

This is an Open Access document downloaded from ORCA, Cardiff University's institutional repository: <https://orca.cardiff.ac.uk/id/eprint/135944/>

This is the author's version of a work that was submitted to / accepted for publication.

Citation for final published version:

Anthony, R. , Paine, A. , Westlake, M., Lowthian, E. and Shelton, K. 2022. Patterns of adversity and post-traumatic stress among children adopted from care. *Child Abuse and Neglect* 130 (P2) , 104795. [10.1016/j.chiabu.2020.104795](https://doi.org/10.1016/j.chiabu.2020.104795)

Publishers page: <https://doi.org/10.1016/j.chiabu.2020.104795>

Please note:

Changes made as a result of publishing processes such as copy-editing, formatting and page numbers may not be reflected in this version. For the definitive version of this publication, please refer to the published source. You are advised to consult the publisher's version if you wish to cite this paper.

This version is being made available in accordance with publisher policies. See <http://orca.cf.ac.uk/policies.html> for usage policies. Copyright and moral rights for publications made available in ORCA are retained by the copyright holders.



**Patterns of Adversity and Post-traumatic Stress among Children Adopted from Care**

Anthony, R<sup>1\*</sup>., Paine, A<sup>2</sup>.L., Westlake, M<sup>2</sup>., Lowthian, E<sup>1</sup>., & Shelton, K.H<sup>2</sup>.

<sup>1</sup>Centre for the Development and Evaluation of Complex Interventions for Public Health Improvement (DECIPHer), School of Social Sciences, Cardiff University, 1-3 Museum Place, Cardiff CF10 3BD, UK. AnthonyRE@cardiff.ac.uk

<sup>2</sup> School of Psychology, Cardiff University, Tower Building, 70 Park Place, Cardiff CF10 3AT, UK

\*Corresponding author

Acknowledgements.

This research was supported by grants from the Welsh Government and from The Waterloo Foundation (Grant reference: 738/3512). The Wales Adoption Study was initially funded by Health and Care Research Wales, a Welsh Government body that develops, in consultation with partners, strategy and policy for research in the NHS and social care in Wales (2014-2016, Grant reference: SC-12-04; co-investigators: Julie Doughty, PhD.; Sally Holland, PhD.; Heather Ottaway, PhD.). Our sincere thanks go to the staff from the local authority adoption teams in Wales, who kindly assisted with contacting families, and to our research advisory group for their guidance. We thank the families who took part in this study and Janet Whitley for research assistance.

Declaration of Interest.

The authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analyses or interpretation of data; in the writing of the manuscript or in the decision to publish the results.

**Abstract**

**Background** Children adopted from care are more likely to have experienced early adversity, but little is known about the impact of early adversity on later post-traumatic stress (PTS) symptoms.

**Objective** To investigate sub-groups of adversity in a sample of adopted children and examine the association with later PTS symptoms.

**Participants and Setting** A study of British children adopted from care using social worker records ( $N = 374$ ) and questionnaire-based longitudinal study of  $n = 58$  children over 4-years post adoptive placement.

**Methods** We used latent class analysis to identify subgroups of children based on commonalities in perinatal and postnatal adversity experienced prior to adoption and examined differences in PTS symptoms at 4-years post-placement between subgroups.

**Results** Nearly one in five (19%) children were in the clinical or borderline ranges for symptoms of PTS arousal, 14% for PTS avoidance and 8% for PTS intrusion. The 5-class solution fitted the data best, with one class characterized by children with a low probability of experiencing any adversity, one perinatal adversity class and three classes capturing different patterns of adversity. The multiple complex adversity class involving both perinatal and postnatal adversity had significantly higher symptoms of PTS avoidance and arousal than other sub-groups.

**Conclusions** The prevalence and complexity of PTS symptoms among adoptive children highlights the need for effective interventions considering different profiles of early adversity.

**Keywords:** adversity, adoption, care, trauma, looked after

**Patterns of Adversity and Post-traumatic Stress among Children Adopted from Care**

Adoption is a permanent care option for some children who cannot live with their birth parents due to risk or experience of inadequate care or maltreatment. Current UK policy favors achieving permanence within a family setting, with a focus on adoption. However, the idea that adoption is the ‘gold standard’ in long-term placements is not shared by all. Research comparing the psychological outcomes for children living in different placements is inconsistent, with some studies reporting no differences in attachment and self-concept from the perspective of the children across placement type (McSherry, Malet, & Weatherall, 2016), and others finding that children adopted from care have better wellbeing outcomes than those in foster care (Berlin, Vinnerljung & Hjern, 2011; Selwyn, Meakings & Wijedasa, 2015). Furthermore, adoption in the UK has been described as a highly charged controversial public intervention (McGhee et al., 2017), due to the radical discontinuity of relationships and the possibility of a child being adopted against their birth parents’ wishes. There has been criticism at high levels of the judiciary about some practice in relation to adoption decisions because the permanent severance of family ties is seen as an extreme option and a last resort (Doughty, 2015).

Research shows that there are enduring psychological vulnerabilities for children adopted from care (e.g. Brown, Waters, & Shelton, 2017; Juffer & van Ijzendoorn, 2005) with evidence suggesting links with experiences of early adversity, such as toxicity *in utero*, birth complications, and early adverse childhood experiences (Tung, Christian-Brandt, Langley, & Waterman, 2020; Authors 2019; 2020). However, few studies have examined the child characteristics and early environmental conditions associated with adopted children’s development of post-traumatic stress (PTS) symptoms (Dovran, Winje, Arefjord, & Haugland, 2012), despite this group being more likely to be referred to Child and Adolescent Mental Health

## LATENT CLASS ANALYSIS OF PTS IN ADOPTED CHILDREN

Services (CAMHS) for specialist care (Trotter, 2017). We investigated patterns of early pre-placement adversity in domestically adopted children and associations with PTS symptoms four years following placement with their adoptive family.

### **Childhood Adversity**

Children's mental health and developmental outcomes can be affected by a range of factors that are often collectively referred to as adverse childhood experiences (ACEs), including abuse, interparental violence, living with household members with substance misuse disorders, mental ill health or suicidality, and incarceration (Felitti et al., 1998) with the potential for a cumulative impact on later health (Rutter, 1979). Indeed, Felitti and colleagues' (1998) work has been supported by a proliferation of scientific, policy and practice literature on the physical and psychological health implications of early adversity (Kelly-Irving & Delpierre, 2019). Extensive literature demonstrates a clear link between the cumulative impact of ACEs and numerous physical, social, emotional, and behavioral problems in childhood (Oh et al., 2018) and in later life (Hughes et al., 2017). However, it is important to note that although studies frequently portray the developmental course as deterministic (Cicchetti, 2010), children differ widely in their response to adversities (Rutter, 1985). Children who fare better than others in the aftermath of adversity are characterized as demonstrating resilience (Luthar & Cicchetti, 2000), defined as: "the process of, capacity for, or outcome of successful adaptation despite challenging or threatening circumstances" (Masten, Best & Garmezy, 1990, p. 425). It is argued that a young person's level of resilience is determined by the presence of multiple risk and protective factors (Hannon, Wood & Bazalgette, 2010), i.e., characteristics of the child, family, and wider environment that reduce the negative effect of adversity on child outcome (Masten & Reed, 2002).

## LATENT CLASS ANALYSIS OF PTS IN ADOPTED CHILDREN

Taking a cumulative approach to contextualizing children's experience can risk oversimplifying complex and challenging issues and can lead to a substantial loss of valuable information (Lacey & Minnis, 2020). Furthermore, variables typically included in 'ACE' studies generally focus on experiences unique to the postnatal environment, despite strong evidence for the importance of perinatal factors in vulnerability to early adversity and risk for later psychopathology (Pluess & Belsky, 2011; Suurland, van der Heijden, Huijbregts, Van Goozen & Swaab, 2018; Vanderbilt & Gleason, 2010; Zammit et al., 2009). However, the consequences of substance exposure *in utero* and birth complications on adopted children's development is limited and inconsistent (Hornfeck et al., 2019). In a study of US families, Goldman and Ryan (2011) found that alcohol, tobacco, and other drug exposure was associated with children's functioning prior to their adoption, but effects did not persist after adoption. A study of German children adopted from care (international and domestic) found that psychosocial adjustment was significantly predicted by pre-adoptive risk factors, including pre-natal risk factors and maltreatment/neglect (Hornfeck et al., 2019). A recent study of children adopted from the foster care system in England found that children with exposure to drugs or alcohol *in utero*, parental learning difficulties, and adverse experiences between birth and moving to the adoptive family was associated with poorer child behavior, wellbeing and relationship quality (Neil, Morciano, Young, & Hartley, 2020).

