed as gender atypical in their lack of empathy and concern for others in addition to their heightened level of aggressiveness. As a result, they are likely to experience high levels of peer rejection and potentially harsh parental consequences. It is important that interventions address the gendered social context and consequences of CU for girls versus boys, integrating additional treatment components as needed to address comorbid conditions and social consequences of CU symptoms.

4.5. Limitations

Despite the strengths of this study, a number of limitations should be considered when interpreting the findings. First, the study relied solely on self-report data for all measures. It is worth noting however, that while some studies have also included parent or teacher reports (e.g., Gill & Stickle, 2016), other research has suggested that self-report data on CU features is as accurate as parent report and more strongly associated with environmental risk factors (e.g., maltreatment in the home; Frick et al., 2014). Future research would still benefit, however, from using multiple informants, including a clinician rating of CU features. Second, the current sample was drawn from a study of a parenting intervention, with some parents self-referring to the community mental health

centres that ran the groups. This could lead to a self-selective sample in that parents are willing to engage in treatment and thus are less likely to be abusive. The population may have also impacted the rate of CU features, as CU features have traditionally been associated with highly aggressive youth in custody centres. Therefore, the base rate of CU features may be higher in other clinical populations (e.g., clinic for behaviour problems; e.g., Andrade et al., 2015) or in other samples (i.e., justice involved youth) resulting in fewer youth classified as primary and secondary CU variants in the current sample. The third limitation was the sample size. Although the sample size was large for a clinical population, the low base rate of CU features resulted in small class sizes for both primary ($n = 81$) and secondary ($n = 27$) youth. A larger sample size could have allowed for more statistical power to detect small to medium effect sizes for mean differences in the levels of ODD. A larger sample size would have also allowed for small effect sizes to be examined across gender. Finally, the current study used baseline cross-sectional data from a treatment trial. Future research examining the longitudinal outcomes of CU variants across adolescence and into youth adulthood is needed.

Measurement must also be considered in interpreting the current study. While two related affective processes, dysregulation and suppression, were examined in the current study, it is also possible that other processes (e.g., emotional numbing; Kerig et al., 2012) may be more salient in the identification of CU subtypes. Importantly, the abuse measure in the current study acted as a marker of exposure to maltreatment rather than an in-depth measure of abuse. Future research would benefit from assessing specific forms of maltreatment, complex maltreatment, and the developmental timing of maltreatment in order to gain a better understanding of the effects of abuse on the development of primary

and secondary CU variants. Additionally, the abuse measure did not specify the gender of the parent. Previous research has shown gender-specific outcomes for abuse perpetrated by mothers versus fathers (e.g., Moretti & Craig, 2012), which was not captured in the current study. Future research may want to include these specific measures to better disentangled the effects of affective and gender processes in the development of CU features.

4.6. Conclusions

The current study adds to our understanding of the development and clinical presentation of CU variants. Results were generally consistent with past findings, and extended the literature by being the first to use affect dysregulation and suppression in distinguishing between primary and secondary CU variants. These affective processes have direct treatment implications in that although all youth with CU features may benefit from treatment that involves increased parental warmth and positive reinforcement strategies, intervention targets may be slightly different for youth with primary versus secondary CU features. More research is needed to increase our understanding of which treatments are effective, and how they are effective for the two variants.

Overall, there are only a handful of studies that have examined gender differences among youth high on CU features or psychopathy (e.g., Gill & Stickle, 2016; Stickle, Marini, & Thomas, 2012). This study was also one of the few studies to consider gender differences across the variants, and the first to examine these effects across multiple

components of the model. The finding that there were no gender differences across the model indicators supports previous findings that have shown primary and secondary groups in single gender and mixed-gender samples. Based on findings from the current study in conjunction with the limited available literature, it is clear that future research needs to consider the effect of both CU variant and gender on clinical correlates and outcomes.

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