### **Composition of Adversity**

Although the association between number of adversities and later child psychopathology is established, little is known about the compositional variations of adversity, or implications of these variations for children's later functioning (Rebbe, Nurius, Ahrens, & Courtney, 2017). Bolger and Patterson (2001) conducted a factor analysis with five separate abuse types. Their

## LATENT CLASS ANALYSIS OF PTS IN ADOPTED CHILDREN

analyses resulted in a three-factor structure in which sexual abuse items, physical and psychological maltreatment items, and physical and supervisory neglect loaded on to single factors. Westermair et al., (2018) also used factor analysis to explore different sub-groups of adversity in a sample of psychiatric patients and compared results to cumulative models. They found evidence for three distinct subgroups: household dysfunction, maltreatment and sexual abuse, with the subgroup including both maltreatment and sexual abuse shown to predict bipolar disorder, Post-Traumatic Stress Disorder (PTSD) and suicidal behavior. However, a drawback of factor analysis is that it creates estimates based on the structure of variables rather than the structure of cases (Armour, Elklit, & Christoffersen, 2014).

Person-centered tools, such as latent class analysis (LCA), can identify population subgroups with similar constellations of risk (Masyn, 2013), rather than using *a priori* cut-off points of cumulative risk. This method does not assess independent contributions of individual experiences, but rather, uses ‘patterns’ of experiences (Warmingham, Handley, Rogosch, Manly & Cicchetti, 2019). LCA represents a well-suited approach to examine differential risk of poor outcomes between different patterns of early adversity, including perinatal and postnatal experiences. Person-centered approaches have been used previously to identify subgroups of maltreated children (see Debowska, Willmott, Boduszek & Jones, 2017): children who experienced multiple forms of maltreatment consistently present with more behavioral and emotional problems. Latent class analysis has been used to identify subgroups within samples of children placed out of home (Biehal, Baldwin, Cusworth, Wade, & Allgar, 2018; Keller, Cusick, & Courtney, 2007; Pears, Kim & Fisher, 2008; Petrenko, Friend, Garrido, Taussig, & Culhane, 2012; Warmingham et al., 2019), and to investigate the needs of adoptive families (Lee, Wyman

Battalen, Brodzinsky, & Goldberg, 2020). To the best of our knowledge, however, no previous research has examined patterns of adversity in children adopted from state care using LCA.

### **Post-traumatic Stress (PTS) Symptoms**

According to DSM-5 A1 criterion, a traumatic life event involves either exposure to death or threatened death, actual or threatened serious physical injury, or sexual violence, either to the self directly, to another person that is witnessed first-hand, to a loved one even if not witnessed directly, or experienced in the course of professional duties (American Psychiatric Association, 2013). Thus, although any adversity may have negative consequences, adversities such as child physical or sexual abuse and witnessing domestic violence (more in line with the definition of traumatic life event), may be more likely to result in post-traumatic stress symptoms (McLaughlin et al., 2017). PTSD is characterized by four symptom clusters: intrusion symptoms; avoidance of traumatic stimuli; negative alterations in cognitions and mood; and changes in arousal and reactivity (American Psychiatric Association, 2013). Although elevated PTS symptoms can be common in the post-trauma period, most young people's initial symptoms will naturally recede without the need for formal support, with 10–20% experiencing more chronic distress (Hiller et al., 2019). PTSD is associated with high rates of psychopathology, including depression, conduct disorder, alcohol dependence, self-harm and suicidal behavior, violent offences and functional impairment by age 18 (Lewis et al., 2019). Although studies investigating PTSD in adopted children are limited, children in foster care exhibit symptoms of PTSD at more than twice the rate as combat veterans (Pecora, White, Jackson, & Wiggins, 2009).

### **The Present Study**



## LATENT CLASS ANALYSIS OF PTS IN ADOPTED CHILDREN

Better understanding of patterns of adversity and symptoms of PTS has the potential to inform post-adoption support that is tailored to a child's needs. The present study aimed to: 1) use LCA to identify distinct classes of perinatal and postnatal early adversity from social worker records in cohort of  $N = 374$  children adopted from state care; 2) profile the prevalence of PTS symptoms at four-years post-placement in a subsample of the same children who took part in a longitudinal study ( $n = 58$  at 4 year follow up) and 3) compare PTS symptoms according to children's patterns of early adversity identified in the LCA. We hypothesized that patterns of adversity which included childhood adversities associated with severe and direct breaches of caregiving (e.g. child abuse or witnessing domestic violence) would be associated with greater PTS symptomatology.

### **Method**

#### **Design**

We harnessed data from the Wales Adoption Cohort Study, a prospective longitudinal cohort study of a national sample of children placed for adoption from care in (see AUTHORS, 2018, and AUTHORS, 2020 for description of adoption in the UK). The study used a mixed-methods approach, with data drawn from social worker records and four questionnaires to adoptive parents administered over the first four years of a placement. The present study is based on information derived from the social worker records ( $N = 374$ ) and the subset of families who took part in the longitudinal component of the study ( $n = 96$ ). This study was conducted in accordance with the 1964 Declaration of Helsinki and its later amendments. Ethical permission for the study was granted by the Research Ethics Committee for [ANON.] and permission to access social worker records was obtained from the [ANON.] Government.

## **Data Collection**

### ***Social Worker Records***

We reviewed the social worker records of all children placed for adoption by every local authority (LA) in [ANON. COUNTRY] between 01 July 2014 and 31 July 2015. These child adoption reports (CARs) contain the information that local authorities must include when reporting on children put forward for adoption, as set out in the Adoption Agencies (ANON. COUNTRY) Regulations (2005). The CARs provide a record of the characteristics and experiences of the children's birth parents, the given reasons children were placed for adoption and the actions taken by the local authority. Reports are completed by social workers, who record information based on their work with the birth parents, contact with the foster carer(s), liaison with other professionals (such as police, health visitors and medical officers) and reviews of historical social services records. Researchers worked on site at the local authority offices.

### ***Questionnaire Data***

Following the review of the social worker records,  $n = 96$  families took part in the longitudinal component of the study. Adoptive parents completed a questionnaire at four waves: at 5-, 21-, 36- and 48-months post-placement (W1, W2, W3 and W4, respectively). At each wave, families completed a questionnaire concerning sociodemographic information, pre- and post-adoption experiences, the child and parent's mental health, and adoptive family relationships. Where groups of siblings were placed together, parents were asked to report on the oldest child in the placement. Questionnaires were completed by either an adoptive mother (87.5% at W1, 87.7% at W2, 97.3% at W3 and 92.6% at W4) or father. It was encouraged that the questionnaires should be completed by the same parent at each wave, and so all families who provided follow-up questionnaires returned at least one completed by the same informant. A

## LATENT CLASS ANALYSIS OF PTS IN ADOPTED CHILDREN

remuneration of a book or voucher was sent to the family upon receipt of each questionnaire.

This study focuses on child PTS symptoms collected at W4.

### **Participants**

For the social worker records sample ( $N = 374$ ), the majority were placed for adoption aged 12 months (range 0–9 years,  $M = 2$  years), just over half (55%,  $n = 204$ ) of the children were male and 93% were white British ( $n = 353$ ). Over a third of children (41%,  $n = 154$ ) were placed into local authority care at birth. A third ( $n = 125$ ) of all children in the sample were placed for adoption as part of a sibling group. For the longitudinal sample ( $n = 96$ ), mean age of children placed for adoption was 2.36 years (range 0 to 9 years); 51% were male and 41% of children were placed into local authority care at birth. Twenty-nine children (30%) were adopted as part of a sibling group. At the commencement of the longitudinal study, parents had a mean age of 40.7 ( $SD = 6.99$ , range 22 to 62) years at the time of adoption, and the majority (99%,  $n = 94$ ) were white British. Most parents were in a heterosexual relationship (82%,  $n = 79$ ), 5% ( $n = 5$ ) were in a same sex relationship and 13% ( $n = 12$ ) were single adopters. Most were in either full-time or part time paid work ( $n = 72$ , 54.2%). The gross family income and education levels were substantially higher than the UK average compared to Office for National Statistics data (ONS; 2019), where 12% earned more than £75,000 per year and 37% had postgraduate degrees. Of the 96 families who participated at W1, 68 (71) participated at W4. Attrition analyses showed no differences in sociodemographic characteristics (child gender and age, parent relationship status, education, and income) between W1 and 4 (all  $ps > .05$ ).

### **Measures**

#### ***Demographics***

## LATENT CLASS ANALYSIS OF PTS IN ADOPTED CHILDREN

We examined the following child characteristics: 1) sex; 2) ethnicity; 3) time spent with birth parents (in months, calculated by subtracting the child's date of birth from the date they were removed from their birth parent's care); 4) time spent in care (in months, calculated by subtracting the date the child was removed from their birth parent's care from the date they were placed for adoption).

### ***Perinatal Adversity***

Perinatal adversity variables were coded as either absent (0) or present (1). If information was not recorded on the CAR for any adversity variable it was coded as absent, due to the duty of social workers to provide detailed information for all aspects of the child's home life for the family courts. Perinatal indicators of adversity (uterine drug or alcohol exposure as confirmed by medical professionals; prematurity at birth (<37 weeks); and low birth weight (<2500g) were included.

### ***Postnatal Adversity***

Postnatal adversity variables were similarly coded as either absent (0) or present (1) from social worker records. We included 11 categories, 10 of which were coded to closely match the original ACEs studies (Felitti et al., 1998; AUTHORS, 2019). These included: childhood emotional, physical, and sexual abuse; neglect and indicators of household dysfunction (including growing up with domestic violence, parental separation, drug abuse, alcohol abuse, mental illness, and incarceration) whilst in the care of their birth parents. Parental learning difficulties was also included based on the identification of it as a risk factor for poor child wellbeing in a recent study of adopted children (Neil et al., 2020).

### ***Post-traumatic Stress Symptoms***

## LATENT CLASS ANALYSIS OF PTS IN ADOPTED CHILDREN

The Trauma Symptom Checklist for Young Children (TSCYC) is a 90-item caregiver-report measure of acute and chronic symptomatology in children ages 3 to 12 years old (Briere, 2005) completed at wave four only. The TSCYC clinical scales have good reliability (Briere et al., 2001) and convergent validity with other parent-report measures (Wherry, Graves, Rhodes, & King, 2008). Items are assessed on a four-point scale based on the frequency of the child's symptoms throughout the previous month. Response options ranged from 1 (*not at all*) to 4 (*very often*). The TSCYC yields eight clinical sub-scales: Anxiety, Depression, Anger/Aggression, Post-traumatic Stress-Intrusion (PTS-I), Post-traumatic Stress-Avoidance (PTS-AV), Post-traumatic Stress-Arousal (PTS-AR), Dissociation, and Sexual Concerns. All internal consistencies for the TSCYC sub-scales were good (PTS-I = .89; PTS-AV = .90 and PTS-AR = .88). This study used the subscales specific to post-traumatic stress: 1) *post-traumatic stress-intrusion* that captures nightmares, post-traumatic play, flashbacks, fear in response to trauma-reminiscent events, and being upset by traumatic memories; 2) *post-traumatic stress-avoidance*, capturing avoidance of people, places and situations reminiscent of a traumatic event, emotional numbing, unwillingness to speak out about a traumatic event, and difficulties fully remembering a trauma; and 3) *post-traumatic stress-arousal*, capturing autonomic hyperarousal, including jumpiness, tension, attention and concentration and sleep problems. We also investigated the sum of these scales (total symptoms of post-traumatic stress).

### **Analysis**

Latent class analysis (LCA) was conducted on 15 perinatal and postnatal binary adverse experience variables to identify subgroups of adversity in the  $N = 374$  social worker records sample. Presence of the pre-placement adversity variable was indicated by a positive response on the dichotomous variable for that variable. The first step in the LCA analysis was to fit the

## LATENT CLASS ANALYSIS OF PTS IN ADOPTED CHILDREN

adversity data to a series of models specified with increasing numbers of latent classes using Mplus 7.4 (Muthén & Muthén., 2017). All models were estimated in two stages using maximum likelihood methods. In the initial stage, 100 random sets of starting values were generated, and 50 optimizations were carried out. To determine the best solution, an iterative process was employed evaluating estimates from models that included from two to six specified classes. The optimal class solution was selected based on several fit indices and decision points, including: 1) smaller Akaike information criterion values for the  $k$  class model relative to the  $k-1$  class model (AIC; Akaike, 1987); 2) smaller sample-size adjusted Bayesian information criterion values for the  $k$  class model relative to the  $k-1$  class model (Adjusted BIC; Sclove, 1987); 3) significance values for the  $k$  class model were compared to those of the  $k-1$  class model for the bootstrap likelihood ratio test (BLRT; Nylund, Asparouhov, & Muthén, 2007); 4) Entropy approaching 1.0 (Celeux & Soromenho, 1996); 5) classes contained more than 5% of the total sample; 6) classes were theoretically meaningful; 7) acceptable class probabilities (Wang, Deng, Bi, Ye, & Yang, 2017), and 8) results were interpretable.

Once the optimal solution had been identified using comparative fit indices, comparative analyses of differences in demographics and child post-traumatic symptoms between classes were conducted. Most probable class membership was determined by posterior probabilities for individuals. An examination of the influence of demographic characteristics on latent class distribution was conducted using the three-step method (R3STEP; Asparouhov & Muthén, 2013). The automatic Bolck-Croon-Hagenaars Method (BCH method; Bolck, Croon, & Hagenaars, 2004) was used to explore the latent classes effect on distal variables (Asparouhov & Muthén, 2014) as it is the recommended statistical procedure for comparing outcome variables between latent classes (Bakk, Tekle, & Vermunt, 2013). The BCH procedure provides

## LATENT CLASS ANALYSIS OF PTS IN ADOPTED CHILDREN

significance tests of mean differences using the Wald test while holding class membership constant. Pairwise comparisons were interpreted if the omnibus tests were significant ( $p < .05$ ). The BCH avoids shifts in latent class in the final stage and accounts for classification error and unequal variance across classes (Asparouhov & Muthén, 2014).

**Missing data.** Complete information for adversity variables was available for the LCA. In the longitudinal subsample ( $N = 96$ ),  $n = 67$  parent-reported assessments of child post-traumatic symptoms were available (one questionnaire was partially completed). There were eight cases where the questionnaires returned by adoptive parents could not be matched with a CAR record containing the adversity information. The final sample used for the analysis in the present study was therefore 58. Missingness for the TSCYC scores was handled in MPlus using listwise deletion, as employed by the BCH method.

### Results

#### Early Adversity

Characteristics of the sample and proportions who had experienced an adversity category are reported in Table 1. For the social worker records sample ( $N = 374$ ), a quarter of the sample were reported to have experienced pre-natal exposure to drugs (28%) and alcohol (25%), with 17% ( $n = 63$ ) experiencing both. Around one in 10 children were born prematurely (10%) or had a low birth weight (9%). Exposure to adversity whilst children were in the care of their birth parents was also common, with over half (54%) of the sample experiencing neglect, 37% being exposed to a domestic violence and 34% being exposed to a parent who abused drugs (Table 1).

#### Latent Class Analysis to Determine Patterns of Adversity

We compared models with two to six classes (See Table 2). Both the difference in AIC and sample size adjusted BIC between classes reduced with each additional class, suggesting that

## LATENT CLASS ANALYSIS OF PTS IN ADOPTED CHILDREN

AIC may be becoming less sensitive to class differences and other metrics should be used. The BLRT test suggested a 5-class model was best. All entropy values were acceptable, and above the recommended .70, indicating excellent accuracy of classification. Inspection of the 6-class model showed that compared to 5-classes, entropy decreased by 0.01, and the BLRT strongly suggested that this was not better than the 5-class model. Based on these results in conjunction with concerns about substantive interpretability of the classes, we chose the model with five classes as it balanced statistical criteria and theoretical judgement (Melendez-Torres et al., 2018).

The 5-class solution suggested five distinct classes of adversity: a lower exposure class, a perinatal risk class and different patterns of adversity in the care of their birth parents (Table 2).

### ***Class One: Postnatal risk (8%)***

This class was characterized by the highest probabilities of verbal, physical abuse and neglect, as well as household dysfunction, particularly witnessing domestic violence.

### ***Class Two: Perinatal risk (14%)***

This class was characterized by high probability of perinatal risk factors, including being born prematurely and with a low birth weight and pre-natal substance exposure.

### ***Class Three: Multiple complex risk (36%)***

The largest class of the five, class three is characterized by high probabilities of pre- and postnatal exposure to parental substance abuse as well as high probabilities for neglect, maltreatment and multiple types of household dysfunction, particularly witnessing domestic violence and parental separation.

### ***Class Four: Parental difficulties (6%)***

This class is characterized by experiencing neglect, a parent with learning difficulties and some probability of physical abuse.



## LATENT CLASS ANALYSIS OF PTS IN ADOPTED CHILDREN

### ***Class Five: Lower exposure (35%)***

The second largest class included children with very low probabilities of experiencing any adversities. Individual item probabilities by class are presented in Table 3. [table 3]

### **Class Solution Latent Class Comparisons on Child Characteristics**

A small number of differences on demographics were found between classes in terms of child characteristics ( $N = 374$ ). No differences between groups were found by sex or ethnicity. With regard to pre-adoptive placement experiences, children in the postnatal risk class ( $M = 1.43$ ,  $SE = 5.00$ ) and the lower exposure class ( $M = .06$ ,  $SE = 0.46$ ) spent less time in the care of their birth parents ( $M = 1.43$ ,  $SE = 5.00$ ;  $M = .06$ ,  $SE = 0.46$  respectively) compared to the postnatal risk class ( $M = 16.88$ ,  $SE = .16$ ,  $p < .01$ ), the multiple complex risk class, ( $M = 24.82$ ,  $SE = 18.60$ ,  $p < .01$ ) and the parental difficulties class ( $M = 19.50$ ,  $SE = 16.20$ ,  $p < .01$ ). Furthermore, children in the lower exposure class spent significantly less time in care ( $M = 12.73$ ,  $SE = 8.25$ ) than children in the postnatal adversities class, ( $M = 19.58$ ,  $SE = 10.67$ ,  $p < .01$ ) and the multiple complex adversities class ( $M = 21.09$ ,  $SE = 11.35$ ,  $p < .01$ ). Post hoc analysis undertaken to explore the reasons for removal from care for children in the lower exposure class revealed that birth mothers of these children were more likely to have been through previous care proceedings compared to the postnatal risk class ( $p < .01$ ).

### **PTS Symptoms**

#### ***PTS symptoms prevalence***

Table 4 shows the percentages of children with trauma symptom scores (TSCYC) in the clinical, borderline and non-clinical range at W4. Nearly one in five (19%) children were in the clinical or borderline ranges for post-traumatic stress arousal. Smaller, but still considerable, percentages of children were in the clinical or borderline range for post-traumatic stress

## LATENT CLASS ANALYSIS OF PTS IN ADOPTED CHILDREN

avoidance (14%) and post-traumatic stress intrusion (8%). The range of children who displayed symptoms scoring within the clinically significant range for all subscales ranged from around 7% to 14%.

### ***Class Solution Latent Class Comparisons on PTS symptoms***

Class means and differences between classes on each distal outcome are presented in Table 5 for PTS scores. Omnibus  $\chi^2$  analyses revealed significant between classes on all traumatic stress subscale symptoms.

**Post-traumatic Stress-Intrusion.** The mean scores for PTS-Intrusion symptoms for class one 'postnatal risk' ( $M = 18.80$ ,  $SE = .46$ ,  $p < .05$ ) were significantly higher than both the lower exposure class (Class five;  $M = 14.41$ ,  $SE = 1.22$ ) and perinatal risk class (Class two;  $M = 15.89$ ,  $SE = 1.12$ ), indicating more symptoms of post-traumatic stress-intrusion present for the class characterized by neglect, maltreatment, witnessing domestic violence and moderate household dysfunction.

**Post-traumatic Stress-Avoidance.** The mean scores for PTS-avoidance symptoms for class three, the multiple complex risk class, characterized by high pre-natal *and* postnatal experience of parental substance misuse, neglect and moderate household dysfunction class ( $M = 12.33$ ,  $SE = .75$ ), were significantly higher than all other classes, except class two characterized by high perinatal adversity.

**Post-traumatic Stress-Arousal.** The mean scores for PTS-arousal symptoms were significantly higher for the multiple complex adversities class (Class 3;  $M = 13.21$ ,  $SE = 1.11$ ) than all other classes. In addition, the postnatal risk class characterized by a high probability of experiencing neglect, maltreatment, witnessing domestic violence and moderate household

dysfunction had significantly lower PTS arousal scores than the perinatal risk, multiple complex risk and lower exposure classes (Table 5).

### **Discussion**

In this study we identified subgroups of children based on commonalities in perinatal and postnatal adversity experienced prior to adoption and examined differences in PTS symptoms at 4-years post-placement between subgroups. Consistent with the literature (e.g. McSherry, 2007), neglect was the most prevalent form of maltreatment, with over half of all children adopted in [ANON. COUNTRY] in a 13-month period recorded as having experienced neglect, followed by verbal abuse, physical abuse, and a small percentage recorded as experiencing sexual abuse. These findings are consistent with studies which asked adoptive parents about their child's maltreatment (e.g. Neil et al., 2020) and used case file approaches (Kim, Wildeman, Jonson-Reid & Drake, 2017). In addition to maltreatment, around a third of our sample was exposed to domestic violence and/or a parent who abused drugs. Nearly a third of children experienced parental separation and one in five experienced parental incarceration. Almost one in five (18%) of the children in our sample had at least one parent with a learning difficulty, and around a quarter of the sample were recorded as having experienced pre-natal exposure to toxic substances, both lower than the proportions found by Neil and colleagues (2020). This discrepancy may result from our collecting information from social worker files prior to adoption rather than asking adoptive parents, who may not possess complete information. The issue of information being withheld or minimized prior to adoption has been highlighted previously (Lee, Kobulsky, Brodzinsky, & Barth, 2018).

## LATENT CLASS ANALYSIS OF PTS IN ADOPTED CHILDREN

To the best of our knowledge, there are no epidemiological studies of the prevalence of PTS symptoms in young children in the UK general population. A comprehensive epidemiological study based on participants from the Environmental Risk Longitudinal Twin Study ( $N = 2232$  children born in England and Wales in 1994–95; Lewis et al., 2019) estimated that 7-8% of young people experienced PTSD by age 18 years. Although our study investigated symptoms rather than a diagnosis of PTSD, we found that between 7 and 14% of children displayed symptoms scoring within the clinically significant range for all subscales, suggesting that our sample may have higher rates of PTS symptoms than the general population. However, given that all children in the sample were adopted from care, and had therefore experienced at least the loss of relationships with their birth family, and possibly also foster carers, and their wider cultural community, it is encouraging to note the absence of PTS symptomology in many instances.

The latent class analysis revealed five sub-groups, of which one group of children (class five) appeared to have experienced relatively lower exposure to our indices of early adversity (35% of the sample). All the children in this group were removed from their parents' care at birth. A significant amount of child protection activity in the UK involves assessments of risk to unborn or newborn children, and there is an increasing trend in the proportion of infants being cared for away from home (Broadhurst et al., 2018). The parents in this group were significantly more likely to have been through previous care proceedings and over two-thirds of the children in this group had older siblings removed from their parent's care. Past negative and tragic outcomes for young children has been highlighted by child protection social workers as a main reason for intervening early (Critchley, 2020). Biehal et al., (2018) found that in over two-thirds of cases where children were referred pre-birth, social workers concerns were borne out as the

## LATENT CLASS ANALYSIS OF PTS IN ADOPTED CHILDREN

children went on to experience abuse or neglect. Thus, we suggest that children in this group were likely to have been removed based on past harm in the family. A further group (class two: perinatal risk) was the smallest group and characterized by a high probability of perinatal risk factors only, including being born prematurely, a low birth weight, and pre-natal substance exposure. This group of children also spent very little time in the care of their birth parents, an average of just over one month.

The three other sub-groups were categorized by different combinations of pre-and postnatal adverse experiences, adding to the literature on the overlapping nature of maltreatment and adverse experiences (Flatley, 2016; Felitti et al., 1998; Hughes et al., 2017). Class three (multiple complex risk) was characterized by children who had high probabilities of experiencing both pre-natal and direct exposure to parental substance abuse, neglect, maltreatment and multiple types of household dysfunction, particularly witnessing domestic violence and parental separation. This group also spent the longest amount of time with their birth parents and in the care of the local authority. On first reading, the postnatal risk class (class one) appears similar to the multiple complex risk class but the postnatal risk class does not include pre-natal or postnatal exposure to substance abuse and has the highest probabilities of all types of abuse, neglect, and household dysfunction, particularly witnessing domestic violence. The children in this group spent an average of 17 months in the care of their birth parents and 20 months in care. The co-occurrence of neglect, maltreatment (particularly verbal abuse) and domestic violence concurs with previous studies (O'Leary, Slep & O'Leary, 2000; Warmingham et al., 2019). Furr, Comer, Villodas, Poznanski & Gurwitch, (2018) state that in cases of child maltreatment and domestic violence, an ongoing threat from a perpetrator exists, which may be accompanied by other stressors, including adult mental illness.

## LATENT CLASS ANALYSIS OF PTS IN ADOPTED CHILDREN

Finally, the parental difficulties class had low probabilities of experiencing any perinatal risks, some risk of physical abuse, high probabilities of neglect and the highest probabilities of the parent having learning difficulties. The high probability of neglectful, rather than abusive, parenting in this group reflects previous findings (Tymchuk, Andron & Tymchuk, 1990) and may be congruent with the idea of ‘unintentional neglect’, referring to acts of omission by the parent, due to an inability to recognize their child's needs (Crain & Millor, 1978) that results from reduced/impaired cognitive functioning (Sheerin, 1998). The children in this group spent an average of 20 months in the care of their birth parents and 18 months in care.

As anticipated, different patterns of adversities between sub-groups seemed to have repercussions for PTS symptoms later in childhood. For PTS intrusion symptoms, which includes nightmares, flashbacks, fear in response to trauma-reminiscent events, and being upset by traumatic memories, the postnatal risk class (class one) had significantly higher scores than the other sub-groups. This may be because this group had the highest probabilities of all types of abuse, neglect, and household dysfunction, particularly witnessing domestic violence. In considering the PTSD definition that events must expose the child to death or threatened death, actual or threatened serious physical injury, or to another person (parent) that one witnesses first-hand, it follows that the experiences of this group may be more likely to result in PTS symptoms, in line with previous literature (Carrion et al., 2001; De Bellis & Zisk, 2014).

The multiple complex risk class (class three) had significantly higher scores than any other sub-groups for PTS avoidance symptoms, which includes emotional numbing, as well as PTS arousal symptoms such as jumpiness, tension, attention and concentration and sleep problems. This group experienced a combination of pre-natal substance exposure and the neglectful and abusive parenting context related to parental substance addiction, as well as

multiple types of household dysfunction, particularly witnessing domestic violence. There is clear evidence that both perinatal (Pluess & Belsky, 2011) and postnatal factors (Felitti et al., 1998) are associated with later psychopathology. The combination of both may put the child at an even higher risk for psychopathology due to altering the development of regulatory systems (such as arousal, attentive and inhibitory control; Parolin, Simonelli, Mapelli, Sacco, & Cristofalo, 2016), physiology, behavioural control and executive functions (Woon & Hedges, 2008; Cook, Blaustein, Spinazzolla, & Van der Kolk, 2003).

### **Strengths and Limitations**

Despite the growing number of studies using an ‘ACE approach’ to measuring adversity, it has been criticized for a reliance on retrospective adult reports and for encompassing only a limited range of issues (Kelly-Irving & Delpierre, 2019). Furthermore, most studies assessing early adversity in adopted samples have relied upon adoptive parent’s information about their child’s pre-adoptive history. We used a different approach by availing of social worker reports of the children’s pre-adoption experiences. As information was derived from independent reports, we believe it to be accurate, though reports will inevitably miss some information about a child’s life (Farmer & Dance, 2016) and some events such as sexual abuse may only be divulged at an older age (London, Bruck, Wright, & Ceci, 2008). This study used a prospective, longitudinal design, adding to the relatively few such studies that have investigated the psychological consequences of child abuse across time (Greenfield, 2010).

Although sizable for a study of children adopted from foster care, the sample size was small, especially for our investigation of differences in child PTS symptoms across classes, with some groups containing less than five children. Therefore, caution must be exercised in interpreting results. We were limited to the use of parent reports of child PTS symptoms due to

## LATENT CLASS ANALYSIS OF PTS IN ADOPTED CHILDREN

the young age of the children, which precluded using child reports of difficulties; this is an important measurement issue (Kassam-Adams, Garcia-Espana, Miller, & Winston, 2006) which should be addressed in future research. Although our approach accounts for many pre-adoptive risks, we could not index child experiences whilst in the care of the local authority, including the loss of relationships with their birth family, foster carers, their home and their possessions, or account for the adoption itself. Furthermore, we could not account for wider structural issues in society (such as living in poverty, or with community violence), or post-adoptive experiences (such as bullying) (Houtepen, Heron, Suderman, Tilling, & Howe, 2018).

This study had a specific aim to understand the association between different patterns of childhood adversity and trauma symptoms, which may reflect an overly pessimistic view of post-adoption outcomes. Although our results show an association between patterns of adversity and PTS symptoms, it is important to note that most children do not go on to develop PTSD, supporting the view that, “one is not doomed to a poor developmental outcome as a function of early adversity” (Biglan, Van Ryzin, & Hawkins, 2017, p. 2). Future work should be undertaken to explore factors that may promote resilience in children, such as adoptive parent characteristics and parenting practices, the efficacy of different forms of intervention, and school factors (Masten & Reed, 2002). Previous studies have shown that mental health service use (Bethell, Gombojav, Solloway, & Wissow, 2016) and parental warmth (AUTHORS, 2019; 2020; Zvara, Sheppard, & Cox, 2018) can function protectively and improve child wellbeing associated with early adversity.

### **Conclusion**

This study demonstrates that person-centered analytic methods can be used to identify distinct sub-groups of children with differing patterns of adversity. Our findings offer insight into



## LATENT CLASS ANALYSIS OF PTS IN ADOPTED CHILDREN

the often co-occurring and complex nature of perinatal and postnatal exposure to adversity experienced by children placed for adoption in the UK. Given the prevalence and complexity in PTS symptom profiles among children in this study, we highlight the need for evidence-based trauma-informed pre-adoption services (e.g., Lotty, Dunn-Galvin, & Bantry-White, 2020) and continuity of interventions from an adequately resourced professional network to meet the needs of children with respect to their mental health post-adoption (Grotevant, Lo, Fiorenzo, & Dunbar, 2017). This study highlights the social conditions in which families live and the adversities that some children placed for adoption in the UK have experienced. Findings also highlight the salience of neglect and parental learning difficulties as a contributory issue to children being placed for adoption; thus, the provision of appropriate supports may mitigate the risk of harm. A recent review shows that trauma-informed child welfare services have the potential to improve the mental and emotional well-being of children served by community-based child welfare services (Bunting et al., 2019). Our findings support an urgent need to recognize and address the needs of children adopted from care to enable successful adaptation to early adversity.

**References**

- Akaike, H. (1987). Factor analysis and AIC. *Psychometrika*, *52*(3), 317–332.  
<https://doi.org/10.1007/BF02294359>
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders (DSM-5®)*. American Psychiatric Pub.
- Armour, C., Elklit, A., & Christoffersen, M. N. (2014). A latent class analysis of childhood maltreatment: Identifying abuse typologies. *Journal of Loss and Trauma*, *19*(1), 23-39.
- Asparouhov, T., & Muthén, B. (2013). Appendices for auxiliary variables in mixture modeling: 3-step approaches using Mplus. MPlus user's guide.
- Asparouhov, T., & Muthén, B. (2014). Auxiliary variables in mixture modeling: Using the BCH method in Mplus to estimate a distal outcome model and an arbitrary secondary model. *Mplus Web Notes*, *21*(2), 1-22.
- Bakk, Z., Tekle, F. B., & Vermunt, J. K. (2013). Estimating the association between latent class membership and external variables using bias-adjusted three-step approaches. *Sociological Methodology*, *43*(1), 272-311.
- Berlin, M., Vinnerljung, B., & Hjern, A. (2011). School performance in primary school and psychosocial problems in young adulthood among care leavers from long term foster care. *Children and Youth Services Review*, *33*(12), 2489-2497.
- Bethell, C., Gombojav, N., Solloway, M., & Wissow, L. (2016). Adverse childhood experiences, resilience and mindfulness-based approaches: common denominator issues for children with emotional, mental, or behavioral problems. *Child and Adolescent Psychiatric Clinics*, *25*(2), 139-156.

## LATENT CLASS ANALYSIS OF PTS IN ADOPTED CHILDREN

- Biehal, N., Baldwin, H., Cusworth, L., Wade, J., & Allgar, V. (2018). In-home support or out of home care? Thresholds for intervention with abused and neglected children. *Children and Youth Services Review, 89*, 263-271.
- Biglan, A., Van Ryzin, M. J., & Hawkins, J. D. (2017). Evolving a more nurturing society to prevent adverse childhood experiences. *Academic Pediatrics, 17*(7), S150-S157.
- Bolger, K. E., & Patterson, C. J. (2001). Developmental pathways from child maltreatment to peer rejection. *Child Development, 72*(2), 549-568.
- Bolck, A., Croon, M., & Hagenaars, J. (2004). Estimating latent structure models with categorical variables: One-step versus three-step estimators. *Political Analysis, 12*(1), 3-27.
- Briere, J., Johnson, K., Bissada, A., Damon, L., Crouch, J., Gil, E., Hanson, R., & Ernst, V. (2001). The trauma symptom checklist for young children (TSCYC): Reliability and association with abuse exposure in a multi-site study. *Child Abuse & Neglect, 25*(8), 1001–1014. [https://doi.org/10.1016/S0145-2134\(01\)00253-8](https://doi.org/10.1016/S0145-2134(01)00253-8)
- Briere, J. (2005). Trauma symptom checklist for young children (TSCYC). Odessa, FL: *Psychological Assessment Resources*.
- Broadhurst, K., Alrouh, B., Mason, C., Ward, H., Holmes, L., Ryan, M., & Bowyer, S. (2018). *Born into care Newborns in care proceedings in England*. London: Nuffield Family Justice Observatory for England and Wales.
- Brown, A., Waters, C. S., & Shelton, K. H. (2017). A systematic review of the school performance and behavioural and emotional adjustments of children adopted from care. *Adoption & Fostering, 41*(4), 346-368.

## LATENT CLASS ANALYSIS OF PTS IN ADOPTED CHILDREN

Bunting, L., Montgomery, L., Mooney, S., MacDonald, M., Coulter, S., Hayes, D., & Davidson, G. (2019). Trauma informed child welfare systems—A rapid evidence review.

*International Journal of Environmental Research and Public Health*, *16*(13), 2365.

Carrion, V. G., Weems, C. F., Eliez, S., Patwardhan, A., Brown, W., Ray, R. D., & Reiss, A. L. (2001). Attenuation of frontal asymmetry in pediatric posttraumatic stress disorder. *Biological Psychiatry*, *50*(12), 943-951.

Celeux, G., & Soromenho, G. (1996). An entropy criterion for assessing the number of clusters in a mixture model. *Journal of Classification*, *13*(2), 195-212.

Cicchetti, D. (2010). Resilience under conditions of extreme stress: a multilevel perspective. *World Psychiatry*, *9*(3), 145-154.

Cook, A., Blaustein, M., Spinazzola, J., & Van der Kolk, B. (2003). Complex trauma in children and adolescents: White paper from the national child traumatic stress network complex trauma task force. Los Angeles: National Center for Child Traumatic Stress.

Crain, L. S., & Millor, G. K. (1978). Forgotten children: Maltreated children of mentally retarded parents. *Pediatrics*, *61*(1), 130-132.

Critchley, A. (2020). 'The lion's den': Social workers' understandings of risk to infants. *Child & Family Social Work*.

De Bellis, M. D., & Zisk, A. (2014). The biological effects of childhood trauma. *Child and Adolescent Psychiatric Clinics*, *23*(2), 185-222.

Debowska, A., Willmott, D., Boduszek, D., & Jones, A. D. (2017). What do we know about child abuse and neglect patterns of co-occurrence? A systematic review of profiling studies and recommendations for future research. *Child Abuse & Neglect*, *70*, 100-111.

Doughty, J. (2015). 'Where nothing else will do': judicial approaches to adoption in England and

## LATENT CLASS ANALYSIS OF PTS IN ADOPTED CHILDREN

- Wales. *Adoption & Fostering*, 39(2), 105-118.
- Dovran, A., Winje, D., Arefjord, K., & Haugland, B. S. (2012). Traumatic events and posttraumatic reactions among children and adolescents in out-of-home placement: A 25-year systematic literature review. *Journal of Child & Adolescent Trauma*, 5(1), 16-32.
- Farmer, E., & Dance, C. (2016). Family finding and matching in adoption: What helps to make a good match? *The British Journal of Social Work*, 46(4), 974-992.
- Felitti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A. M., Edwards, V., & Marks, J. S. (1998). Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults: The Adverse Childhood Experiences (ACE) Study. *American Journal of Preventive Medicine*, 14(4), 245-258.
- Flatley, J. (2016). Abuse during childhood: Findings from the crime survey for England and Wales, year ending March 2016. Office for National Statistics. Retrieved December, 21, 2016.
- Furr, J. M., Comer, J. S., Villodas, M. T., Poznanski, B., & Gurwitch, R. (2018). Trauma and child psychopathology: From risk and resilience to evidence-based intervention.
- Goldman, G. D., & Ryan, S. D. (2011). Direct and modifying influences of selected risk factors on children's pre-adoption functioning and post-adoption adjustment. *Children and Youth Services Review*, 33(2), 291-300.
- Greenfield, E. A. (2010). Child abuse as a life-course social determinant of adult health. *Maturitas*, 66(1), 51-55.
- Grotevant, H. D., Lo, A. Y., Fiorenza, L., & Dunbar, N. D. (2017). Adoptive identity and adjustment from adolescence to emerging adulthood: A person-centered approach. *Developmental Psychology*, 53(11), 2195.

## LATENT CLASS ANALYSIS OF PTS IN ADOPTED CHILDREN

- Hannon, C., Wood, C., & Bazalgette, L. (2010). In Loco parentis. London, Demos. Retrieved from [http://www.demos.co.uk/files/In\\_Loco\\_Parentis\\_-\\_web.pdf?1277484312](http://www.demos.co.uk/files/In_Loco_Parentis_-_web.pdf?1277484312)
- Hiller, R. M., Creswell, C., Meiser-Stedman, R., Lobo, S., Cowdrey, F., Lyttle, M. D., Ehlers, A., & Halligan, S. L. (2019). A Longitudinal Examination of the Relationship between Trauma-Related Cognitive Factors and Internalising and Externalising Psychopathology in Physically Injured Children. *Journal of abnormal child psychology*, 47(4), 683–693. <https://doi.org/10.1007/s10802-018-0477-8>
- Hornfeck, F., Bovenschen, I., Heene, S., Zimmermann, J., Zwönitzer, A., & Kindler, H. (2019). Emotional and behavior problems in adopted children—The role of early adversities and adoptive parents’ regulation and behavior. *Child Abuse & Neglect*, 98, 104221.
- Houtepen, L. C., Heron, J., Suderman, M. J., Tilling, K., & Howe, L. D. (2018). Adverse childhood experiences in the children of the Avon Longitudinal Study of Parents and Children (ALSPAC). Wellcome open research, 3.
- Hughes, K., Bellis, M. A., Hardcastle, K. A., Sethi, D., Butchart, A., Mikton, C., Jones, L., & Dunne, M. P. (2017). The effect of multiple adverse childhood experiences on health: a systematic review and meta-analysis. *The Lancet. Public health*, 2(8), e356–e366. [https://doi.org/10.1016/S2468-2667\(17\)30118-4](https://doi.org/10.1016/S2468-2667(17)30118-4)
- Juffer, F., & Van Ijzendoorn, M. H. (2005). Behavior problems and mental health referrals of international adoptees: A meta-analysis. *JAMA*, 293(20), 2501-2515.
- Kassam-Adams, N., Garcia-Espana, J. F., Miller, V. A., & Winston, F. (2006). Parent-child agreement regarding children's acute stress: the role of parent acute stress reactions. *Journal of the American Academy of Child & Adolescent Psychiatry*, 45(12), 1485-1493.

## LATENT CLASS ANALYSIS OF PTS IN ADOPTED CHILDREN

Keller, T. E., Cusick, G. R., & Courtney, M. E. (2007). Approaching the transition to adulthood:

Distinctive profiles of adolescents aging out of the child welfare system. *Social service review, 81*(3), 453-484.

Kelly-Irving, M., & Delpierre, C. (2019). A critique of the adverse childhood experiences

framework in epidemiology and public health: uses and misuses. *Social Policy and Society, 18*(3), 445-456.

Kim, H., Wildeman, C., Jonson-Reid, M., & Drake, B. (2017). Lifetime prevalence of

investigating child maltreatment among US children. *American Journal of Public Health, 107*(2), 274-280.

Lacey, R. E., & Minnis, H. (2020). Practitioner Review: Twenty years of research with adverse

childhood experience scores—Advantages, disadvantages and applications to practice. *Journal of Child Psychology and Psychiatry, 61*(2), 116-130.

Lee, B. R., Kobulsky, J. M., Brodzinsky, D., & Barth, R. P. (2018). Parent perspectives on

adoption preparation: Findings from the Modern Adoptive Families project. *Children and Youth Services Review, 85*, 63-71.

Lee, B. R., Wyman Battalen, A., Brodzinsky, D. M., & Goldberg, A. E. (2020). Parent, Child,

and Adoption Characteristics Associated with Post-Adoption Support Needs. *Social Work Research, 44*(1), 21

Lewis, S. J., Arseneault, L., Caspi, A., Fisher, H. L., Matthews, T., Moffitt, T. E., Odgers, C. L.,

Stahl, D., Teng, J. Y., & Danese, A. (2019). The epidemiology of trauma and post-traumatic stress disorder in a representative cohort of young people in England and

Wales. *The Lancet. Psychiatry, 6*(3), 247-256. [https://doi.org/10.1016/S2215-0366\(19\)30031-8](https://doi.org/10.1016/S2215-0366(19)30031-8)

## LATENT CLASS ANALYSIS OF PTS IN ADOPTED CHILDREN

- Little, T. D. (Ed.). (2013). *The Oxford Handbook of Quantitative Methods in Psychology: Vol. 2: Statistical Analysis (Vol. 2)*. Oxford University Press.
- London, K., Bruck, M., Wright, D. B., & Ceci, S. J. (2008). Review of the contemporary literature on how children report sexual abuse to others: Findings, methodological issues, and implications for forensic interviewers. *Memory, 16*(1), 29-47.
- Lotty, M., Dunn-Galvin, A., & Bantry-White, E. (2020). Effectiveness of a trauma-informed care psychoeducational program for foster carers—Evaluation of the Fostering Connections Program. *Child Abuse & Neglect, 102*, 104390.
- Luthar, S. S., & Cicchetti, D. (2000). The construct of resilience: Implications for interventions and social policies. *Development and Psychopathology, 12*(4), 857-885.
- Masten, A. S., Best, K. M., & Garmezy, N. (1990). Resilience and development: Contributions from the study of children who overcome adversity. *Development and Psychopathology, 2*(4), 425-444.
- Masten, A. S., & Reed, M. G. J. (2002). Resilience in development. In: Snyder CR, Lopez SJ, editors. *Handbook of positive psychology*. Oxford University Press; New York: pp. 74–88.
- Masyn, K. (2013). Latent class analysis and finite mixture modeling, in: Little, T. (Ed.), *The Oxford Handbook of Quantitative Methods: Vol. 2. Statistical Analysis*. Oxford University Press, New York, pp. 551–611.
- McGhee, J., Bunting, L., McCartan, C., Elliott, M., Bywaters, P. and Featherstone, B. (2017) ‘Looking after children in the UK—convergence or divergence?’. *The British Journal Social Work, bcx103*, <https://doi.org/10.1093/bjsw/bcx103>.
- McLaughlin, K. A., Koenen, K. C., Bromet, E. J., Karam, E. G., Liu, H., Petukhova, M., Ruscio, A. M., Sampson, N. A., Stein, D. J., Aguilar-Gaxiola, S., Alonso, J., Borges, G.,



## LATENT CLASS ANALYSIS OF PTS IN ADOPTED CHILDREN

- Demyttenaere, K., Dinolova, R. V., Ferry, F., Florescu, S., de Girolamo, G., Gureje, O., Kawakami, N., . . . Kessler, R. C. (2017). Childhood adversities and post-traumatic stress disorder: Evidence for stress sensitisation in the World Mental Health Surveys. *The British Journal of Psychiatry*, *211*(5), 280–288.  
<https://doi.org/10.1192/bjp.bp.116.197640>
- McSherry, D. (2007). Understanding and addressing the “neglect of neglect”: Why are we making a mole-hill out of a mountain. *Child Abuse & Neglect*, *31*(6), 607-614.
- McSherry, D., Malet, M. F., & Weatherall, K. (2016). Comparing long-term placements for young children in care: Does placement type really matter?. *Children and Youth Services Review*, *69*, 56-66.
- Melendez-Torres, G. J., Bourne, A., Reid, D., Hickson, F., Bonell, C., & Weatherburn, P. (2018). Typology of drug use in United Kingdom men who have sex with men and associations with socio-sexual characteristics. *International Journal of Drug Policy*, *55*, 159-164.
- Muthén, L. K., & Muthén, B. O. (2017). 1998–2017. Mplus user’s guide. Los Angeles, CA: Muthén & Muthén.
- Neil, E., Morciano, M., Young, J., & Hartley, L. (2020). Exploring links between early adversities and later outcomes for children adopted from care: Implications for planning post adoption support. *Developmental Child Welfare*, *2*(1), 52-71.
- Nylund, K. L., Asparouhov, T., & Muthén, B. O. (2007). Deciding on the number of classes in latent class analysis and growth mixture modeling: A Monte Carlo simulation study. *Structural Equation Modeling: A Multidisciplinary Journal*, *14*(4), 535-569.
- O’Leary, K. D., Slep, A. M. S., & O’leary, S. G. (2000). Co-occurrence of partner and parent aggression: Research and treatment implications. *Behavior Therapy*, *31*(4), 631-648.

## LATENT CLASS ANALYSIS OF PTS IN ADOPTED CHILDREN

Office for National Statistics. Gross Household Income, UK, Financial Year Ending. 2018.

Available

online: <https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/incomeandwealth/adhocs/009772grosshouseholdincomeukfinancialyearending2018> (accessed on 21 February 2019).

Oh, D. L., Jerman, P., Marques, S. S., Koita, K., Boparai, S. K. P., Harris, N. B., & Bucci, M. (2018). Systematic review of pediatric health outcomes associated with childhood adversity. *BMC Pediatrics*, *18*(1), 83.

Parolin, M., Simonelli, A., Mapelli, D., Sacco, M., & Cristofalo, P. (2016). Parental Substance Abuse As an Early Traumatic Event. Preliminary Findings on Neuropsychological and Personality Functioning in Young Drug Addicts Exposed to Drugs Early. *Frontiers in psychology*, *7*, 887. <https://doi.org/10.3389/fpsyg.2016.00887>

Pears, K. C., Kim, H. K., & Fisher, P. A. (2008). Psychosocial and cognitive functioning of children with specific profiles of maltreatment. *Child Abuse & Neglect*, *32*(10), 958-971.

Pecora, P. J., White, C. R., Jackson, L. J., & Wiggins, T. (2009). Mental health of current and former recipients of foster care: A review of recent studies in the USA. *Child & Family Social Work*, *14*(2), 132–146. <https://doi.org/10.1111/j.1365-2206.2009.00618.x>

Petrenko, C. L., Friend, A., Garrido, E. F., Taussig, H. N., & Culhane, S. E. (2012). Does subtype matter? Assessing the effects of maltreatment on functioning in preadolescent youth in out-of-home care. *Child Abuse & Neglect*, *36*(9), 633-644.

Pluess, M., & Belsky, J. (2011). Prenatal programming of postnatal plasticity? *Development and Psychopathology*, *23*(1), 29-38.

## LATENT CLASS ANALYSIS OF PTS IN ADOPTED CHILDREN

- Rebbe, R., Nurius, P. S., Ahrens, K. R., & Courtney, M. E. (2017). Adverse childhood experiences among youth aging out of foster care: A latent class analysis. *Children and youth services review, 74*, 108-116.
- Rutter M. (1979). Maternal deprivation, 1972-1978: new findings, new concepts, new approaches. *Child development, 50*(2), 283–305.
- Rutter, M. (1985). Resilience in the face of adversity: Protective factors and resistance to psychiatric disorder. *The British Journal of Psychiatry, 147*(6), 598-611.
- Sclove, S. L. (1987). Application of model-selection criteria to some problems in multivariate analysis. *Psychometrika, 52*(3), 333-343.
- Selwyn, J., Meakings, S., & Wijedasa, D. (2015). Beyond the adoption order. *Challenges, interventions and adoption disruption*.
- Sheerin, F. (1998). Parents with learning disabilities: A review of the literature. *Journal of Advanced Nursing, 28*(1), 126-133.
- Spss, I. I. B. M. (2011). IBM SPSS statistics for Windows, version 20.0. New York: IBM Corp, 440.
- Suurland, J., van der Heijden, K. B., Huijbregts, S. C. J., Van Goozen, S. H. M., & Swaab, H. (2018). Infant parasympathetic and sympathetic activity during baseline, stress and recovery: Interactions with prenatal adversity predict physical aggression in toddlerhood. *Journal of Abnormal Child Psychology, 46*(4), 755-768.
- Trotter, F. (2017). Pathologizing Trauma: A Discourse Analysis of Diagnosis in Adoption (Doctoral dissertation, City University of Seattle).

## LATENT CLASS ANALYSIS OF PTS IN ADOPTED CHILDREN

- Tymchuk, A. J., Andron, L., & Tymchuk, M. (1990). Training mothers with mental handicaps to understand behavioural and developmental principles. *Mental Handicap Research*, 3(1), 51-59.
- Tung, I, Christian-Brandt, AS, Langley, AK, Waterman, JM. Developmental outcomes of infants adopted from foster care: Predictive associations from perinatal and preplacement risk factors. *Infancy*. 2020; 25: 84– 109. <https://doi.org/10.1111/infa.12319>
- Vanderbilt, D., & Gleason, M. M. (2010). Mental health concerns of the premature infant through the lifespan. *Child and Adolescent Psychiatric Clinics*, 19(2), 211-228.
- Wang, M. C., Deng, Q., Bi, X., Ye, H., & Yang, W. (2017). Performance of the entropy as an index of classification accuracy in latent profile analysis: A Monte Carlo simulation study. *Acta Psychologica Sinica*, 49(11), 1473-1482.
- Warmingham, J. M., Handley, E. D., Rogosch, F. A., Manly, J. T., & Cicchetti, D. (2019). Identifying maltreatment subgroups with patterns of maltreatment subtype and chronicity: A latent class analysis approach. *Child Abuse & Neglect*, 87, 28-39.
- Westermair, A. L., Stoll, A. M., Greggersen, W., Kahl, K. G., Hüppe, M., & Schweiger, U. (2018). All Unhappy Childhoods Are Unhappy in Their Own Way-Differential Impact of Dimensions of Adverse Childhood Experiences on Adult Mental Health and Health Behavior. *Frontiers in psychiatry*, 9, 198. <https://doi.org/10.3389/fpsy.2018.00198>
- Wherry, J. N., Graves, L. E., & Rhodes King, H. M. (2008). The convergent validity of the trauma symptom checklist for young children for a sample of sexually abused outpatients. *Journal of Child Sexual Abuse*, 17(1), 38-50.

## LATENT CLASS ANALYSIS OF PTS IN ADOPTED CHILDREN

Woon, F. L., & Hedges, D. W. (2008). Hippocampal and amygdala volumes in children and adults with childhood maltreatment-related posttraumatic stress disorder: a meta-analysis.

*Hippocampus*, 18(8), 729–736. <https://doi.org/10.1002/hipo.20437>

Zammit, S., Thomas, K., Thompson, A., Horwood, J., Menezes, P., Gunnell, D., . . . Harrison, G.

(2009). Maternal tobacco, cannabis and alcohol use during pregnancy and risk of adolescent psychotic symptoms in offspring. *British Journal of Psychiatry*, 195(4), 294-300. doi:10.1192/bjp.bp.108.062471

Zvara, B. J., Sheppard, K. W., & Cox, M. (2018). Bidirectional effects between parenting sensitivity and child behavior: A cross-lagged analysis across middle childhood and adolescence.

*Journal of Family Psychology*, 32(4), 484.

## Tables

Table 1

*Child adversity in the social worker records and longitudinal sample at W4*

		Social worker records sample % (n) (n = 374)	Longitudinal sample % (n) (n = 58)
<i>Pre-adoptive adversity</i>			
Perinatal risk	Low birth weight	9 (34)	7 (4)
	Pre-natal drug exposure	28 (104)	26 (15)
	Pre-natal alcohol exposure	25 (93)	26 (15)
	Prematurity	10 (39)	10 (6)
Child abuse and neglect	Verbal abuse	23 (85)	24 (14)
	Physical abuse	19 (70)	24 (14)
	Sexual abuse	4 (14)	7 (4)
	Neglect	54 (203)	57 (33)
Household dysfunction	Domestic violence	37 (138)	41 (24)
	Parent with mental health problems	32 (118)	38 (22)
	Parent with drug addiction	34 (126)	33 (19)
	Parent with alcohol addiction	26 (96)	24 (14)
	Incarcerated parent	20 (74)	22 (13)
	Separated parents	30 (113)	26 (15)
	Parent with learning difficulties	18 (68)	26 (15)

LATENT CLASS ANALYSIS OF PTS IN ADOPTED CHILDREN

Table 2

*Fit statistics for the unconditional class analysis for 2 – 6 classes*

	2-class	3-class	4-class	<b>5-class</b>	6-class
AIC	4694.82	4573.33	4510.71	<b>4474.33</b>	4442.80
sBIC	4718.12	4608.65	4558.05	<b>4533.70</b>	4514.19
Proportions	45% (n=167)	42% (n=156)	14% (n=54)	<b>8% (n=31)</b>	11% (n=41)
	55% (n=207)	44% (n=44)	41% (n=154)	<b>14% (n=54)</b>	6% (n=22)
		14% (n=54)	6% (n=23)	<b>36% (n=135)</b>	34% (n=125)
			38% (n=143)	<b>6% (n=22)</b>	6% (n=21)
				<b>35% (n=132)</b>	35% (n=132)
					9% (n=33)
Entropy	0.98	0.99	0.98	<b>0.96</b>	0.95
Classification	99%	99%	100%	<b>93%</b>	99%
accuracy*	99%	99%	99%	<b>100%</b>	96%
		100%	95%	<b>98%</b>	97%
			99%	<b>96%</b>	94%
				<b>98%</b>	98%
					93%
BLRT p-value	0.00	0.00	0.00	<b>0.04</b>	~1.00

*Note* \*Average latent class probabilities for most likely latent class membership

LATENT CLASS ANALYSIS OF PTS IN ADOPTED CHILDREN

Table 3

*Item response probabilities and class membership proportions for 5-class solution*

	<b>Class 1:</b> Postnatal risk	<b>Class 2:</b> Perinatal risk	<b>Class 3:</b> Multiple complex risk	<b>Class 4:</b> Parental difficulties	<b>Class 5:</b> Lower exposure
Low birth weight	<b>0.04</b>	<b>0.97</b>	<b>0.09</b>	<b>0.00</b>	<b>0.02</b>
Pre-natal drug exposure	<b>0.00</b>	0.64	<b>1.00</b>	<b>0.00</b>	<b>0.28</b>
Pre-natal alcohol exposure	<b>0.13</b>	0.44	0.63	<b>0.00</b>	<b>0.24</b>
Prematurity	<b>0.07</b>	<b>0.91</b>	<b>0.13</b>	<b>0.00</b>	<b>0.03</b>
Verbal abuse	0.50	<b>0.00</b>	0.33	<b>0.01</b>	<b>0.00</b>
Physical abuse	0.32	<b>0.00</b>	<b>0.30</b>	0.30	<b>0.00</b>
Sexual abuse	<b>0.08</b>	<b>0.00</b>	<b>0.00</b>	<b>0.08</b>	<b>0.00</b>
Neglect	<b>0.95</b>	<b>0.00</b>	<b>0.96</b>	0.69	<b>0.00</b>
Domestic violence	<b>0.76</b>	<b>0.05</b>	0.65	<b>0.01</b>	<b>0.00</b>
Parent with mental health problems	0.57	<b>0.00</b>	0.65	<b>0.16</b>	<b>0.00</b>
Parent with drug addiction	0.49	<b>0.00</b>	0.54	<b>0.00</b>	<b>0.00</b>
Parent with alcohol addiction	0.49	<b>0.00</b>	<b>1.00</b>	<b>0.19</b>	<b>0.00</b>
Incarcerated parent	0.34	<b>0.00</b>	0.48	<b>0.06</b>	<b>0.00</b>
Separated parents	0.62	<b>0.00</b>	0.46	<b>0.14</b>	<b>0.00</b>
Parent with learning difficulties	0.32	<b>0.00</b>	<b>0.19</b>	0.47	<b>0.00</b>
Class proportion	8% (n=31)	14% (n=54)	36% (n=135)	6% (n=22)	35% (n=132)

*Note.* The bolded items reflect good homogeneity e.g. <.03 or >.07 (Little, 2013)



LATENT CLASS ANALYSIS OF PTS IN ADOPTED CHILDREN

Table 4

*Prevalence of post-traumatic stress symptoms (n = 67)*

	Raw scores ( <i>M, SD</i> )	Non-clinical ( <i>N, %</i> )	Borderline ( <i>N, %</i> )	Clinical ( <i>N, %</i> )
PTS Intrusion	11.18 (3.69)	59 (88)	1 (2)	7 (10)
PTS Avoidance	11.33 (4.48)	53 (79)	7 (10)	7 (10)
PTS Arousal	15.24 (5.89)	48 (72)	5 (8)	14 (21)

LATENT CLASS ANALYSIS OF PTS IN ADOPTED CHILDREN

Table 5

*Overall Significance Tests for Mean and Pairwise Differences on Child PTS Symptoms*

	Class 1: Postnatal risk <i>n</i> = 6	Class 2: Perinatal risk <i>n</i> = 9	Class 3: Multiple complex risk <i>n</i> = 21	Class 4: Parental difficulties <i>n</i> = 2	Class 5: Lower exposure <i>n</i> = 21	$\chi^2$ Omnibus Test	Mean Pairwise Differences significant at <i>p</i> < .05
Months spent in care of birth parents	16.88 (16.06)	1.43 (5.00)	24.82 (18.60)	19.50 (16.20)	.06 (0.46)	62.18 (<.01)	2, 5 < 1, 3, 4
Months spent in care	19.58 (10.67)	16.82 (11.43)	21.09 (11.35)	16.24 (12.35)	12.73 (8.25)	10.17 (<.01)	5 < 1, 3
PTS Intrusion	18.80 (0.46)	15.89 (1.12)	17.25 (1.67)	16.42 (2.58)	14.41 (1.22)	14.06 (<.01)	1 > 5, 2
PTS Avoidance	10.01 (0.02)	10.56 (0.71)	12.33 (0.75)	9.95 (0.34)	9.81 (0.19)	11.69 (<.05)	3 > 1, 4, 5
PTS Arousal	8.96 (0.04)	10.33 (0.69)	13.21 (1.11)	9.49 (0.87)	9.53 (0.26)	23.60 (<.01)	1 < 2, 3, 5 3 > all

*Note.* Figures shown as Mean (SD) unless otherwise stated.